Horizon 2020 Societal challenge 5
Climate action, environment, resource
Efficiency and raw materials

SIM4NEXUS
D2.2
Nexus-relevant policies in the transboundary, national and regional case studies
Main Report

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Executive summary

This report provides a synthesis and an analysis of the policy assessments conducted by the case studies of the SIM4NEXUS project. The case studies include**:**

- two transboundary cases: Germany-Czech Republic-Slovakia and Germany-France (Upper Rhine basin);
- five national cases: Azerbaijan, Greece, Latvia, The Netherlands, Sweden;
- three regional cases: Andalusia, Sardinia, South-West England.

In accordance with the grant agreement, this report provides:

1) an overview of nexus-relevant policies relevant to the transboundary, national and regional SIM4NEXUS case studies (section 2.4);
2) an analysis of how global and European policy goals and targets are translated to lower governance levels and how policies are implemented (chapter 3);
3) an analysis of synergies, conflicts and related trade-offs between policies in the implementation phase, gathered through bottom up methodology (chapter 4);
4) an overview of solutions found to address trade-offs and exploit synergies, from an institutional and governance perspective (chapter 5).

Nexus issues investigated by the case studies
The cases cover all water-land-energy-food and agriculture-climate (WLEFC) nexus sectors and in addition forestry, economy with a focus on tourism, and environment especially in relation to biodiversity conservation. Azerbaijan, Latvia, Sweden and the Netherlands focus on pursuing a low carbon economy. Greece and Sardinia take an interest in efficient use of water and energy for tourism and agriculture as these are two main components of their economy. The other regional cases share an interest in water, energy and agriculture. As for the transboundary cases, they are clustered around the theme of water, with a focus on its relation to land use in the case of Czech Republic-Slovakia-Germany and on biodiversity conservation in the Upper Rhine River basin in the case of Germany-France.

Policy coherence analysis
The cases selected policy documents for their area and made an overview of policy objectives and instruments that are relevant for their research focus. The national case studies analysed how these objectives are related to international multilateral agreements and to European policies. The regional cases investigated the relation between national and regional policies, Germany-France case looked at transboundary policies. All the cases also analysed horizontal coherence between policies of different sectors, analysing policy documents and consulting stakeholders to learn about coherence issues in practice.

Vertical policy coherence: from global to national policies

The national case studies that assessed the integration of global policies into national ones are Greece, Latvia, The Netherlands and Czech Republic as part of the transboundary DE-CZ-SK case.

Greece, Latvia, The Netherlands and the Czech Republic reported the full integration of the UNFCCC climate agreements into their national policies. Greece also found that the International Convention on plant genetic resources for food and agriculture is fully integrated in the country's legislation. The Dutch case study reported the full integration of the Sustainable Development Goals Agenda into the national legislation. The Czech case reported that the European Landscape Convention, adopted in the year 2000 by the Council of Europe, was only partly implemented in the Czech national Agricultural Land Protection Act. Full implementation would support national and regional protection and restoration of the agricultural landscape that is subjected to great pressure caused by the subsidised growth of bio-energy crops as a result of climate policy.

Surprisingly, only the Dutch case investigated the integration of the Sustainable Development Goals (SDGs) into its national policies. As no other case investigated coherence of national policies with the SDGs, this may bring up the conclusion that the SDGs currently do not get as much attention by the national governments as climate change policy.

Vertical policy coherence: EU-national, national-regional and transboundary policy interactions

All reviewed EU policies were reported as fully integrated into policy documents at national and regional scale. However, this does not necessarily translate into full implementation in practice. Several factors hindering vertical coherence between policy levels are found both in the interaction between EU and national policy and between national and regional policy. These include:

- Measures taken at lower administrative scale are insufficient to achieve targets set at higher scale;
- Cancelling/hampering effects between regulations at different scales;
- Policies at lower administrative scale that have more ambitious goals, and therefore find little support in policies at higher scale;
- Lack of coordination of implementation actions between scales;
- Lack of power to influence decisions - this is more a national versus regional scale issue that however affects also the implementation of EU policies;
- Lack of continuity of policy instruments.

Most of these issues concern interactions between administrative levels within countries but inevitably, these domestic problems also affect the implementation of EU policies.

Reported issues that specifically concern the interaction between EU and national policy include:

- Transposition and implementation of EU directives requiring major adjustments of national policy frameworks and infrastructure;
- Lack of clarity about provisions in EU policy;
- Lack of communication to affected parties on the provisions of EU regulations;
- Overregulation – too many EU rules;

- EU regulation provisions implemented to meet minimum requirements with minor impact in practice.

Issues that specifically concern the interactions between national and regional level include:

- Regional regulation and initiatives are unknown to national governments or there is no interest to support them;
- Centralized regulatory systems only partly account for local needs.

Finally, specific transboundary issues include:

- Regulatory differences between countries;
- Insufficient sharing of information on planning and management rules for shared resources;
- Differences in governance structures;
- Lack of or difficulty to spend financial resources for shared projects.

Horizontal policy coherence: trade-offs and synergies across WLEFC nexus sectors

In all cases, more synergies than conflicts were found between policy objectives for the WLEFC sectors, based on an analysis of policy documents. This corresponds with the coherence analysis of EU policy documents. Policy coherence between sectors is most evident if objectives for one sector are mainstreamed in policies for another sector or when objectives of one sector are closely related to objectives of another sector, like in the case of climate and energy sectors. However, policy coherence in policy documents is not a guarantee for coherence in practice. Stakeholders mentioned conflicting interests during implementation, e.g. competing claims on water and land, ambiguous effects of expanding agriculture, biomass production and developing hydropower, failure to implement environmental and landscape objectives. It was also noted that conflicts 'on paper' could turn out more synergistic in practice, as could potentially be the case with economic and environmental objectives for agriculture in Sweden if more focus were given to organic production.

Six prominent policy coherence issues observed at EU level were also encountered in the cases.

Synergy:

1. The positive effects in the nexus caused by good practices in water and land management, restoration and prevention of soil erosion and reforestation were confirmed by nearly all cases.
2. The positive effects in the nexus of increasing energy and water efficiency, resource efficiency in the agri-food chain, and reduction of the use of water and energy was confirmed by all cases that investigated these objectives.

Ambiguous linkages:

3. The positive effects in the nexus of sufficient water supply and management of floods and droughts may have negative trade-offs depending on the solutions implemented, either technical or nature-based. This was mentioned in the Czech, Slovak and Andalusian cases.
4. Internal conflicts that may exist in agriculture policy between economic and environmental objectives with trade-offs to water, land, energy and climate objectives. There was

confirmation in Latvia, Andalusia, South-West England, Czech Republic, Slovakia and Germany that measures adopted in the EU common agricultural policy were contested. On the other hand, agriculture has potential to deliver environmental public services and positively interact with water, land, nature, energy and climate.

Trade-offs:

5. Competition for scarce water and land, confirmed by The Netherlands, Czech Republic, Germany and Germany-France.
6. Negative interactions in the nexus that producing 1st generation biofuel crops creates. These trade-offs are mentioned by the Czech Republic, Slovakia and Germany. Conflicts are also mentioned by Latvia, The Netherlands, Sweden, South-West England and Germany-France with 'renewable energy' or 'biomass, including biomass from forests'.

Solutions found to address trade-offs and exploit synergies from an institutional and governance perspective

Commitment, common goals, perspectives and interests as well as trust are most frequently mentioned as enabling factors for successful cross-sector arrangements. These criteria cannot be taken for granted in inter-sectoral situations. Thus, profound attention must to be paid to them, when organizing cross-sectoral cooperation in a nexus approach.

The **transboundary** arrangements described by the Germany-France case are all formal and institutionalised, permanent or temporary, public or public-private and concern water and water-related issues in other sectors like energy and agriculture. Enabling factors are the availability of funds, a long-established inter-organizational cooperation and a credible agenda aligned with regional needs. Hindering factors are time consuming procedures and complex decision-making structures, different governance structures and legislation between countries and regions involved, and for the transboundary temporary projects, disagreement about project design and spending of funds, and lack of awareness of financial opportunities.

Cross-sectoral arrangements at **national** level can be public, private or public-private, formal or informal, permanent or temporary, and may have many functions. The arrangements mentioned by the cases cover all sectors of the nexus, with energy and climate most frequently addressed. About half of the arrangements are considered effective and working. Trust, commitment and common goals, interests and perspectives are the most frequently mentioned enabling factors for cooperation. The most commonly mentioned hindering factors are lack of common goals, perspectives and interests, lack of trust, disagreement on responsibilities and roles, and lack of funding.

The cross-sectoral arrangements described by the **regional** cases are public, private and public-private. Most of them are formal. They mostly address issues related to the connections between water, food and agriculture, land and nature. Several of them address energy and climate. According to the case studies, most arrangements are working effectively. Common interests and shared goals appear to be important enabling factors. Reaching understanding and agreement on shared interests and goals is a resource (time, personnel, finances) consuming process, which however,

pays off in terms of avoided deadlocks and conflicts in the implementation of policies. A crucial factor for regional cooperation is the presence of financial resources to implement joint projects or activate joint initiatives with a long-term horizon. Also, the possibility of economic gains is a driver of cooperation. The main hindering factors are unaddressed trade-offs, insufficient advice from the regional government, not fully explored common interests, competing plans and cuts in subsidies.

In general, a nexus approach adopted from the initial stage of any policy process that addresses multi-sectoral issues must make sure that financial and human resources are available, thus providing the institutional infrastructure for allowing the common interests, shared goals and trust to emerge. Furthermore, a nexus approach that gives equal importance to all sectors can provide the space for open discussion about how to jointly raise such resources.

Acronyms

Table 1 Acronyms used in the report

Acronym	Description
AZ	Azerbaijan
GR	Greece
LV	Latvia
NL	Netherlands
SE	Sweden
AND	Andalusia
SAR	Sardinia
SWE	South-West England
DE-CZ-SK	Transboundary Germany-Czech Republic-Slovakia
DE-FR	Transboundary Germany-France (Upper Rhine basin)
AD	Anaerobic digestion
AIEA	Latvian Auctioning Instrument of Emission Allowances
APREAN	Andalusian Association of Promoters and Producers of Renewable Energy
CAP	European Common Agricultural Policy
CITE	*Crédit d'impôt transition énergétique,* the energy transition tax credit
COAG	Andalusian Agricultural Professional Organisations
CSO	Community Supported Organizations
DWI	English Independent Water Inspectorate
ECN	Energy Research Centre of The Netherlands
EEOS	Latvian Energy Efficiency Obligation Schemes
EFAs	Ecological Focus Areas
ENAS	Sardinian regional water authority
FENACORE	Andalusian irrigation water users associations at national level
FERAGUA	Andalusian irrigation water users associations at regional level

GAEC	Good Agricultural and Environmental Conditions
GHGs	Green-house gases
IFAPA	Andalusian Institute of Agricultural and Fisheries Research and Training
NPFA	Non-Productive Functions of Agriculture
NGOs	Non-Governmental Organisations
LEMs	Localised energy networks
PBL	Netherlands Environmental Assessment Agency
RWS	Dutch national water and infrastructure agency Rijkswaterstaat
RES	Renewable energy sources
RHI	The UK Renewable Heat Incentive
RQs	Research questions
SDGs	Sustainable Development Goals
SME	Small Medium Enterprise
SRCE	Regional Schemes for Ecological Coherence
STOWA	Research office of Dutch Union of Water Authorities
SWW	South West Water in South-west England
UvW	Dutch Union of Water Authorities
UNFCCC	United Nation Framework Convention on Climate Change
WLEFC nexus	Water-Land-Energy-Food and Agriculture-Climate nexus
WUR	Wageningen University

1 Introduction

This report provides a synthesis and an analysis of the policy assessment conducted in the transboundary, national and regional case studies of the SIM4NEXUS project. Specifically, in accordance with the grant agreement, this report provides:

1) an overview of nexus-relevant policies relevant to the transboundary, national and regional SIM4NEXUS case studies (section 2.4);
2) an analysis of how global and European policy goals and targets are translated to lower governance levels and how policies are implemented (chapter 3);
3) an analysis of synergies, conflicts and related trade-offs between policies in the implementation phase, gathered through bottom up methodology (chapter 4);
4) an overview of solutions found to address trade-offs and exploit synergies from an institutional and governance perspective (chapter 5).

A common guidance for the policy analyses of the case studies was developed. Each case study used the same analytical framework and report template (Munaretto & Witmer, 2017a). The case study analysis was tied to that conducted at global and European scale, reported in Munaretto & Witmer (2017b). The case study analysis consisted of:

- mapping of relevant policy areas related to the WLEFC nexus, depending on the main research questions of the case;
- mapping of stakeholders and of power and interest structures;
- mapping of policies in the relevant policy areas;
- mapping of policy goals and instruments in the relevant policy areas;
- assessment of coherence between objectives of different nexus sectors and relevant instruments (horizontal coherence);
- assessment of coherence between policies at different scales (vertical coherence), except Sardinia and Slovakia;
- assessment of formal and informal arrangements and practices in place for coordination, addressing trade-offs and exploiting synergies between policies of different sectors, except Slovakia;

The case study reports are listed in Table 2. The interested reader can find the detailed policy analysis in these background reports. All reports can be found on the SIM4NEXUS website (https://www.sim4nexus.eu/). Most reports are also included in The background report of this deliverable.

The policy analysis in the case studies was conducted by the case study partners, who are responsible for the content of their reports. The case study reports constituted the background information for the synthesis and analysis presented in this report. Therefore, the content of this deliverable reflects the level of detail provided by the case studies, which depends on their different research focus. Consequently, some case study sections are more elaborated than others. This deliverable was reviewed by each case study partner for the part concerning their case study and by a third person for the summary, introduction and conclusions.

Table 2 Case study reports

Case study	SIM4NEXUS partner	Authors	Reviewed[1]
Azerbaijan (AZ)	KTH, Baku State University (external consultant)	Anar Nuriyev, Georgios Avgerinopoulos	yes
Greece (GR)	University of Athens University of Thessaly	Chrysaida-Aliki Papadopoulou, Maria P. Papadopoulou, Chrysi Laspidou	yes
Latvia (LV)	BEF	Daina Indriksone, Ingrida Bremere	yes
Netherlands (NL)	WUR, PBL	Trond Selnes, Vincent Linderhof, Roos Marinissen	yes
Sweden (SE)	UU	Claudia Teutschbein, Malgorzata Blicharska	yes
Andalusia (AND)	UPM	Bente Castro, Pilar Martinez, Maria Blanco, Javier Castaño	yes
Sardinia (SAR)	UNISS	Simone Mereu, Fabio Madau, Daniele Pulino, Vania Statzu, Gavril Kyriakakys, Elisabetta Strazzera, Loudes Morillas, José Costa-Saura, Antonio Trabucco	Only block1
South-West England (SWE)	SWW	Julie Smith, Nicola Hole, Carolyn Petersen, Matthew Griffey, Catherine Mitchell, Ben Ward, Lottie McKnight	yes
Transboundary DE-CZ-SK	PIK ENKI P&W	**Czech part:** Petra Hesslerová, Jan Pokorný, Lenka Kröpfelová, Marek Baxa **German part:** Chris Hodel, Tobias Conradt **Slovak part:** Michal Kravčík, Martin Kováč, Michal Gažovič, Jaroslav Karahuta	CZ yes DE only block1 SK only block1
Transboundary DE-FR	ACT	Pierre Strosser, Alexandra Rossi, Anaïs Hanus, Camille Chanard, Camille Parrod, Gitta Köllner, Maïté Fournier, Maya Taselaar, Ornella Puschiasis, Thomas Désaunay, Verena Mattheiß	Yes

[1] By WP2 partner.

2 The SIM4NEXUS transboundary, national and regional case studies

2.1 Nexus problems and issues investigated

This section summarizes the main problems in the cases, the issues investigated, research questions (RQs), and relevant nexus sectors in all case studies (Table 3). It also describes similarities and differences in problems tackled and research focus between the cases. Figure 1 shows the geographical location of the cases and their main research question.

Table 3 Main nexus problems, issues investigated, research questions and nexus policy areas per each case study

Case study	Main problems	Issues investigated	Research questions	Nexus policy areas
Azerbaijan	Economy based primarily on exploitation of fossil fuels Agriculture only other important economic sector of the country	Transition to a low carbon economy	***Main RQ: What are the implications of Azerbaijan's transition to low carbon economy on the different Nexus domains?*** What is the optimal way for Azerbaijan's transition to a low carbon economy while minimizing the stresses on the energy, water, climate, land use and food sector?	Water Land (Forestry) Agriculture Energy Climate Environment (pollution)
Greece	Water scarcity and droughts, exacerbated by climate change Competition for water: most water used for irrigation Marked seasonality patterns in water availability and demand: tourism and agriculture peak demand in summer Need to increase share of renewables in the energy mix to achieve national emission targets	Water resource efficiency (tourism & agriculture) Sustainable food production (land use) Low-carbon energy transitions Climate change adaptation	***Main RQ: How national policies in water management and electricity production may result in changes in agricultural food production and tourism under climate change conditions?*** What synergies need to be developed between policies at national scale and between national and regional/local policies in the nexus to improve water efficiency, ensure sustainable food production and support the transition to a low carbon economy? Which are the impacts of climate change on water resources and agri-food production and how they will be managed in the future (adaptation and mitigation strategies)?	Water Land Energy Agriculture and food Climate Tourism

Latvia	High potential for domestic energy production from RES to ensure energy diversification and increase security High level of national GHGs emissions incompatible with economic growth: need to decouple growth from emissions Pressure on water quality from agriculture, flooding due to climate change	Low-carbon development through: sustainable use of renewable energy sources; energy efficiency; substitution of fossil-based energy with bioenergy and other renewable energy (solar, wind); efficient energy production technologies Impacts of energy production from renewable energy sources on natural resources: forestry, competition for land, water quality, agricultural production, GHG emissions Climate change adaptation	***Main RQ: What are the possibilities and implications in a transition to a low-carbon economy in Latvia?*** Which trade-offs would be acceptable and what are the possible solutions towards low carbon economy? The case study will also seek for solutions helping the decision makers to decide on climate change resilient measures. What are potential solutions to maintain resource sustainability and ensure the economic feasibility?	Energy (biomass, biofuels) Land (forestry) Food (agriculture) Water (water quality) Climate (mitigation, adaptation)
Netherlands	High level of national GHG emissions: need to reduce emissions to meet agreed climate targets by 2050 Limited space to produce feed and crop biomass in NL: need to rely on import; sustainability of imported biomass is major issue. Exploitation of biomass can be increased but there are	Role of biomass in transition to low-carbon economy; interaction with land use, soil and water in the Netherlands Opportunities and barriers for the intensification of biomass production in The Netherlands Sustainable biomass production and use, also of	***Main RQ: What can be the role of biomass in the Dutch transition to a low-carbon and resource efficient economy by 2050, considering the interaction with water, land, energy, food and climate?*** To what extent are the intensification of production and increase of import of biomass for energy in The Netherlands feasible from a biophysical, socioeconomic and policy perspective?	Water Energy Land (landscape, soil, spatial planning) Food (agriculture and consumption) Environment (nature, forestry, biodiversity)

	environmental impacts to consider. Currently, large scale use of biomass for energy generation has a bad reputation. Policies officially support cascade use of biomass (priority for high-value use and re-use), but subsidies do the contrary Competition and friction between biomass for energy generation and circular economy (closing loops) and bio-based economy	imported biomass, effects on GHG emissions, land and water outside The Netherlands Scarcity of sustainably produced biomass and competition between biomass for energy generation and other purposes		Circular economy (waste, biomass) Climate (mitigation, adaptation)
Sweden	Forestry is an important economic and natural resource of the country Increased forestry production could contribute to climate mitigation Trade-offs between forest production and biodiversity conservation Water shortages in summer due to climate change increasingly affect drinking water supply, both quality and quantity	Manage trade-offs between economic, environmental and recreational functions Increase the supply of forest biomass for energy Climate change impacts on water quality and quantity	***<u>Main RQ:</u> Does the goal of becoming a fossil-free nation interfere with some of the national environmental objectives such as sustainable development of water and forest resources and biodiversity conservation?*** How future climate change will affect streamflow, and change (drinking) water availability and quality? Can the extraction of forest biomass for energy and other commercial uses be further increased in the future without negative consequences for other forest functions (recreational, climate and environmental regulation functions), biodiversity and water availability/quality?	Water Land (forestry) Energy Climate Environment

Andalusia	Marked seasonal variation of water availability and demand Climate change impact on water availability Specific cases of overexploitation of water resources Increasing deterioration of water and soil quality because of economic activities Increasing competition for water among sectors Inadequate consideration of the linkages between irrigation water saving technologies and energy costs GHG emissions	Sustainable water management Climate change mitigation and adaptation Energy efficiency and promotion of renewable energies Fight against soil erosion and desertification Resource efficient food production Sustainable socioeconomic development	***Main RQ: How can agricultural and environmental policies be integrated to address pressures on land and water whilst promoting their sustainable use and economic development?***	Water Land Energy Agriculture Climate
Sardinia	Marked seasonal and inter-annual variation of water availability and demand Competition for water: most water used for irrigation Water loss due to poor water infrastructure	Potential to increase share of renewable energy by upgrading the distribution grid (smart grids) and by increasing power plants Decrease of energy consumption for agriculture (pumping of water)	***Main RQ: How to reach a resilient system able to satisfy all the demands under climate change?*** How can policies and new infrastructure in the water, agriculture, energy, tourism sectors be integrated to support sustainable (local) food production, provision of water for all uses, reduction of greenhouse gas emissions through increased share of renewable energy in the context of the need for adaptation to climate change?	Water Land Energy Agriculture Climate Tourism

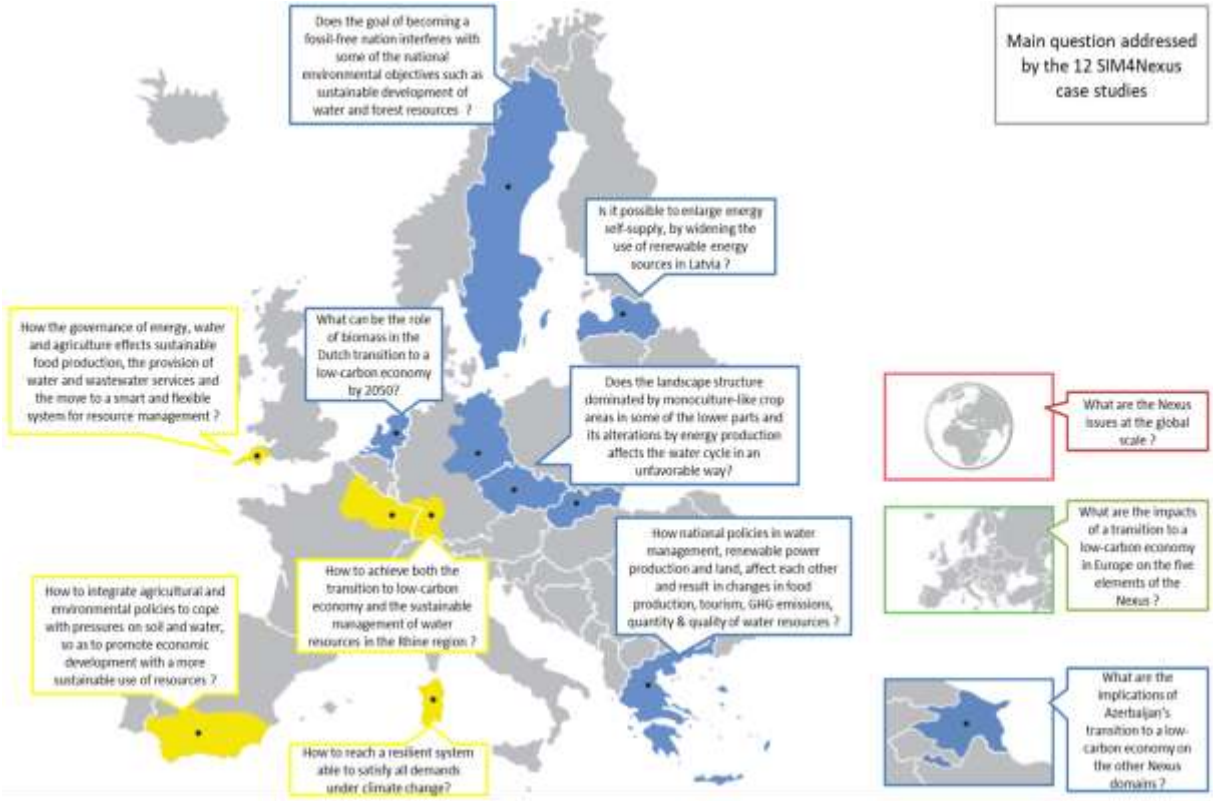
	Environmental pressure on the coasts due to tourism and migration to coastal cities Abandonment of agricultural land Scarce use of biomass from forests despite their large cover in the region Increasing water scarcity and droughts due to climate change Inadequate electricity distribution network and conflicts with energy providers limits the potential achievement of a low carbon economy Solar and wind plants built in agricultural land and conflicts related to landscape quality Conflicts related to bringing methane to the island	Increase resilience of water provisioning Energy efficiency and promotion of renewable energy Climate change mitigation and adaptation Sustainable socioeconomic development		
South-west England	Water system relies on significant pumping because of dispersed nature of population - water is expensive due to electricity cost	How the governance of energy, water and agriculture in the UK affects sustainable food production, the provision of water and wastewater services and the move to a smart and flexible	***Main RQ:* How the governance of energy, water and agriculture affects sustainable food production, the provision of water and wastewater services and the move to a smart and flexible system for resource management?** How can local and global environmental protection objectives be addressed, including the reduction of flood	Water Energy Agriculture Land Food

	High environmental pressure at the coast: water quality, quantity, nature conservation and floods. Traditional energy distribution network becoming obsolete: need investment in new, smart, flexible network infrastructure Climate change and harmful land management and farming practices puts highly productive agricultural land at risk of soil erosion and loss of organic carbon	system of energy provision within the South West of England Possibility to increase renewable energy use for provision of water services and for the region in general. Special issues with future nuclear plant at the border of the region. Possibility to change agricultural practices to lessen the likelihood of floods Improving the natural capital of land and water in the face of climate change	risk, while meeting an increasing demand for low cost and high quality water/waste water services? To what extent can renewable energy generation, energy efficiency and demand management reduce or otherwise offset the need for grid-imported energy in the provision of water/waste water services? How can South West Water and the agricultural sectors work together to improve future farming practices in order to protect food security, biodiversity and water objectives, tackle GHG emissions and increase renewable energy outputs from local farms?	Climate change
Transboundary DE-CZ-SK	The 3 countries share a history of land collectivization which turned the agriculture landscape into large field blocks and simplified natural landscape. Advent of CAP and carbon emission targets (crop for biofuel) speeded up the process of agriculture intensification. Consequences of these changes in the 3 countries include: water quality and quantity degradation,	Landscape restoration options (CZ, SK, DE) Effects of landscape restoration on soil quality, water quality and quantity (CZ, SK) Agricultural reform options (CZ, SK)	***Main RQ:* Does the landscape structure dominated by monoculture-like crop areas in some of the lower parts and its alterations by energy production affect the water cycle in an unfavourable way?*** Common: What is an effect of large scale drained fields on local climate? How far is it affected by large drained fields which surface temperature in summer after crop harvest reaches 50 C?	Water Land Energy Agriculture Climate

	increase of floods and droughts, loss of biodiversity, soil erosion and quality degradation, changes of local climatic conditions Overexploitation of forest resources (SK) Complex land ownership legal framework (SK, CZ) Groundwater abstraction and destruction of rural landscape due to mining (DE)	Trade-offs between biomass, food, land/soil quality and water (DE, CZ, SK)	How much carbon from 1ha of field is recycled in biofuels, biogas and how much carbon is released into atmosphere from the soil due to mineralization process? CZ/SK - How can the complex and extensive changes of landscape structure be achieved at national scale so as to restore soil functions (water retention, carbon sequestration, nutrients retention, etc.)? CZ/SK - What effect of landscape restoration on rain water discharge (dumping of torrential rain floods) local temperature (daily amplitudes), air humidity, landscape drying (via irreversible transport of water vapour high up into the atmosphere) and in long term perspective content of organic matter in soil could be achieved through landscape restoration in the current agricultural landscape? CZ/SK - How can landscape restoration be embedded into policy for climate change mitigation and adaptation? DE - How threatened is the electricity supply in the area given the increasing amount of unstable renewable sources under climate change? DE - What would be the consequences of an immediate shutdown of the lignite mining activities in Lusatia? DE - How much food production is and will be sacrificed to biomass generation? DE - What are the environmental consequences of this “green” energy in the area, especially regarding the water balance?	

Transboundary DE-FR	Highly industrialized and densely populated region in EU Upper Rhine known as best practice of integrated water resource management and transnational cooperation	Transition to low carbon economy Sustainable management of natural resources and ecosystems, in particular water Opportunities for enhancing cooperation between FR and DE for more effective policies addressing transboundary issues	***Main RQ:* How to achieve both the transition to low-carbon economy and the sustainable management of water resources in the Rhine region?** How could cooperation between France (Grand Est) and Germany (Baden-Württemberg) be strengthened to jointly reach a transition to a low carbon economy in an effective manner? What would be the social, economic and environmental impacts of such cooperation? (Business as usual vs alternative Nexus-compliant approach)? How should cooperation be designed, accounting for today's situation and for climate change, in such a way that negative impacts on natural resources and ecosystems are minimized, and positive impacts of cooperation on natural resources and ecosystems are maximized?	Water Energy Agriculture Climate Land use (including biodiversity, forestry)

Figure 1 SIM4NEXUS case studies and their main research question



Legenda: blue=transboundary and national cases; yellow: regional cases; green=European case; red=global case

2.2 Nexus sectors and policy domains

The cases cover all WLEFC nexus sectors and in addition forestry, economy with a focus on tourism, and environment especially in relation to biodiversity conservation (Table 4). They investigated a large variety of aspects of the nexus sectors as Table 5 shows.

All national case studies regard the transition to a low-carbon economy as a driver of change in the other nexus sectors. Azerbaijan, Latvia, Sweden and the Netherlands focus on pursuing a low carbon economy. Their objectives differ as it comes to the approach. Moving towards more sustainable energy sources is a key objective of Azerbaijan. Energy security and autonomy is a crucial factor for Latvia. Sweden focuses on the effects of bioenergy sources on water and forests (including biodiversity). Finally, the Netherlands focuses on possible biomass production and its consequences.

Both Sweden and Greece pay close attention to water management. In Sweden the question is how additional forest exploitation for renewable energy may affect water quality and quantity in the country. Greece focuses on efficient use of water and energy for tourism and agriculture as these

are the two main components of the national economy. Preservation of natural and cultural resources is important and often linked with land management and other industries in Greece.

A common focus of the regional cases is water, energy and agriculture. In the case of the South-West of England, energy-efficient and low-cost water provision and water treatment lie at the heart of the nexus approach and is closely bound up with energy, environmental, agricultural and land use issues. Andalusia applies a more integrated approach paying similar attention to all nexus areas, considering a resource efficient food production and environmental policies as driving forces. Competing water demand for energy generation, agriculture and tourism are distinctive of Sardinia. Agriculture and tourism are key sectors for the island's economy due to its geography (fertile, yet rather dry region) and touristic vocation.

Both transboundary cases are clustered around the theme of water, with a prevalent focus on its relation to land use in the case of Germany-Czech Republic-Slovakia (DE-CZ-SK) and on biodiversity conservation in the case of Germany-France (DE-FR). In case of DE-CZ-SK, hydrological alterations and climate change became major challenges as result of the long lasting agricultural land use policy of socialist times.

For DE-FR, the Rhine River and its basin lie at the centre of the transboundary cooperation. The river has been providing important ecosystem services for centuries, ranging from transportation to energy production. As a result, biodiversity protection in the riparian zone currently requires more attention.

Table 4 Nexus issues covered by the national, regional and transboundary cases and the direction of influence investigated

Legend: direction of influence | Driver | Affected | Both: driver and affected |

	Water	Land	Energy	Agri/Food	Climate	Forestry	Economy	Environment/Bio div.
AZ	Quality and quantity	Land use for food production	Trans. to low-carbon	Food production, food security	GHG emissions			Pollution
GR	Water efficiency	Land use for food production	Trans. to low-carbon/electricity	Food production	Adaptation		Tourism	
LV	Water quality	Scarcity > competition	Trans. to low-carbon	Agriculture production	GHG emissions Adaptation	Biomass	Economic feasibility	
NL	Water quality and quantity	Land use for biomass	Trans. to low-carbon, role of biomass	Agriculture production/biomass	GHG emissions	Biomass	Biobased economy	Effect on biomass
SE	Water resources, drinking water, quant. & qual.	Land-use forest	Trans. to low-carbon		Changing stream flow, drinking water quant. & qual. Changed emissions by forest	Biomass extraction affects other forest functions	Recreation function forest	Environmental regulation function of forest Biodiversity conservation
AND	Sustainable water management	Fight against soil erosion, desertification	Energy efficiency, renewable energy	Resource efficient food production	Climate mitigation and adaptation		Sustainable socioeconomic development	Environmental policy
SAR	Infrastructure, water provision		Energy efficiency, renewable energy, infrastructure, power plants	Infrastructure, Sustainable local food production,	Reduction GHG emissions, Adaptation		Tourism	

SWE	Provision of low-cost high qual. water & wastewater services, Reduce grid-imported energy in the provision of water services, Improving natural capital of water in the face of climate change, protect water objectives	Improving natural capital of land in the face of climate change	Energy provision, renewable energy from local initiatives, impacto of new nuclear plant	Agricultural practices against floods, sustainable food production, food security	Improving natural capital of land and water in the face of climate change, reduce flood risks			Protect biodiversity
DE-CZ-SK	Effects of landscape restoration on soil quality, water quality and quantity, Effects of energy crops production on water	Effects of landscape restoration on soil quality and functions, and on local climate, How can changes of landscape structure be achieved, e.g. embedded in climate policies, Carbon release from soil by	Trans. to low-carbon, stimulating production of energy crops, Threat to electricity supply by unstable renewable sources under climate change, Consequences of immediate shutdown of lignite mining in Lusatia, Competition between food and energy production,	Effect of large scale energy crops production with drained fields on local climate, Carbon efficiency and GHG emissions of energy crops production, Agricultural reform options, Competition between energy and food production	Effect of large scale energy crops with drained fields on local climate, Carbon emissions from energy crops production			Environmental effects of energy crop production

		energy crop production	Environmental effects of energy crop production					
DE-FR	Sustainable management of water, Transboundary cooperation		Trans. to low-carbon, Transboundary cooperation		Cooperation design, for today's situation and climate change, to minimize negative impacts on natural resources and ecosystems and maximize positive impacts.		Social, economic and environmental impacts of transboundary cooperation (Business as usual vs. Nexus-compliant).	Effects of trans. to low-carbon, Environmental impacts of transboundary cooperation (Business as usual vs. Nexus-compliant).

Table 5 Aspects of the WLEFC sectors investigated by the case studies

Water	Effects of transition to low-carbon economy on water Water efficiency Water quality Water footprint of biomass production Water as a resource, water provision Drinking water quantity and quality Sustainable water management Water infrastructure Wastewater treatment Energy use for water provision and wastewater treatment Costs of water provision and wastewater treatment Water as natural capital facing climate change Water protection to reach quality and quantity objectives Effects of landscape restoration on water system Effects of energy crop production on water quantity and quality Transboundary cooperation for water management
Land	Effects of transition to low-carbon economy on land Land-use for food production, forestry Scarcity of land and competition between food and energy crops Land footprint of biomass production Soil erosion and desertification Land as natural capital, facing climate change Effects of landscape restoration on soil quality and functions How to achieve landscape restoration, e.g. with climate policy Carbon release from soil by energy crop production
Energy	Transition to a low-carbon economy Electricity production Energy infrastructure and power plants Energy efficiency Renewable energy, biomass, energy crops production Environmental effects of energy crop production Small scale renewable energy production on farms Nuclear energy Energy provision Threat to electricity supply by unstable renewable sources under climate change Consequences of immediate shutdown of lignite mining Competition between food and energy production Transboundary cooperation for transition to low-carbon economy
Food and Agriculture	Agricultural production, food production, resource efficient and sustainable food production Competition between food and energy production Effects of transition to low-carbon economy on food production Infrastructure of food production Food security Effects of large scale agriculture on local hydrology and climate

	Carbon efficiency of and GHG emissions from energy crops production Agricultural reform options
Climate	Adaptation to climate change Mitigation of climate change GHG emissions Influence of climate change on stream flow, drinking water quantity and quality Changed emissions from forests caused by biomass production and extraction Reduce flood risks Effect of large scale energy crops with drained fields on local climate Carbon emissions from energy crops production Transboundary cooperation to minimize negative impacts of climate change on natural resources and ecosystems and maximize positive impacts
Forestry	Changed emissions from forests caused by biomass production Biomass production and extraction, and effects on other forest functions
Economy	Tourism and relation to use of energy and water Economic feasibility of transition to low-carbon Sustainable socioeconomic development, related to resource efficient food production Socioeconomic impacts of transboundary cooperation (Business as usual vs. Nexus-compliant).
Environment, biodiversity	Pollution caused by transition to low-carbon economy Environmental regulation function of forest Effects of environmental policy on sustainable use of land and water, and economy Biodiversity protection/conservation Environmental effects of energy crop production Environmental impacts of transboundary cooperation (Business as usual vs. Nexus-compliant).

2.3 Stakeholders' constellation

This chapter illustrates, in the form of a map, the relevant WLEFC nexus stakeholders involved in each case study. Each stakeholder group in the map is represented by a circle. The colour of the circle indicates different stakeholder groups (e.g. public organizations, NGOs, businesses, academic/research institutes, professional associations, etc.). The size of the circle represents the size of the stakeholder group (in terms of employees, turn over, etc.): small circle = small stakeholder group, big circle = big stakeholder group. The formal and informal interactions between stakeholders are indicated by the distance/overlapping of the circles: the bigger the distance, the weaker the relationship; an overlap means that the two stakeholders are related by a formal relationship; typically the small circle stakeholder is a member of the big circle stakeholder organization. Arrows indicate the direction of the prevailing relationship while labels specify the nature of the relationship[2].

[2] This structure was not exactly followed by all case studies.

In general, the relevant stakeholders can be grouped in the following categories:

- National governmental organizations
- National governmental organizations operating at regional level
- Regional governmental organizations
- Municipalities
- Research organizations (both public and private)
- Private businesses
- Education organisations
- Labour unions
- NGOs
- Investors (banks)
- Citizens

The case studies reported[3] stakeholder groups often overlooked in the literature: investors, including banks, labour unions and citizens. Investors are important partners of public organizations for the funding of infrastructure, typically in the form of public-private partnerships. Labour unions organized citizens groups can also influence policy decisions through lobby pressure in different formal policy venues (e.g. consultation committees) or informal (e.g. self-organized public initiatives such as street demonstrations and strikes to raise awareness on specific issues).

2.3.1 Azerbaijan

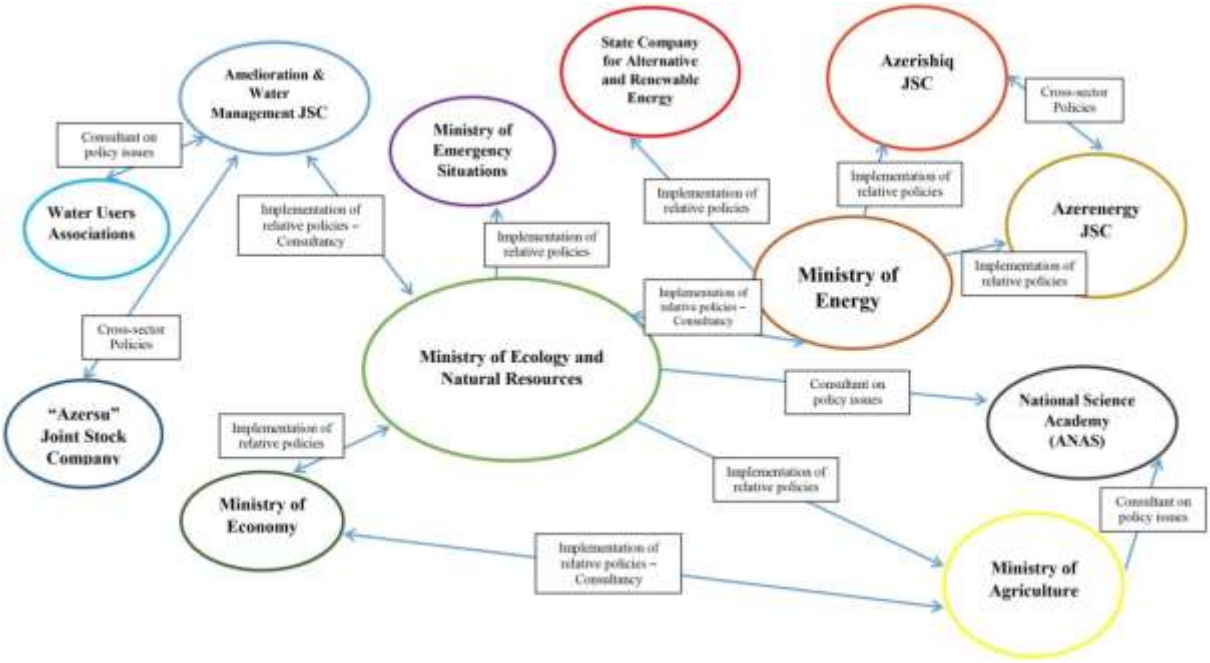
The relevant stakeholders in Azerbaijan were identified in 15 institutions (Figure 2). The majority of stakeholders is constituted by public actors, both national ministries responsible for formulating national policies and national agencies (Public Joint Stock Companies) implementing national policies. As for the ministries, these include the Ministry of Ecology and Natural Resources, Ministry of Agriculture, Ministry of Economy and Ministry of Emergency Situations.

Public agencies exist in the water and energy sector. In the water sector, the national agency Azersu is responsible for water extraction, treatment, transportation and construction and management of the related infrastructure. The other national agency, Amelioration and Water Management Company is in in charge of land reclamation, irrigation infrastructure, flood protection, and design of national plans for water resources exploitation. In addition, water user associations exist in the irrigation sector (private actors).

In the energy sector there are three national agencies implementing the energy policy. The State Agency for Alternative and Renewable Energy is responsible for the planning, design and implementation of renewable energy infrastructure. Azerenergy is responsible for the operation of the country's electro-energy system (power generation and transmission). Finally, Azerishiq distributes electricity to the consumers.

The National Academy of Science is the scientific reference point for knowledge generation for policy-making.

Figure 2 Stakeholder map for Azerbaijan



Source: Nuriyev & Avgerinopoulos (2018).

2.3.2 Greece

For the Greek case study 18 relevant stakeholders were identified (Figure 3). They vary in terms of their formal and informal role during the policy making process, the source of their power as well as their interests with respect to the nexus-related policy sectors.

At ministerial level the relevant organizations are the Ministry of Environment and Energy, Ministry of Infrastructure, Transport and Networks (Special Office for Public Works, Construction and Maintenance of Hydraulic Infrastructure), Ministry of Foreign Affairs (Directorate of International Energy Issues), Ministry of Agriculture (although not in the map because not yet involved in the project), and Ministry of Tourism. These ministries design the national policy in the respective sectors.

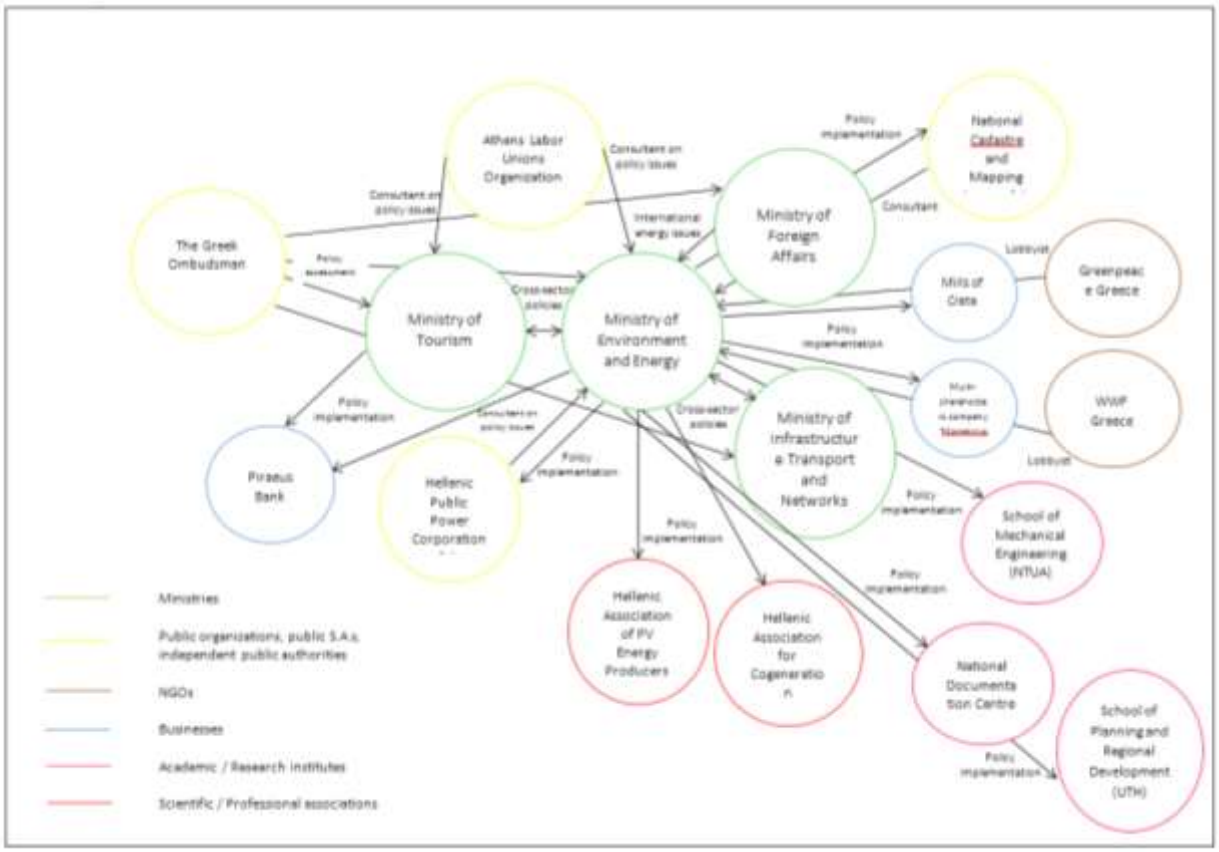
National public agencies include:

- the National Cadastre and Mapping Agency which has a supportive role in the design of land use policies by providing geo-data to the ministries;
- the Hellenic Public Power Corporation, the largest energy and electricity supply company in Greece (generation, transmission and distribution).

- Athens Labour Union Organization, concerned with protecting and advancing the labour and social security of employees, especially with regard to environmental working conditions which interact with issues such as air quality, urban environment, waste and water management, land use, energy and transport;
- The Greek Ombudsman, an independent authority that helps citizen exercise their rights before public authorities and contributes to public administration policy reforms and policy implementation.

Among the private businesses there are the associations of energy producers and a bank. As for research organizations, one university and one national research institute are included. Finally, two environmental NGOs, the national offices of WWF and Greenpeace, are also part of the relevant stakeholders in the Greek case study.

Figure 3 Stakeholder map for Greece



Source: Papadopoulou, Papadopoulou, & Laspidou (2018, p. 28).

2.3.3 Latvia

The Latvian case study identified many relevant stakeholders: 12 public organizations, 2 education organizations, 4 research organizations, 5 private actors, and 3 NGOs (Figure 4).

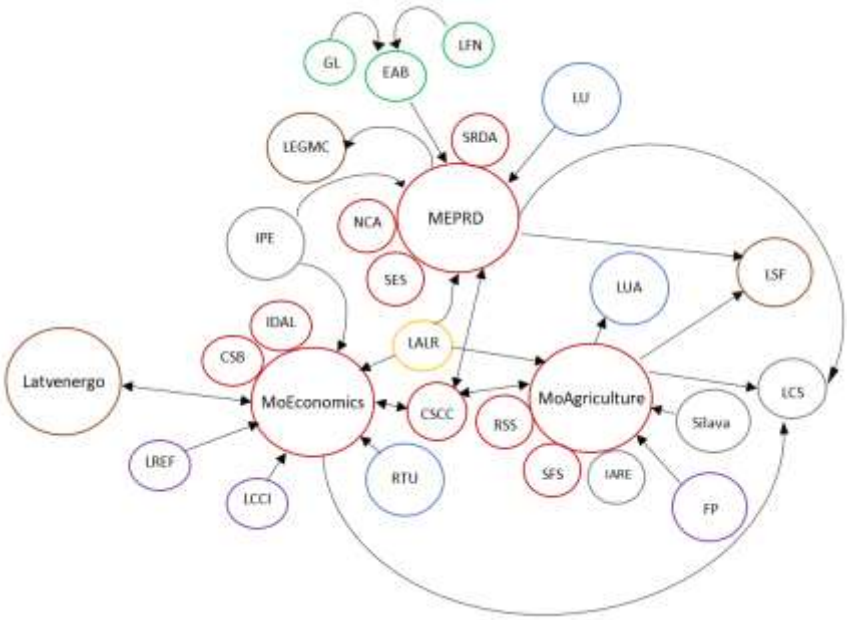
Three ministries set the national policy in the nexus sectors of importance for the case study, the Ministry of Environmental Protection and Regional Development, the Ministry of Agriculture and the Ministry of Economics. Of the remaining public organizations, one is the Latvian Association of Local and Regional Governments and the others are national agencies and service centres related to the water, energy, forestry and agriculture sectors.

Of the 4 private organizations, three are sector unions (Latvian Renewable Energy Federation, Latvian Chamber of Commerce and Industry and the Association “Farmers Parliament”) one is the Latvian Environment, Geology, and Meteorology Centre and the other one is an electric power generation, transmission and distribution company (Latvenergo).

Research organizations include both national research institutes (Institute of Physical Energetics, Institute of Agricultural Resources and Economic, Latvian State Forestry Research Institute “Silava”, Latvian Council of Science) and universities (Latvia University of Life Sciences and Technologies - previously known as Latvia University of Agriculture), University of Latvia and Riga Technical University) generating knowledge for policy-making.

Finally, the three NGOS are environmental protection organizations (Association “Green Liberty”, Environmental Advisory Board and Foundation “Latvian Fund for Nature”).

Figure 4 Stakeholder map for Latvia



Legend:

- National governmental organization
- Business
- Education
- Research
- Municipalities
- Trade union
- NGO

Abbreviations:

MEPRD	Ministry of Environmental Protection and Regional Development	**IARE**	Institute of Agricultural Resources and Economics
MoAgriculture	Ministry of Agriculture	**Silava**	Latvian State Forestry Research Institute "Silava"
MoEconomics	Ministry of Economics	**LCS**	Latvian Council of Science
IDAL	Investment and Development Agency of Latvia	**IPE**	Institute of Physical Energetics
CSB	Central Statistical Bureau	**LALRG**	Latvian Association of Local and Regional Government
CSCC	Cross-Sectoral Coordination Centre	**LCCI**	Latvian Chamber of Commerce and Industry
SES	State Environmental Service	**FP**	Association "Farmers Parliament"
NCA	Nature Conservation Agency	**LREF**	Latvian Renewable Energy Federation
SRDA	State Regional Development Agency	**EAB**	Environmental Advisory Board
SFS	State Forest Service	**GL**	Association "Green Liberty"
RSS	Rural Support Service	**LFN**	Foundation "Latvian Fund for Nature"
LEGMC	Latvian Environment, Geology, and Meteorology Centre	**LUA**	Latvia University of Life Sciences and Technologies (previously Latvia University of Agriculture)
Latvenergo	JSC "Latvenergo"	**RTU**	Riga Technical University
LSF	JSC "Latvia's State Forests"	**LU**	University of Latvia

Source: Indriksone & Bremere (2018, p. 17).

2.3.4 The Netherlands

The Ministry of Economic Affairs and Climate is responsible for the national policy on energy and climate. For agriculture and food, the reference ministry is the Ministry of Agriculture, Nature and Food Quality. Water is one of the essential sectors in the Netherlands and the Ministry of Infrastructure and Water is in charge of water policy and water infrastructure directly and through its national agency Rijkswaterstaat (RWS). The Union of the Dutch Water Authorities (UvW) is the national association of the 21 water authorities. Together with its own research office, called STOWA, it has quite some influence and operational independency. The water authorities are in charge of the implementation of water management issues. There are also strong links between water and agriculture and nature (Figure 5).

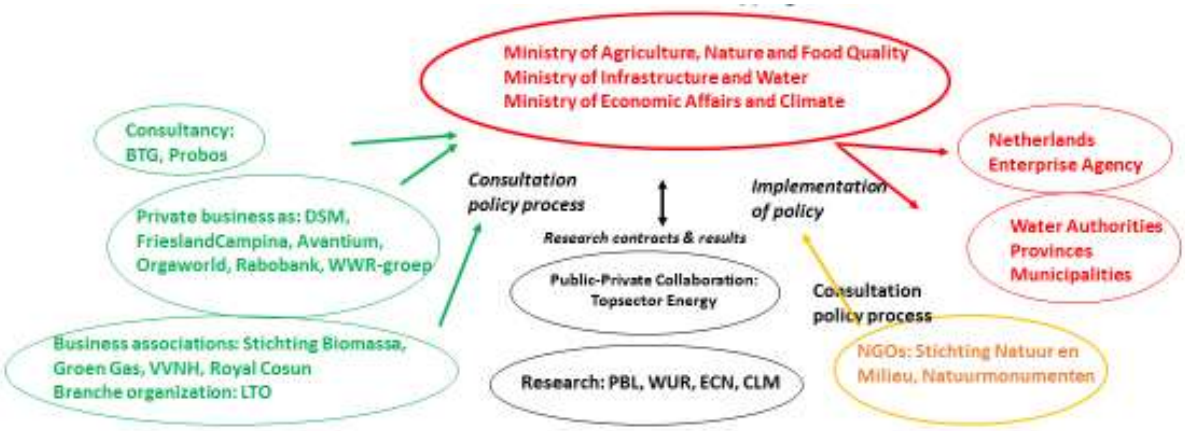
Provinces are the regional governments of the Netherlands, and municipalities are the local governments. Provinces are essential for much of the policy implementation and relevant for the case study, as they implement nature conservation policy.

Companies from the energy, manufacturing, agriculture and food, transportation, and investment sectors directly connect to the nexus domains of relevance for the case study. These business actors participate in public-private collaboration through, for example, the policy consultation and dialogues aiming to set and implement the policy agenda for the transition policy, the implementation of the policy strategy for biomass and the 'Topsector' policy that is a vehicle for establishing research projects.

Research institutes are also included in such public-private collaboration initiatives, but they are also important on their own for the knowledge they produce in support of policy making and the setting of priorities. Examples of these research organizations are the Netherlands Environmental Assessment Agency (PBL), Energy Research Centre of The Netherlands ECN, Wageningen University (WUR), and CLM a consultancy firm in the field of agriculture, food, nature and environment. Using public research agencies as PBL is quite normal in the Netherlands, and their advice is then picked up by the gatekeepers for the Cabinet, either a ministry or for example the Social Economic Council, which then advice the Cabinet.

Finally, branch/business associations and NGOs are also important stakeholders. In general, the NL organizes extensive and lengthy public consultation processes in many policy sectors, where the business sector is usually highly involved. There is a long-standing tradition for this way of working. Business companies are however not always able or willing to participate in collaborative initiatives on their own, and branch organizations or business associations are then a way to carry out influence within for instance the 'Topsector' policy, or in all kinds of advisory committees and other fora with a policy impact.

Figure 5 Stakeholder map for the Netherlands



Legend : green=private ; red=government ; orange=NGOs ; black=research/consultancy

Source: Selnes et al. (2018, p. 30).

2.3.5 Sweden

The stakeholder list for the Swedish case study (Figure 6) contains 18 businesses, comprising several different hydropower, biofuel and forest-owning companies. The list further includes one common interest association, two local federations formed by municipalities to manage local drinking water concerns, and 290 municipalities belonging in the group of local governmental organizations.

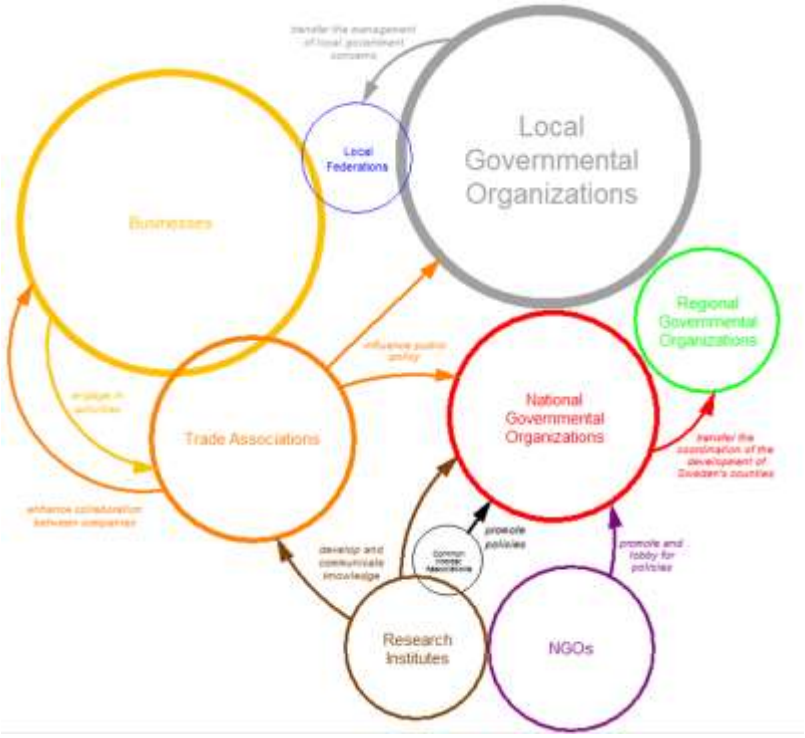
As for regional public organizations, there are 5 regional water authorities coordinating the work within the Swedish water districts.

At national level, 9 national governmental organizations were identified. They mainly consist of Swedish government agencies that act independently to design and/or implement sectoral policies. They are: Ministry of the Environment and Energy, Swedish Environmental Protection Agency, National Food Agency, National Property Board of Sweden, Swedish Agency for Marine and Water Management, Swedish Energy Agency, Swedish Forest Agency, Swedish Fortifications Agency and Swedish Geological Survey.

Furthermore, 6 NGOs dealing with forest and nature conservation issues and 5 research organizations in the forest, water and energy sectors were identified. The NGOs include: Swedish Forest Stewardship Council, Swedish Programme for the Endorsement of Forest Certification, Swedish Society for Nature Conservation, Royal Swedish Academy of Agriculture and Forestry, Swedish Forest Society Foundation, and Swedish Forestry Association. The research organizations are: Nordic Association for Hydrology, Stockholm International Water Institute, Swedish Energy Research Centre, Swedish Hydrological Council and Forestry Research Institute of Sweden. Finally 9

trade associations in the forestry, water, agriculture and bioenergy sector were considered relevant stakeholders for the case study.

Figure 6 Stakeholder map for Sweden



Source: Teutschbein & Blicharska (2018, p. 24).

2.3.6 Andalusia

Considering the main nexus policy challenges to be addressed in the case study of Andalusia, the main stakeholders from the sectors of water, food and energy have been identified in public ministries, agencies, councils, authorities and private associations, producer organisations, NGOs and research institutions (Figure 7).

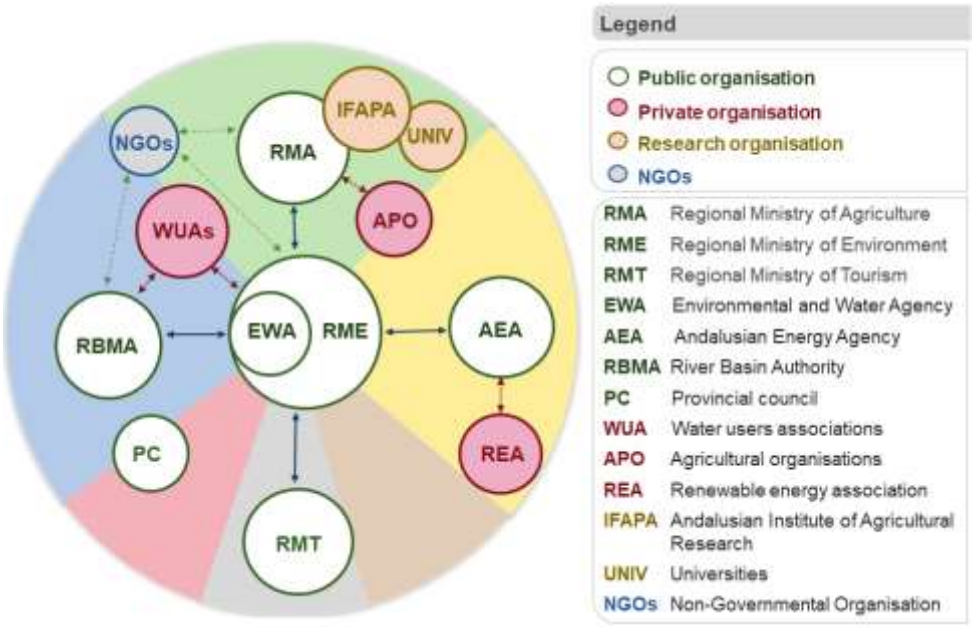
Important public stakeholders are the Regional Ministry of the Environment and Spatial Planning that has competences in the areas of environment, water, spatial planning and land use management, the Regional Ministry of Agriculture, Fishery and Rural Development and the Regional Ministry of Tourism and Sports.

In the water sector, the river basin authority of the Guadalquivir river is a crucial actor in charge of water management in the river basin together with the Environment and Water Agency of Andalusia that is in charge of the river basins at the intra-community level. In the agricultural sector, there are

irrigation water users associations at national and regional level (FENACORE and FERAGUA, respectively) and agricultural professional organisations (COAG). In the energy sector, there are the Andalusian Energy Agency and the Andalusian Association of Promoters and Producers of Renewable Energy (APREAN).

Among research institutes, there are the Andalusian Institute of Agricultural and Fisheries Research and Training (IFAPA), the University of Cordoba and the University of Almeria. An example of NGOs is WWF, a global environmental conservation organisation.

Figure 7 Stakeholder map for Andalusia



Source: Castro, Martinez, Blanco, & Castaño, 2017, p. 28.

2.3.7 Sardinia

For Sardinia 17 main stakeholders were identified (Figure 8). They include regional ministries, regional sector authorities, private companies, NGOs and research institutions.

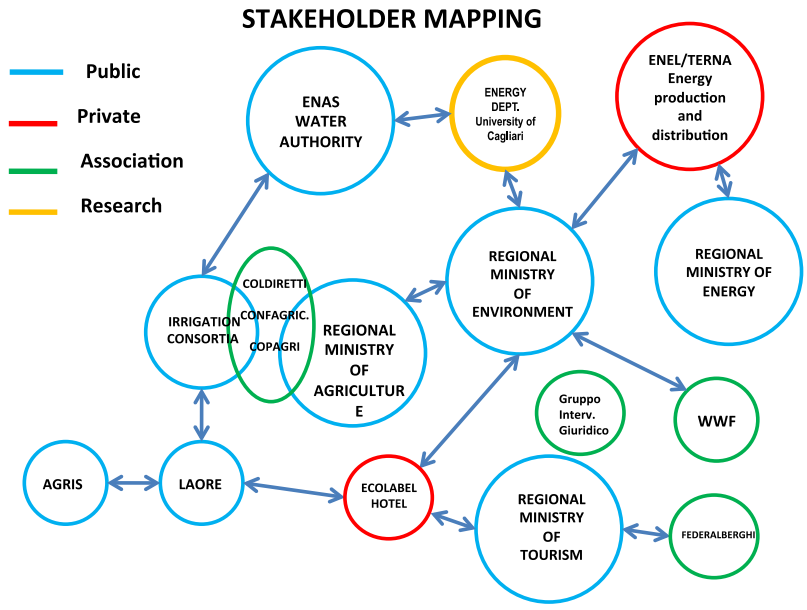
Regional ministerial bodies in Sardinia have a higher level of autonomy in terms of regulatory and financial aspects compared to most of the other Italian regions. This is due to the fact that the region has the status of Special Autonomous Region (together with other 4 regions in Italy). The regional ministries of relevance for the case study are: Regional Ministry of Agriculture, Regional Ministry of Environment, Regional Ministry of Tourism and Regional Ministry of Energy.

Public organizations implementing in the water sector include the regional water authority (ENAS) in charge of design, construction and management of water infrastructure including hydropower plants; irrigation consortia in charge of land reclamation and irrigation water management and distribution. As for agriculture, the agency for the implementation of regional programs in agriculture and rural development and the regional agency for scientific research, experimentation and technological innovation in the agricultural, agro-industrial and forestry sectors respectively implement and develop knowledge for the regional agricultural policy.

Among NGOs, WWF is well established in Sardinia, because of the natural protected areas that it manages that cover about 3.608 hectares. Furthermore, three major farmer associations like Coldiretti, Confagricoltura and COPAGRI represent the interests of the farmers in the region.

Finally, among businesses, the national energy company ENEL is of relevance for the case study. Former public agency, it is now a private company producing and distributing electricity and gas. The company has two main branches: one generates energy from fossil and renewable sources and the other one distributes electricity to the final consumers.

Figure 8 Stakeholder map for Sardinia



Legend:

Ecolabel – association of hotels that voluntary took the membership certification granted to those products and services that comply with ecological and performance criteria established at European level.

AGRIS - the agency of the Sardinia Region for scientific research, experimentation and technological innovation in the agricultural, agro-industrial and forestry sectors.

LAORE - the agency for the implementation of regional programs in agriculture and rural development.

Source: Mereu et al. (2017, p. 19).

2.3.8 South-West England

For South-West England, the list of key stakeholders includes 7 public bodies that represent regulators, local authorities and a government department (Figure 9). These are:

- Ofwat, the economic regulator of the water sector in England and Wales. It is a non-ministerial government department and an independent National Regulatory Authority, recognised by EU Directives;
- Ofgem, a non-ministerial government department and an independent National Regulatory Authority; it is the Office of Gas and Electricity Markets;
- Department for Environment, Food and Rural Affairs (Defra) responsible for safeguarding the natural environment, supporting the food and farming industry, and sustaining a thriving rural economy;
- Natural England, public agency advising the government on the natural environment;
- Devon County Council, Cornwall Council and Exeter City Council are local authorities for Devon, Cornwall and Exeter.

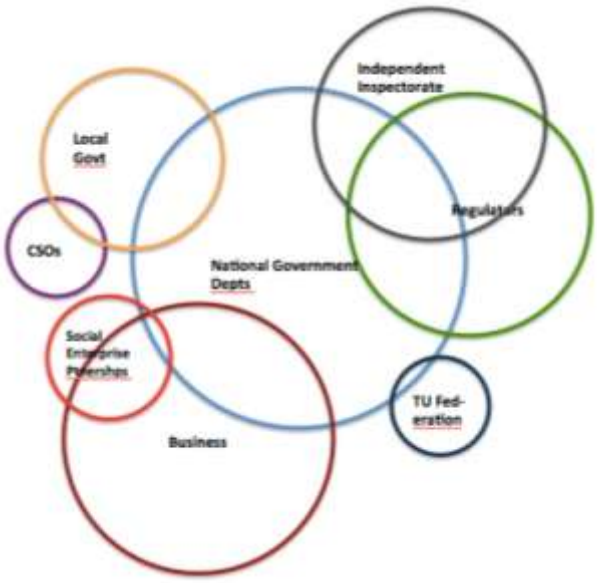
There also is one independent water inspectorate (DWI) that works to ensure that water supplies in England and Wales are safe and drinking water quality is acceptable to consumers.

Businesses are represented by a private energy company responsible for electricity distribution (Western Power Distribution) and a private water company providing drinking water and waste water services (South West Water, SWW). There also is one trade union federation that represents farm and agricultural workers (National Farmers Union).

Five CSOs (Community Supported Organizations), charity/NGO organizations covering the nexus sectors relevant to the case study (water, agriculture and food, land use and energy.

Finally, three social enterprise partnerships (Exeter Community Energy, Cornwall Food Foundation and Cornwall New Energy Project) focus on local projects to build SME capabilities in the context of the nexus sectors investigated.

Figure 9 Stakeholder map for South-West England



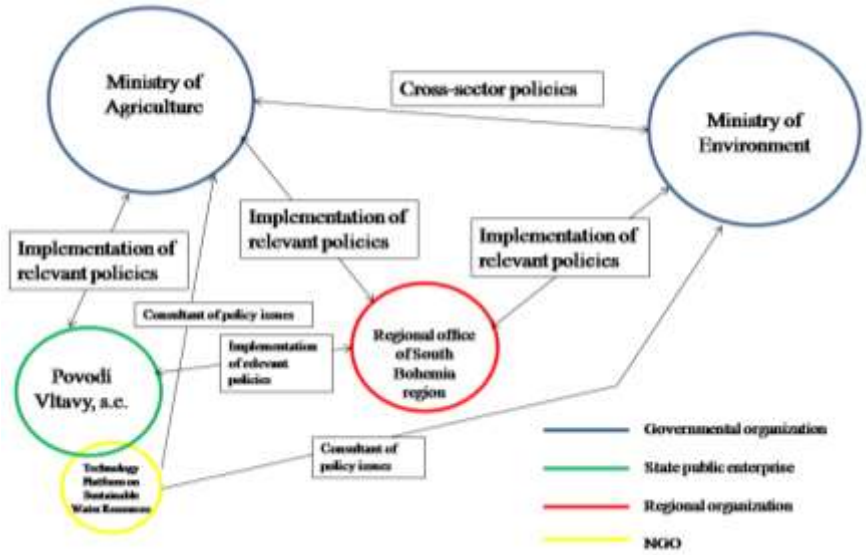
Legend:
CSOs – Community Supported Organizations
Source: Hole, Mitchell, Smith, & Griffey (2017, p. 38).

2.3.9 Transboundary DE-CZ-SK

Czech Republic

In Czech Republic, 5 main stakeholders have been identified (Figure 10). The Ministry of Agriculture is a major player as it is responsible for agriculture, food, water management, land use and to some extent energy policy (renewable energy resources). The Ministry of Environment is responsible mainly for climate issues, but also water and land use policy. The regional office of South Bohemia has a relatively strong mandate in agriculture and land use issues; it is however less involved in water, energy and climate issues. Povodí Vltavy, the river basin authority of the river Vltava is engaged in water policy and management issues, and partly in energy (renewable energy resources - hydropower) and land use issues.

Figure 10 Stakeholder map for Czech Republic



Legend:
Povodí Vltavy, s.e. – Vltava River Basin management authority, state enterprise.
Source: Hesslerová, Pokorný, Kröpfelová, & Baxa, 2018, p. 20.

Slovakia

For Slovakia, 48 stakeholders were identified including public, private bodies, research institutions, business and NGOs. Figure 11 shows them organized in major groups.

At national level, there are the Ministry of Environment, Ministry of Agriculture and Ministry of Economy. The Ministry of Economy is responsible for energy policy. The Ministry of Environment is responsible for water, climate and environmental policy in general.
The association of towns and municipalities, representing local governments, contributes to the drafting of national laws that concern local affairs. Local governments implement policies concerning local services such as drinking water supply and waste water treatment through public joint stock companies, and spatial planning.

In the water sector an important stakeholder is the Slovak water management company, a public enterprise under the Ministry of Environment organized in four geographical branches according to the river basins of the country. The company is in charge of water infrastructure construction and management, flood management, water quality protection and monitoring.

Although not represented in the figure (because included in the groups represented), other actors are mentioned in the policy analysis report of Slovakia. These include research institutes like the Slovak Environmental Agency and the Water Research Institute of the Ministry of Environment. The latter conducts both policy and natural science research on water issues. The institute is in charge of the implementation of the Water Framework Directive including river basin management plans

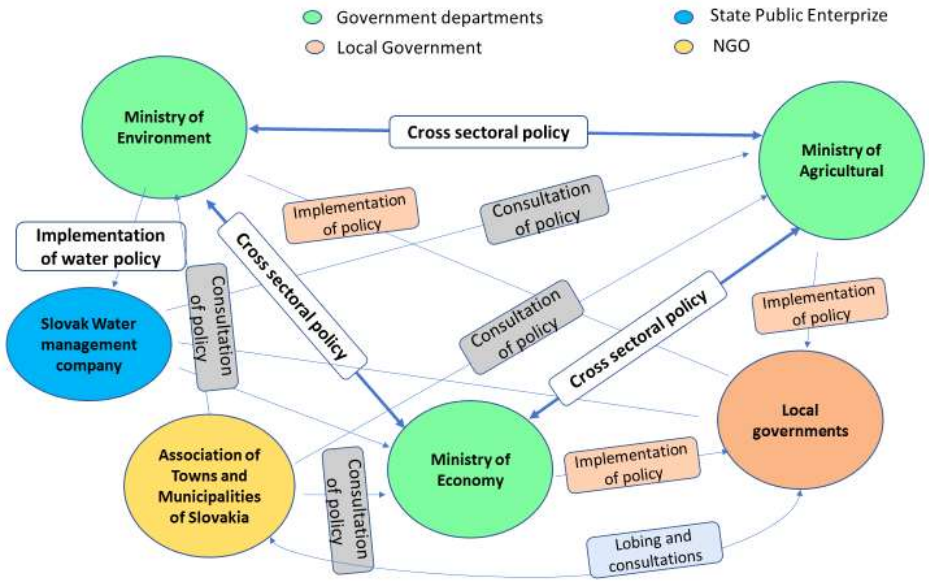
and flood management plans. Another stakeholder part of the Ministry is the state water investment company Vodohospodárska výstavba.

Within the Ministry of Agriculture, the State Forest of Slovakia who manages small rivers flowing through forested land and the State Forest of the Tatra National Park who manages small rivers flowing through the Tatra National Park. There is also Hydromeliorace managing the amelioration facilities in agricultural and urban areas and the Institute for education and training of forestry and water management workers of Slovakia.

Professional associations and trade unions in the water, forestry and agriculture sectors are also mentioned among the private stakeholders that lobby public organizations on specific policies that interact with their interests.

Greenpeace, Living River, People and Water, Sosna, Forest protection Association VOLF, Ekopolis Foundation, Bratislava Protect Association, Slovak Society for Sustainable Life, Carpathian Foundation are all NGOs representing different environmental, social and cultural interests. These organizations actively work on creating civic participation and public awareness on specific environmental issues in the country.

Figure 11 Stakeholder map for Slovakia



Source: Kravčík, Kováč, Gažovič & Karahuta 2018, p. 31.

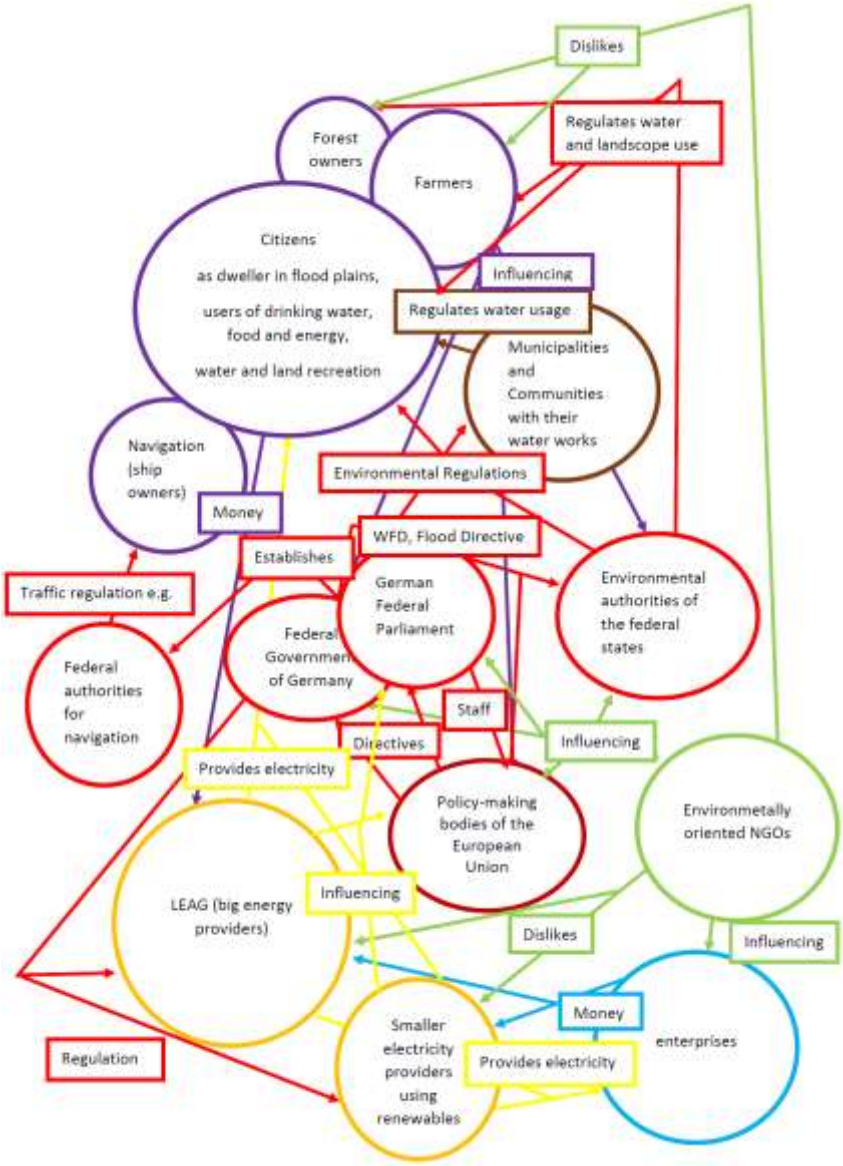
Germany

For Germany, numerous stakeholder groups were identified ranging from European institutions to the federal and regional governmental bodies and citizens (Figure 12). The Government, Parliament and ministries and Federal States hold the decision-making power.

At federal level, navigation authorities are in charge of maintenance of rivers and canals for navigation, with a focus on safety (of relevance for the case study are the Elbe and Oder river); while environmental authorities are in charge of all aspects of environmental management. Implementation of energy and agriculture policy also occur at federal state level. Concerning water, federal states implement the EU water framework directive and the flood directive. Drinking water supply and waste water treatment are then implemented by local administrations (municipalities).

As for the private sector, ship owners, big and small energy producers and distributors, farmers and their organizations and forest owner and their organizations are important stakeholders as they are affected by policies and can influence policy making. For example, a major energy stakeholder is LEAG, a company owning large coal plants and lignite pits in Eastern Germany who is the major energy provider of the region.

Figure 12 Stakeholder map for Germany in the transboundary case DE-CZ-SK



Source: Hodel & Conradt (2017, p. 24).

2.3.10 Transboundary DE-FR

Stakeholders from various sectors relevant to the Upper Rhine case study are listed in Table 6 (a stakeholder map is not available). Since the case is transboundary (France/Germany), some public organizations work in both or more countries. Some stakeholders function as networking platforms or clusters within their field of expertise and have other stakeholders as contributing members. For example the members of the working groups of the Upper Rhine Commission are members of the French, German and Swiss local governments and ministries.

Table 6 List of relevant stakeholders in the transboundary Upper Rhine basin (DE-FR)

Country	Nexus Sector	Type of organization	Abbreviation	Name of Organization
France				
FR	Multiple sectors	Regional governmental organisation	Région GE	Région Grand Est
FR	Multiple sectors	Regional governmental organization	SGARE	Secrétaire Général pour les Affaires Régionales et Européennes (SGARE)
FR	Multiple sectors	Governmental organizations	Departments	Départements Grand Est (10: Ardennes, Aube, Marne, Haute-Marne, Meurthe-et-Moselle, Meuse, Moselle, Bas-Rhin, Haut-Rhin, Vosges)
FR	Multiple sectors	Governmental organizations	DDT	Directions Départementales des Territoires (10)
FR	Multiple sectors	National governmental organisation	ADEME	Agence de l'environnement et de la maîtrise de l'énergie
FR	Multiple sectors	Regional governmental organization	ADEMEGE	Agence de l'environnement et de la maîtrise de l'énergie régionale Grand Est
FR	Multiple sectors	Trade union	CCI Alsace	Chambre de commerce et de l'Industrie d'Alsace
FR	Multiple sectors	Network	IDA	Idée Alsace
FR	Agriculture	Trade union	CRA	Chambre d'agriculture d'Alsace
FR	Agriculture	Research	INRA Colmar	Institut National de Recherche Agronomique de Colmar
FR	Agriculture	Business	CAC	Coopérative Agricole de Céréales
FR	Agriculture	Business	Le Comptoir Agricole	Le Comptoir Agricole
FR	Agriculture, Land use	Business	SAFER	Sociétés d'aménagement foncier et d'établissement rural
FR	Agriculture, Land use	Regional governmental organisation	DRAAF GE	Direction Régionale de l'Alimentation, de l'Agriculture et de la Forêt Grand Est
FR	Land use	National governmental organisation	ONF	Office National des Forêts

FR	Land use	Regional governmental organisation	DREAL	Direction régionale de l'environnement, de l'aménagement et du logement
FR	Land use	National governmental organisation	ONCFS	Office National de la Chasse et de la Faune Sauvage
FR	Land use, water, energy	NGO	Alsace Nature	Alsace nature
FR	Land use, water, energy	NGO	FNEGE	France Nature Environnement Grand Est
FR	Water, Land use, Climate	Research	ENGEES	École national du génie de l'eau et de l'environnement de Strasbourg
FR	Water	Network	APRONA	Association pour la Protection de la Nappe Phréatique de la Plaine d'Alsace
FR	Water	Regional governmental organisation	AERM	Agence de l'eau Rhine-Meuse
FR	Energy, Water	Business	EDF	Électricité de France
Germany				
GER	Multiple sectors	Regional governmental organisation	RPräsF	Regierungspräsidium Freiburg
GER	Multiple sectors	Regional governmental organisation	RPräsK	Regierungspräsidium Karlsruhe
GER	Multiple sectors	Regional governmental organisation	RPräsS	Regierungspräsidium Stuttgart
GER	Multiple sectors	Regional governmental organisation	RPräsT	Regierungspräsidium Tübingen
GER	Multiple sectors	Business	IHK	IHK Südlicher Oberrhein
GER	Multiple sectors	Research	KIT	Karlsruhe Institute of Technology
GER	Agriculture	Trade Union	BLHV	Badischer Landwirtschaftlicher Hauptverband e.V .
GER	Agriculture	Research	WBI	Weinbauinstituts and Staatsweingut Freiburg
GER	Agriculture, Land use	Regional governmental organisation	MLV	Ministerium für Ländlichen Raum und Verbraucherschutz Baden-Württemberg
GER	Land use, Water, Energy	NGO	BUND	Bund für Umwelt und Naturschutz Deutschland Regionalverband Mittlerer Oberrhein
GER	Land use	Regional governmental organisation	FLBW	Forst Landesbetrieb Baden Württemberg
GER	Climate, energy	Network	KPO	Klimapartner Oberrhein
GER	Energy, Climate,	Regional governmental organisation	MUKE	Ministerium für Umwelt, Klima und Energiewirtschaft Baden-Württemberg

	Land use			
GER	Energy	Business	EnBW	Energie Baden-Württemberg
GER	Energy	Network	SPKO	Strategische Partner Klimaschutz am Oberrhein e.V.
International				
FR, GER, CH	Multiple sectors	International governmental organization	UPC	Upper Rhine Conference
FR, GER	Multiple sectors	Network	EU SKO	Eurodistrict Strasbourg-Kehl-Offenburg
FR, GER	Multiple sectors	Network	EU FR	Eurodistrict Freiburg-Alsace
FR, GER	Multiple sectors	NGO	ICLEI	International Council for Local Environmental Initiatives
Inter-national [3]	Water	International governmental organization	ICPR	International Commission for the Protection of the Rhine
Inter-national [4]	Water	Research	CHR	Commission Internationale pour l'Hydrologie du bassin du Rhin
FR,GER	Water	Network	LOGAR	Länderübergreifende Organisation für Grundwasserschutz am Rhein
FR, GER	Energy, Land use	Network	URC	Upper Rhine Cluster for Sustainability Research
FR, GER	Energy	Research	EIFER	European institute for Energy Research
FR,GER	Energy	Network	TRION	TRION Climate e.V. Netzwerk für Energie und Klima der Trinationalen Metropolregion Oberrhein
Internati onal	Energy, climate	Network	ICLEI	International Council for Local Environmental Initiatives (ICLEI)

[3] Switzerland, France, Germany, Luxemburg, the Netherlands, the European Commission, Austria, Liechtenstein, the Belgian region of Wallonia, Italy.

[4] Switzerland, Austria, Germany, France, Luxembourg and the Netherlands.

2.4 Nexus-relevant policy documents

Table 7 illustrates the nexus-relevant policies identified in the case studies. Overall, the policy documents identified by the case studies can be included in the following categories:

- International agreements and conventions;
- Transboundary agreements between neighbouring countries;
- EU directives and regulations;
- National laws, ordinances and acts transposing or implementing EU directives and regulations;
- National and regional laws, ordinances and acts implementing policy instruments;
- National and regional plans and programs implementing national and regional laws;
- National and regional vision and strategy documents setting medium-long term goals and course of action;
- Regional laws, ordinances and acts implementing EU directives and regulations;
- Regional laws, ordinances and acts implementing policy instruments.

Table 7 Nexus sectors and nexus-relevant policies per each case study

Case study	Nexus sectors involved	Nexus-relevant policies
Azerbaijan	Water	Law on water supply and sewage Water Code of the Azerbaijan Republic Law on land amelioration and irrigation Law on hydrometeorology Law on water economy of municipalities Law on safety of hydro-technical installations Law on environmental protection Law on industrial and municipal wastes Presidential Decree, Development Concept “Azerbaijan - 2020: Outlook for The Future” Presidential Decree “Strategic road maps for the national economy and main economic sectors”
	Land (Forestry)	Law on use, preservation and management of forestry The National Forestry Program
	Agriculture	Law No. 344-IIQ "About stimulation of insurance in agricultural industry" Law of June 13, 2008 No. 650-IIIG "About environmentally friendly agricultural industry" State program on developing of vine production and industry in Azerbaijan Strategic Road Map for the manufacture and processing of agricultural products
	Energy	Law on the utilization of energy resources Law on Energy (addressing oil and gas industry) Law on electric power and heat stations (designing, construction, operation and use of the permanent installations) Law on Electrical Energy (production and provision of electricity services) State Strategy on use of alternative and renewable energy sources

	Climate	Decree, Azerbaijan 2020: Look to the Future Action Plan on improvement of ecological situation and efficient use of natural resources for 2015-2020 State Programme for the socioeconomic development of the regions of Azerbaijan Law on the verification of the Kyoto Protocol in the UNFCCC
	Environment (pollution)	Law on Environmental Protection Law on industrial and municipal wastes Law on protection of atmospheric air
Greece	Water	Law 3199/2003: Protection and management of water resources – Reconciliation with the WFD 2000/60/EC Presidential decree 51/2007: Determination of measures and procedures for the integrated protection and management of water resources in compliance with the WFD 2000/60/EC Decision 39626/2208/E130 (2009): Measures for the protection of groundwater from pollution and deterioration in compliance with the European Directive 2006/118/EC Common Ministerial Decision 31822/1542/E103 (2010): Assessment and management of flood risk in compliance with the provisions of the European Directive 2007/60/EC River Basin Management Plans for all 14 water districts
	Land	Decision 6876/481-2008: General legislative framework for spatial planning and sustainable development Law 4269/2014: Spatial and urban planning reformation – Sustainable development Decision 31722-2011: Special legislative framework for spatial planning and sustainable development of the aquaculture sector and the respective strategic environmental impact assessment Decision 11508-2009: Special legislative framework for spatial planning and sustainable development of the industrial sector and the respective strategic environmental impact assessment
	Energy	Decision 49828-2008: Special legislative framework of spatial planning and sustainable development for the renewable energy sector and the respective environmental impact assessment Law 3468/2006: Electricity production from RES and cogeneration of high performance electricity and heat Law 3734/2009: Promotion of cogeneration from two or more types of energy – Issues concerning the 'Mesochora' hydroelectric plant project

		Law 3851/2010: Acceleration of RES development for combating climate change Law 4001/2011: Operation of electricity markets and natural gas markets – Research, production and transmission networks for hydrocarbons Law 4414/2016: Support of electricity production from RES and cogeneration of high performance electricity and heat– Legal and operational separation of natural gas supply and distribution
	Agriculture and food	Law 3165/2003: Sanction of the International Convention on plant genetic resources for food and agriculture Law 4056/2012: Regulations for farming activities, livestock and livestock facilities Law 4036/2012: Pesticides market in Greece – Rational use of pesticides Law 4282/2014: Development of the aquaculture sector Law 4351/2015: Pastures and grazing land in Greece Law 3874/2010: Register of farmers and farms Law 4384/2016: Agricultural associations, types of collective organization of the agricultural land (rural areas) Law 4235/2014: Administrative measures, processes and penalties for the implementation of the EU and national legislation in the food, fodder and health sector and protection of animals Rural Development Programme 2014-2020: Measures for the future development of agricultural sector. Integrated development and sustainable competitiveness of agricultural space. Enhancement of the agri-food sector's competitiveness; promotion of the multifunctional role of rural regions, and; protection of natural environment. Common Agricultural Policy 2015-2020 for Greece.
	Climate	Law 3017/2002: Verification of the Kyoto Protocol in the UNFCCC National programme for the reduction of GHG emissions 2000-2010 Law 4345/2015: Verification of the Doha's amendment on the Kyoto Protocol in the UNFCCC, having been verified by the Law 3017/2002 Law 4426/2016: Verification of the Paris Convention in the UNFCCC National strategic plan for climate change adaptation
	Tourism	Law 4179/2013: Simplification of procedures that support tourist entrepreneurship – Reformation of the Greek Tourism Organization

		Law 3105/2003: Tourist training and regulations concerning the tourist sector
Latvia	Energy	Long-Term Energy Strategy of Latvia 2030 - Competitive Energy for the Society The Guidelines for the Development of Energy Sector for 2016-2020 Long-term strategy for refurbishment of buildings 2014 -2020 Cabinet of Ministers Order No 202 “Plan for development of alternative fuels 2017 – 2020” (adopted in 2017) Energy Law (adopted in 1998) Biofuel Law (adopted in 2005) Electricity Market Law (adopted in 2005) Energy Efficiency Law (adopted in 2016) Law on the Energy Performance of Buildings (adopted in 2013) Subsidised Electricity Tax Law (adopted in 2013)
	Food (agriculture)	Latvia – Rural Development Programme (National) 2014 – 2020 Law on Agriculture and Rural Development (adopted in 2004)
	Land (forestry)	Cabinet of Ministers Order No 611 “The Guidelines for the development of forestry and related branches 2015.-2020” (adopted in 2015) Law on Forests (adopted in 2000) Law on Specially Protected Nature Territories (1993)
	Water	Water Management Law (adopted in 2002) Natural Resources Tax Law, (adopted in 2005)
	Climate	Environmental policy guidelines 2014-2020
Netherlands	Water	Agreement Water for the Netherlands, Union of Waterboards, IPO, VEWIN, Ministry of Infrastructure and Environment, VNG (2011) Delta Programme 2018: working on a sustainable and safe delta. Delta Programme Office (2017) and implementation process Flood protection programme 2016: project book, Waterboards, Rijkswaterstaat, HWBP (2016)

		River Basin Management Plans: 2nd generation, Ministry of Infrastructure and the Environment (2015) and revisions during years to come
	Land	Vision for Infrastructure and Spatial Planning: Netherlands competitive, accessible, liveable and safe. Report. Ministry of Infrastructure and Environment (2012) The Environmental Planning Act: The Parliament adopted in 2016 the new law submitted by the Ministry for Infrastructure and Environment. The new Act is expected to enter into force in 2021. The Act seeks to modernise, harmonise and simplify current rules on land use planning, environmental protection, nature conservation, construction of buildings, protection of cultural heritage, water management, urban and rural redevelopment, development of major public and private works and mining and earth removal, and integrate these rules into one legal framework.
	Energy	'Kabinetsaanpak klimaatbeleid', Letter to Lower Chambre 32 813 nr. 163, Minister of Economic Affairs (2018). Follow-up process (2018): Climate consultation, leading to a new national Climate and Energy agreement. The Energy Agenda, towards a CO_2-low energy supply. Ministry of Economic Affairs (2016) Uitvoeringsagenda Energieakkoord voor duurzame groei 2018 (Energy Agreement Sustainable Growth). Social Economic Council SER (2018), The Hague. The Netherlands. Uitvoeringsagenda Energieakkoord voor duurzame groei 2017 (Energy Agreement Sustainable Growth). Social Economic Council SER (2017), The Hague. The Netherlands. Energieakkoord voor duurzame groei (Energy Agreement Sustainable Growth), Social Economic Council SER (2013), The Hague. The Netherlands.
	Agriculture and food	CAP in your country: The Netherlands, European Commission (2016) Factsheet on Rural Development Program of the Netherlands, 2014-2020. European Commission (2016), Brussels, Belgium. Implementation of the Rural Development Programme 2014-2020. Letter to Parliament, Ministry of Economic Affairs (2014) Agenda for safe, healthy and sustainable food. Letter to the Parliament, Ministry of Economic Affairs, Ministry of Infrastructure and the Environment and Ministry of Foreign Affairs (2015) Beleidsbrief duurzame voedselproductie (Policy brief sustainable food production). Letter to the Parliament. Ministry of Economic Affairs and Ministry of Health, Wellbeing and Sports (2013), The Hague, The Netherlands. Agenda for more Sustainable Food. Report. Ministry of Economic Affairs and the Alliance of more Sustainable Food (2013)

	Environment (nature, biodiversity, forestry)	Implementation of Natural Capital Accounting: preservation and sustainable use of biodiversity. Report. Ministry of Economic Affairs (2013) Vision on nature policy 2014. Report. Ministry of Economic Affairs (2014)
	Circular economy (waste, biomass)	National waste policy plan, 2009-2021, Ministry of Infrastructure and the Environment (2014) Programme from waste to resource, Ministry of Infrastructure and the Environment (2014) A circular economy in The Netherlands by 2050. Ministries of Infrastructure and the Environment, Economic Affairs, Foreign Affairs, Interior and Kingdom Relations (2016). Transition agenda biomass and food (2018) Guidelines for a bio-based economy. Attachment no.2 of a Letter to the Parliament of the minister of Economic Affairs (2012) Biomassa 2030: strategische visie voor de inzet van biomassa op weg naar 2030. Report nr. 89293. Ministry of Economic Affairs (2015), The Hague, The Netherlands.
	Climate adaptation and mitigation	National climate adaptation strategy, Ministry of Infrastructure and the Environment (2016) 'Kabinetsaanpak klimaatbeleid', Letter to Lower Chambre 32 813 nr. 163, Minister of Economic Affairs (2018). Follow-up process (2018): Climate consultation, leading to a new national Climate and Energy agreement.
Sweden	Water	Act (SFS 1993:787) on Fisheries Ordinance (SFS 1994:1716) on Fishing, Aquaculture and Fisheries Ordinance (SFS 1998:1343) on the Support of Fish Conservation Ordinance (SFS 2009:956) on Flood Risk Act (SFS 1975:424) on the Duty to Report on the Exploration for Groundwater and Drilling of Wells Act (SFS 1998:812) Containing Special Provisions concerning Water Operations Ordinance (SFS 2004:660) on management of the quality of the aquatic environment Ordinance (2008:218) on Bathing Waters Ordinance (SFS 2001:554) on Environmental Quality Standards for Fish and Bivalve Waters Ordinance (SFS 1982:840) on Government Funding for Liming of Lakes and Rivers Act (SFS 2006:412) on Public Water Services

	Land (forestry)	Act (SFS 1979:429) on Forest Maintenance Ordinance (SFS 1993:1096) on Forest Maintenance Ordinance (SFS 2009:1393) with Instructions for the Swedish Forest Agency Ordinance (SFS 2010:1879) on Support for Certain Measures in Forestry
	Energy	Act (SFS 1997:857) on Electricity Act (1994:1776) on Tax on Energy Ordinance (2010:178) on Tax on Energy Act (SFS 2011:1200) Regarding Electricity Certificates Ordinance (SFS 2011:1480) on Electricity Certificates Act (SFS 2010:601) on Guarantees of Origin for Electricity Ordinance (SFS 2010:853) on Guarantees of Origin for Electricity Agreement by The Government, the Moderate Party, the Centre Party and the Christian Democrats on Swedish energy policy Act (SFS 2010:598) on Sustainability Criteria for Biofuels and Bioliquids Ordinance (SFS 2011:1088) on Sustainability Criteria for Biofuels and Bioliquids Ordinance (SFS 2003:564) on Grants for Measures Promoting Effective and Environmentally Sustainable Energy Supply Research and New Technology for the Future Energy System (Gov. Bill 2005/06:127) Act (SFS 1990:613) on an Environmental Charge on Emissions of Nitrogen Oxides in Energy Production
	Climate	The Swedish Climate Policy Framework (passed in parliament 15 June, 2017) A Climate Policy Framework for Sweden (Gov. Bill 2016/17:146 Ordinance (SFS 2015:517) on Aid to Local Climate Investments Ordinance (SFS 2016:385) on Financial Support for Municipal Energy and Climate Advisors Act (SFS 2004:1199) on Emission Trading Ordinance (SFS 2004:1205) on Emissions Trading
	Environment	A Swedish strategy for biodiversity and ecosystem services (Gov. Bill 2013/14:141)

		Ordinance (SFS 2007:845) on Species Protection Environmental Code (SFS 1998:808) Proposal for Consequential Legislation to the Environmental Code (Gov. Bill 1997/98:90) Ordinance (SFS 1998:899) on Environmentally Hazardous Activities and the Protection of Public Health Ordinance (SFS 1998:905) on Environmental Impact Statements Ordinance (SFS 1998:915) on Environmental Considerations in Agriculture Ordinance (SFS 1998:1252) on the Protection of Natural Areas According to the Environmental Code Environmental Quality Objectives – A Shared Responsibility (Gov. Bill 2004/05:150), Chapter 12-13 Act (SFS 1984:410) on Taxation of Pesticides Ordinance (SFS 2001:512) on the Landfill of Waste Ordinance (SFS 2011:927) on Waste
Andalusia	Water	Royal Decree 1/2001 Rewritten Text of the Water Act Law 9/2010 of Water of Andalusia Law 10/2001 National Hydrological Plan Guadalquivir River Basin Management Plan Guadiana River Basin Management Plan Segura River Basin Management Plan Mediterranean River Basins Management Plan Guadalete and Barbate River Basin Management Plan Tinto, Odiel and Piedras River Basin Management Plan National Irrigation Plan Horizon 2008 Agenda for Andalusian Irrigation Horizon 2015 Special Management Plan of the Irrigation Zones Located to the North of the Forest Crown of Doñana Andalusian Water Agreement in the Guadalquivir RBD
	Land	Law 7/2002, Urban Planning of Andalusia Andalusian Land Planning Scheme

		Andalusian Integrated Coastline Management Strategy Andalusian Coastline Protection Plan
	Energy	Law 15/2012, Fiscal Measures for Energy Sustainability Law 24/2013 Electric Sector Royal Decree 900/2015 that regulates the administrative, technical and economic conditions of the modalities of electric energy supply and production with self-consumption Saving and energy efficiency action plan 2014-2020 Saving and energy efficiency action plan 2017-2020 Renewable Energy Plan 2011-2020 Andalusian Energy Strategy 2020 Andalusian Energy Action Plan 2016-2017
	Agriculture	Royal Decree 1075/2014 implementation of direct payments and rural development in Spain Royal Decree 1072/2015 modification of RD 1075/2014 of implementation of direct payment and rural development in Spain Royal Decree 1076/2014 allocation of payment entitlement National Rural Development Programme 2014-2020 Andalusian Rural Development Programme 2014-2020 Andalusian proposed law on agriculture
	Climate	Spanish Climate Change and clean energy strategy Horizon 2007-2012-2020 Andalusian Climate Action Plan: Mitigation programme 2007-2012 Andalusian Climate Action Plan: Adaptation programme 2007-2012 Andalusian proposed Law on Climate Change Covenant of Mayors for Climate & Energy
	Tourism	Law 13/2011 of Tourism of Andalusia Andalusia Quality Tourism Plan 2014-2020 Sustainable Integral Strategy for the Development of Interior Tourism in Andalusia General Plan for Sustainable Tourism in Andalusia – Horizon 2020

	Environment and sustainable development	Law 7/2007 on Environmental Quality Integrated Management of Andalusia Environmental Plan Andalusia - Horizon 2017 Spanish Strategy for Sustainable Development Andalusian Strategy for Sustainable Development 2020 Urban Sustainability Strategy for Andalusia Law 45/2007 Sustainable Rural Development Andalusian Strategy for Biodiversity Integrated Management
	Bioeconomy	Draft of the Spanish Strategy on Circular Economy Formulation agreement for the Bioeconomy Strategy of Andalusia
Sardinia	Water	Sardinian Hydrologic district management plan Regional water law 19/2006 Oristano Irrigation Consortium regulation Central Sardinia Irrigation Consortium regulation Nurra Irrigation Consortium regulation North Sardinia Irrigation Consortium regulation Campidano Irrigation Consortium regulation Regional deliberation n. 19/16 2015 “Coordination table for the implementation of EU directives 2000/60/CE and 2007/60/CE
	Land (forestry)	Forestry Law of Sardinia 27 April 2016, n.8 Regional plan for the forecasting, prevention and active fight against wildfire 2014 – 2016. Update 2016 Hydrogeological Risk Plan Regional Landscape Plan
	Energy	Sardinia Energy plan 2016-2020 Regional regulation 12/21 2012 Guidelines on renewable energy sources DGR 27/12 2011 – Guidelines for authorization of renewable energy power plants
	Agriculture	Sardinian Rural development programme 2014-2020

	Climate	Establishment of inter-departmental coordination for a regional climate change adaptation strategy Adaptation Strategy to Climate Change. Signing of the protocol "UNDER 2 MOU"
	Tourism	LR N°16, 28-07-2017: Normatives for the Tourist sector Regional Development Programme 2014 – 2019
South-West England	Water	The government's strategic priorities and objectives for Ofwat (The economic regulator of the water sector in England and Wales) Defra's strategic policy statement to Ofwat: Incorporating social and environmental guidance South West river basin district river basin management plan (Water for life and livelihoods) 2015 Water Act 2014 The Water Supply (Water Quality) Regulations 2016 The Private Water Supplies (England) Regulations 2016 White Paper 'Water for life' 2011- EU Water Framework Directives: includes Urban Water Directive, Water Framework Directive, Bathing Water Directive and Drinking Water Directive: 2000- current and Brexit related implications
	Energy	UK Energy Policy set on 'smart and flexible path' - set out in Clean Growth Strategy (2017) which fits into the UK's Industrial Strategy (2017) and Ofgem's Upgrading our Energy Systems (2017). Climate Change Act 2008: to reduce GHG by 80% from 1990 level. It sets out 5 carbon budgets in order to meet this. Energy Act 2008 The UK Low Carbon Transition Plan National strategy for climate and energy 2009 Energy Act 2013 - mainly focused on setting targets for the decarbonisation of the UK energy system alongside setting out guidance for reforming the UK electricity market EU Renewable energy directive 2009-2020 - sets out the national renewable energy targets for the UK, EU Energy Efficiency Directive (2012/27/EU) 2014 - The Energy Saving Opportunity Scheme (ESOS) implemented in UK law and Brexit related implications The Renewable Transport Fuel Obligations Order 2007

	Agriculture, food and land use	A Green Future: our 25 year plan to improve the environment. 2017 Health and Harmony: The Future, for food, farming and the environment in a Green Brexit. 2018 Agriculture Bill. 2018 Environmental Principles and Governance Bill. 2018- Common Agricultural Policy (CAP) reform. 2013-20 and Brexit related implications EU Rural Development Policy for England 2014-2020: Protecting farmland through environmental land management, targeted to specific biodiversity and water objectives and Brexit related implications New consultation on post-CAP domestic settlement for agriculture - agricultural support scheme that encourages farmers to protect the environment and invest in new technology to improve productivity. 2018 Natural Environment and Rural Communities Act (the NERC Act). 2006 -(under review) Protection of water against nitrate pollution (England and Wales) Regulations. 1996- The Sludge (use in agriculture) Regulations. 1989- Sewage Sludge on Farmland: code of practice for England, Wales and Northern Ireland. Updated 2017 Countryside and Environmental Stewardship Schemes. 2006- The Plant Protection Products (Sustainable Use) Regulations. 2012- EU Rural Development Policy for England 2014-2020: Protecting farmland through environmental land management, targeted to specific biodiversity and water objectives. EU Directives in UK regulatory framework: Includes: Birds and Habitats Directives; Integrated Pollution Prevention and Control Directive and the Waste Framework Directive; Framework Directive on the Sustainable Use of Pesticides and Brexit related implications.
Transboundary DE-CZ-SK	Water	**Czech Republic** Government decision No. 1083/2015, Coll. National plans of Labe, Odra, Danube catchments National plan of Labe catchment Preparation of measures to mitigate the negative impacts of drought and water scarcity Concept of the solution of flood protection in the Czech Republic using both technical and nature measures Water Policy Conception of the Ministry of Agriculture by 2015

		Act no. 254/2001 Coll. On water State Nature Conservation Program **Slovakia** Act no. 364/2004 Coll. on Water and on Amendments to the Act of the Slovak National Council no. 372/1990 ZB. on Offenses as amended (Water Act) Act no. 7/2010 Coll. on Flood Protection, as amended Act no. 442/2002 Coll. on Public Water Supply and Public Sewerage and on Amendment to Act No. 276/2001 Coll. regulation on network industries **Germany** All policy documents, see report in The background report. **Transboundary** Water framework directive 2000/60/ES Directive on the assessment and management of flood risks - 2007/60 / EC Agreement between the Czech Republic and the Federal Republic of Germany on cooperation on transboundary waters in the field of water management (signed in 1995, came into force in 1997) International Plan of the Elbe river basin
	Land	**Czech Republic** Soil protection framework directive, amending the directive 2004/35/ES Government order no. 13/2014 Coll. On the procedure for the implementation of land consolidation and the requirements of land consolidation proposal Act no. 139/2002 Coll. On landscape consolidation and land offices Act of the Czech National Council no. 334/1992 Coll., on agriculture soil protection Government decree no. 13/1994 Coll., which amends some details on the protection of the agricultural land fund State environmental policy **Slovakia** Act no. 543/2002 Coll. on Nature and Landscape Protection

		Act no. 50/1976 Coll. on the Territorial Planning and the Building Code (Building Act) Act no. 145/2013 Coll., Supplementing the Act of the Slovak National Council no. 330/1991 Coll. on land adjustments, arrangement of land ownership, land offices, land fund and land associations, as amended Act no. 326/2005 Z z. on forests as amended Act no. 138/2010 Coll. on Forest Reproductive Material as amended **Germany** All policy documents, see report in The background report. **Transboundary** Soil protection framework directive, amending the directive 2004/35/ES European Landscape Protection Convention
	Energy	**Czech Republic** National action plan of the Czech Republic for the renewable resources energy Act no.180/2005 Coll. On support of electricity production from renewable resources Act no. 383/2012 Coll. on the conditions for trading in greenhouse gas emission allowances. Biomass action plan **Slovakia** Act no. 555/2005 Coll. on the Energy Efficiency of Buildings and on Amendments to Certain Acts, as amended Act no. 309/2009 Coll. on the promotion of renewable energy sources and high-efficiency cogeneration and on the amendment of certain laws as amended **Germany** All policy documents, see report in The background report. **Transboundary** Directive 2009/28/ EC on the promotion of the use of energy from renewable sources Energy efficiency and its contribution to energy security and the 2030 Framework for climate and energy policy (EU ETS) directive 2009/29/ES on greenhouse gas emission allowance trading scheme of the Community
	Agriculture	**Czech Republic**

		Act No.252/1997 Coll. on agriculture Government order no. 307/2014 Coll. On determination the evidence details of land use according to users relations Government order no.75/2015 on conditions for the implementation of agri-environmental measures Government order no. 48/2017 Coll. On the establishment of requirements under the acts and standards of good agricultural and environmental condition for the areas of cross compliance rules and the consequences of their breach for the provision of certain agricultural subsidies Government order no.50/2015 and its Amendment No.61/2016 on laying down certain conditions for granting direct payments to farmers Guidance - The principles of good agricultural practice in land management - GAEC Guidance - Cross compliance 2017 - guidance for farmers Act no. 256/2000 Coll. on State agriculture intervention fund Government order no. 49/2017Coll. On Amending certain Government Orders in connection with the adoption of a Government Order laying down requirements under the acts and standards of good agricultural and environmental condition for the areas of cross compliance rules and the consequences of their violations for the provision of certain agricultural subsidies Government order no. 47/2017 Coll. The methodology for direct payments Strategy of the Ministry of Agriculture, with a view to 2030 **Slovakia** Act no. 220/2004 Coll. on the Protection and Use of Agricultural Land and on the Amendment of Act No. 245/2003 Coll. on integrated pollution prevention and control and on the amendment of certain laws, as amended Government Regulation no. 342/2014 Z. z. laying down the rules for the granting of agricultural aid in respect of the direct payments schemes, as amended Government Regulation no. 75/2015 Z. z. establishing the rules for the granting of support in connection with rural development programming. Act no. 543/2007 Coll. on the competence of state administration bodies in providing support in agriculture and rural development as amended Act no. 136/2000 Coll. on fertilizers as amended

		Germany All policy documents, see report in The background report. **Transboundary** Common agriculture policy Regulation No 1307/2013 of the European Parliament and of the Council, establishing rules for direct payments to farmers under support schemes within the framework of the common agricultural policy Regulation No 1305/2013 of the European Parliament and of the Council on support for rural development by the European Agricultural Fund for Rural Development (EAFRD) Regulation (EU) No 1306/2013 of the European Parliament and of the Council on the financing, management and monitoring of the common agricultural policy Proposal for a Regulation of the EU Parliament and of the Council establishing rules for direct payments to farmers under support schemes within the framework of the common agricultural policy
	Climate	**Czech Republic** Government decision no.861/2015, The Adaptation Strategy of the Czech Republic on climate changes Government decision no. 207/2017 Coll., Policy of climate protection in the Czech Republic 6th National communication of the Czech Republic Government decision no. 34/2017, National adaptation plan **Slovakia** Act no. 258/2011 Coll. on the permanent storage of carbon dioxide in the geological environment and on the amendment and supplementation of some laws, as amended by Act No. 147/2017 **Germany** All policy documents, see report in The background report. **Transboundary** The United Nations Framework Convention on Climate change, Kyoto Protocol, Paris Agreement EU strategy on adaptation to climate change (COM(2013)216)

Transboundary DE-FR	Water	**France** Water and wetlands law 2006 (LEMA) Flood Risk Management Plan (PGRI) Rhine Meuse Water Development and Management Plan Rhine-Meuse (SDAGE Rhin-Meuse) Flood risks prevention plans (PPRI/GEMAPI) **Germany** Water law (Wasser Haushaltgesetz) Water law for Baden-Württemberg River Basin Management Plan Upper Rhine Integrated Rhine Program Baden-Württemberg **Transboundary** Internationally coordinated flood risk management directive for the Rhine basin Transnational climate change adaptation strategy for the IRBD Rhine
	Energy	**France** National law for Energy Transition for Green Growth (LTECV) National Energy Pluriannual Planning (PPE) Regional Scheme for Climate Air Energy Alsace (SRCAE) Regional biomass plan (SRB) Territorial Climate Air Energy Plans (PCAET) Regional scheme for renewable energy connexion to the power supply network (S3REnR) **Germany** National regulation of electricity generation of biomass Renewable Energy Sources Act Law on energy services and other energy efficiency measures Revised law of the Combined Heat and Power Act Regional Integrated Law of Energy and Climate Protection

	Agriculture	**France** National Framework for the European Agricultural Fund for Rural Development Rural Development Programme Alsace Regional Plan for sustainable agriculture Alsace **Germany** Law of Agriculture and National Culture Baden-Württemberg Rural Development Programme Baden-Württemberg Measures and development programme Baden-Württemberg Law for the Common Task to improve the Agricultural Structure and Coastal Protection Framework plan Common Task to improve the Agricultural Structure and Coastal Protection
	Climate	**France** National Plan for Climate Change Adaptation 2011 (PNACC) Low-carbon national strategy (SNBC) Climate change adaptation plan, Rhine-Meuse basin Regional Scheme for Climate Air Energy Alsace (SRCAE) Territorial Climate Air Energy Plans (PCAET) **Germany** National Climate Action Plan 2050 Climate Change Adaptation Strategy Baden-Württemberg **Transboundary** International Climate Protection and Energy Strategy (Upper Rhine Conference)
	Land use (including biodiversity and forestry)	**France** National directives for green and blue habitat networks (ONTVB) National strategy for biodiversity (SNB) Regional strategy for biodiversity (SRB) Scheme for regional ecological coherence Alsace (SRCE)

		Regional biomass plan (SRB) Regional scheme for forest management (SRGS) Regional nature parks (PNR) Territorial coherence scheme (SCoT) Urbanism local plans (PLU(I)) **Germany** Law of Nature Conservation and Landscape Development Baden-Württemberg Law of Nature Conservation and Landscape Development Nature conservation strategy Baden-Württemberg Forestry Directive Baden-Württemberg **Transboundary** Natura 2000

2.5 Nexus policy goals and instruments

This section presents a summary of the policy goals and instruments identified by the case studies as relevant for their investigation. It should be noted that this is a selection of objectives for the specific purpose of the case study investigation and that the summary groups such objectives in general categories. This means that if one case study is not represented in one category it does not imply that the country/region does not pursue that objective.

2.5.1 Policy objectives across cases

Water

The cases include a number of water related objectives. Even though they are formulated differently, they all refer to the objectives established by the EU water policy and they can be grouped into general categories (Table 8). All case studies address the management of both surface water bodies and groundwater. In most of the cases, important objectives are protection and rehabilitation of water ecosystems (including biodiversity), as well as preservation of water resources (9 out of 10 cases). A few case studies focus on flood and drought protection (e.g. Andalusia). Some examples of policy objectives include:

- Regulation of uses in relation to protection of water bodies (e.g. Azerbaijan, Greece);
- Cost reduction of water management/ Increase cost-efficiency in relation to water quality, flood protection, water supply and (re)use of waste water (e.g. the Netherlands);
- Protection of inland surface waters, transitional waters and coastal waters (e.g. Sweden);
- Ensuring water quality levels compatible with natural resource management (e.g. Andalusia);
- Implementing integrated water monitoring system (e.g. Sardinia);
- Maintain water infrastructure and manage water resources effectively, to develop a resilient and customer focused water industry (e.g. South-west England);
- Integrate flood risk management plans with measures to support for sustainable land use, soil water retention and controlled flooding of certain areas in the event of floods (e.g. Czech Republic);
- Mitigation of droughts (e.g. Slovakia);
- Integration and consistency between different approaches to flood risk management in the Rhine-Meuse basin (e.g. transboundary case of DE-FR).

Table 8 Water policy objectives in all case studies

Objective	AZ	GR	LV*	NL	SE	AND	SAR	SWE	CZ	DE	SK	DE-FR
Water supply (quantity)	X	X		X	X	X		X		X		
Water quality			X	X	X	X	X	X		X		X
Waste, sewage discharge and pollution control	X	X	X		X	X	X	X				X
Sustainable management of water bodies and groundwater	X	X	X	X	X	X	X	X	X	X	X	X
Protection and rehabilitation of water ecosystems	X	X	X	X	X	X		X			X	X
Water efficiency			X	X	X	X		X				
Integrated water management and planning				X	X	X	X	X	X			X
Preservation of water resources	X	X		X	X	X	X	X	X	X	X	X
Amending melioration and irrigation	X					X		X				
Flood and drought protection		X		X	X	X		X	X	X	X	X
Other		X						X	X			X

*In Latvia assessed together with climate and environment.

Land use and forestry

Land use and forestry objectives show considerable dispersion across the case studies, reflecting the different focus of the cases (Table 9). Many cases have included objectives regarding sustainable forest management (6 out of 10 cases). Some objectives focus on specific topics such as forest protection, sustainable planning for industry or agriculture (5 out of 10 cases). Others are related to more general objectives such as integrated spatial planning or sustainable development (5 out of 10 cases). Examples of land use and forestry policy objectives include:

- Development of a national strategy for spatial and urban planning (e.g. Greece);
- Sustainable forest management (e.g. Latvia, Sweden, Sardinia);
- Sustainable, safe and efficient use of the subsoil (e.g. the Netherlands);
- Protection of the Andalusian coastline's natural and cultural heritage (e.g. Andalusia);
- Sustainable and environmentally friendly use of land (e.g. Germany and South-West England);
- Reduction of soil erosion and increase in soil water retention capacity (e.g. Slovakia).

Table 9 Land use and forestry policy objectives in all case studies

Objective	AZ	GR	LV	NL	SE	AND	SAR	SWE	CZ	DE	SK	DE-FR *
Forest protection	X				X		X			X		X
Sustainable forest management	X		X		X		X			X		X
Sustainable use of forest resources	X				X		X			X		
Integrated spatial planning		X		X		X			X			X
Sustainable development		X				X			X	X		X
Urban planning		X				X			X			X
Development of the aquaculture sector and of coastal areas		X				X						
Sustainable spatial planning for industry		X	X	X		X						X
Sustainable land use				X		X	X	X	X	X		
Prevention of soil erosion				X				X	X		X	X
Sustainable farming in the landscape		X					X	X	X	X		X
Land risk mitigation		X		X			X	X	X		X	
Landscape protection				X							X	
Other		X		X			X		X			

* The transboundary case of DE-FR focused on environment related the land use policy. In the table above, the goals related to spatial planning were captured, as the main focus is not nature.

Energy

For the **energy** sector (Table 10), 9 out of 10 studies selected increasing share of renewable energy sources and energy efficiency as key objectives, which are direct emanation of the EU energy policy. Additionally, climate change adaptation and mitigation is an objective of 6 of 10 cases, often indicated under energy rather than climate policy. Some cases mention more specific goals such as contrasting energy poverty (e.g. the DE-FR transboundary case), withdrawal from the nuclear energy (e.g. Germany), and upgrading energy infrastructure (e.g. Sweden, Sardinia, South-west England). Some examples of objectives for the energy sector are:

- Identification of rules and criteria for the sustainable management of RES (e.g. Greece);
- Competitive economy, sustainable energy to be reached by increasing energy efficiency and use of renewable energy (e.g. Latvia);
- Sustainable increase in biomass supply (e.g. the Netherlands);

- Sustainable and environmentally friendly energy supply (e.g. Sweden);
- Competitive electricity prices and robust electricity network with high security (e.g. Sweden);
- Achieve 25% renewable energy share in the total energy consumption (e.g. Andalusia);
- Increase economic competitiveness in the energy market and full integration in the European market (e.g. Sardinia);
- Financial support for various renewable energy schemes (e.g. South-West England);
- Support for biomass production - ripe and corn (e.g. Czech Republic);
- End of nuclear energy usage (e.g. Germany);
- Contrast energy poverty (e.g. the transboundary case of DE-FR).

Table 10 Energy policy objectives in all case studies

Objective	AZ	GR	LV	NL	SE	AND	SAR	SWE	CZ	DE	SK*	DE-FR
Increasing share of renewable energy sources	X	X	X	X	X	X		X	X	X	-	X
Energy efficiency	X	X	X	X	X	X	X	X	X	X	-	
Climate change adaptation and/or mitigation		X	X	X		X		X	X		-	
Energy security	X	X	X		X		X	X			-	
Competitive energy and prices			X		X		X	X			-	
Upgrade energy infrastructure (smart grids)					X		X	X			-	
Contrast energy poverty											-	X
Withdrawal from the nuclear energy										X	-	X

*The Slovak case has not addressed the energy objectives specifically.

Agriculture and food

For the **agriculture** sector, the main objective is sustainable and environmental friendly agriculture across cases, which is also an objective of the EU CAP (Table 11). More specific objectives are for example maintaining of pastures and grazing lands (e.g. Greece) and sustainable use of pesticides (e.g. Greece, South-west England). Some examples of agriculture and food policy objectives include:

- Preservation and sustainable use of plant genetic resources for food and agriculture (e.g. Greece);
- Food security (e.g. Greece);
- Sustainable and healthy food consumption (e.g. the Netherlands);
- Zero eutrophication (e.g. Sweden);

- Improve farmers' education and training and enhance employment of young people and female farmers in the agricultural and agro-industrial sector (e.g. Andalusia);
- Encouraging the efficient use of resources and the transition to a low-carbon and climate-friendly economy in the agri-food and forestry sectors (e.g. Sardinia);
- Ensure that food safety is given priority when pesticides are authorised (e.g. South-West England);
- Increase soil protection in view of climate change through sustainable farming and sustainable landscape management (e.g. Czech Republic);
- Prevention of animal diseases (e.g. Germany);
- Support for agriculture, rural development and fisheries (e.g. Slovakia);
- Provision of practical guidance and funds for agricultural practices preserving ecosystems, biodiversity and soil as well as promotion of climate smart and organic agriculture in Alsace (the transboundary case of DE-FR).

Table 11 Agriculture and food policy objectives in all case studies

Objective	AZ	GR	LV*	NL	SE **	AND	SAR	SWE	CZ	DE	SK	DE-FR
Improving competitiveness of agriculture				X	X	X	X					X
Improving sustainability of the agriculture sector			X	X		X	X	X	X	X		X
Improving socio-economic conditions for farmers and rural areas	X					X	X		X		X	X
Environmental friendly agriculture	X			X	X	X	X	X	X	X	X	X
Development of wine production	X					X						X
Food security and safety	X	X		X	X	X		X				
Sustainable, good quality and healthy food consumption and supply chain				X	X	X		X		X		X
Preservation and sustainable use of biodiversity and genetic resources		X			X	X				X		X

Development of livestock farming and disease control		X				X		X		X		X
Sustainable use of pesticides		X						X				
Sustainable development of aquaculture and fisheries		X									X	X
Maintaining of pastures and grazing lands		X										
Modernisation of infrastructure in agriculture						X						X
Improving soil management and preventing land degradation						X			X			X
Strategic use of land								X	X		X	X

*In Latvia assessed together with land use and forestry.
** Described in the Swedish report as objectives of other horizontal sectors.

Climate

Finally, **climate** objectives are similar across case studies and all derive from the international and EU climate policy regime. Resilience towards climate change impacts and reduction of greenhouse gas emissions are common objectives across case studies (7 out of 10 cases). Some cases also include air pollution and environment protection as objectives (see Table 12). Climate objectives are often connected to environmental objectives, such as improving the state of environment or efficient use of natural resources. A few specific climate policy objectives include:

- Reduction of GHGs emissions (e.g. Greece, Sweden, Germany, DE-FR);
- Promotion of knowledge on climate change in agriculture sector and training of farmers on the use of good agricultural practices (e.g. Andalusia);
- Reduction of the vulnerability of natural, social and economic systems (e.g. Sardinia);
- Adaptation to climate change (e.g. Czech Republic, Slovakia, DE-FR).

Table 12 Climate policy objectives in all case studies

Objective	AZ	GR	LV	NL*	SE	AND	SAR	SWE*	CZ	DE	SK	DE-FR
Climate mitigation (reduction of GHGs emissions)	X	X		-	X	X	X	-	X	X		X
Climate change adaptation	X			-			X	-	X		X	X
Improve state of the environment	X		X	-	X	X		-	X	X		X
Efficient use of natural resources and energy	X	X	X	-		X		-		X		X
Increase of renewable energy share in the energy mix	X	X		-	X	X		-		X		X
Resilience against climate change impacts	X	X		-	X	X	X	-	X			X
Sustainable development	X	X	X	-				-				
UNFCCC implementation		X		-		X	X	-				
Stable, long-term climate policy	X	X		-	X		X	-				
Mainstreaming climate adaptation and mitigation in relevant sectors	X	X				X		-		X		X

*The Dutch and South-West England cases have not addressed climate policy objectives specifically. Climate policy is addressed indirectly via the energy policy for the Netherlands (included via biomass policy) and via energy, agriculture and water policies for South-West England.

2.5.2 Policy instruments across cases

Water

Looking at policy instruments, in the water sector regulatory measures are the most common across cases (all 10 cases), along with organisational change measures (7 out of 10 cases), which usually include creation of new water management bodies, schemes or programs (Table 13). Some examples include:

- Rules for recovery of the expenses of water supply services, discharge of sewage and discharge of wastes (e.g. Azerbaijan);
- Combined approach for monitoring point and diffuse sources of pollution (discharges into surface waters) (e.g. Greece, Andalusia);

- Restrictions of activities in coastal dunes (e.g. Latvia);
- Provisions concerning the management of the quality of the aquatic environment (e.g. Sweden);
- Fee for using public water resources (e.g. Andalusia);
- Optimized water management with integrated monitoring systems (e.g. Sardinia);
- Revision of measures for forestry meliorations, streams and forest roads with a focus on protection and restoration of natural water regime in forests (e.g. Czech Republic);
- Flood Risk Management Plans (e.g. transboundary DE-FR, Andalusia).

Table 13 Water policy instruments in all case studies

Instrument	AZ	GR	LV*	NL	SE	AND	SAR	SWE	CZ	DE	SK	DE-FR
Economic penalties		X		X	X	X		X		X		
Economic incentives	X		X	X	X	X	X	X				
Regulations or legislation	X	X	X	X	X	X	X	X	X	X	X	X
Voluntary regulations												
Public education & awareness	X			X	X		X					X
Organizational change		X		X	X	X	X	X	X		X	X
Dialogue and consultation		X		X	X			X				X
Monitoring	X	X	X				X	X		X		

*In Latvia assessed together with climate and environment.

Land use and forestry

Land use and forestry instruments focus on regulatory and financial measures (Table 14). Financial instruments are of different nature depending on the objectives and whether the focus is on forestry, agriculture or biodiversity protection/conservation. For example:

- Certification system for sustainable forest management (e.g. Azerbaijan, Sweden);
- Promotion of a multi-centric pattern of industrial development – Decentralization of the industrial sector (e.g. Greece);
- Subsidy for planting of trees in land not suitable for agriculture (e.g. Latvia);
- Delta Fund, Delta Commissioner, Delta Programme for water safety, spatial adaptation, water supply (e.g. Netherlands);
- Direct charge of environmental sanctions by a supervisory authority when a violation against the Environmental Code is ascertained (e.g. Sweden);
- Penalties for land use change actions without licence (e.g. Andalusia);

- Land use development plans (e.g. Sardinia);
- Local enterprise partnerships - Established as locally derived business-led partnerships between the private and public sector to drive local economic growth (e.g. South-West England)
- Financial and material support for land consolidation (e.g. Czech Republic);
- Inclusion of Regional Schemes for Ecological Coherence (SRCE) in planning documents and projects of the State and local authorities (e.g. transboundary DE-FR).

Table 14 Land use and forestry policy instruments in all case studies

Instrument	AZ	GR	LV	NL	SE	AND	SAR	SWE	CZ	DE	SK	DE-FR *
Economic penalties			X	X	X	X	X	X		X		
Economic incentives			X	X	X	X	X	X	X	X		
Regulations or legislation	X	X	X	X	X	X	X	X	X	X	X	X
Voluntary regulations	X				X			X			X	
Public education & awareness	X	X		X	X			X				X
Organizational change												
Dialogue and consultation		X		X	X							
Monitoring	X	X						X				

* The transboundary case of DE-FR focused on environment related the land use policy. In the table above, the goals related to spatial planning were captured, as the main focus is not nature.

Energy

In case of **energy** policy (Table 15), regulations are most commonly used, along with economic incentives (e.g. subsidies for renewables) and penalties (e.g. energy taxation). For example:

- Standards on energy saving and energy resources efficient utilization, power engineering standards (e.g. Azerbaijan);
- Warranties of the origin of the produced electricity (e.g. Greece);
- Standards for heat losses in centralized heat supply systems (heat losses ≤ 19% since 2018; 17% since 2019) (e.g. Latvia);
- Investment subsidy SDE+ scheme: mono-manure fermentation tender (150 million euros available for building 200 mono-manure digesters) (e.g. Netherlands);
- Subsidies for solar panels and environmental cars, Energy mapping (Sweden);

- Tax on electricity generated for self-consumption from photovoltaic installations larger than 10 kW (e.g. Andalusia);
- Subsidies for energy efficiency of private buildings and production of energy with renewables for self-consumption (e.g. Sardinia);
- The energy transition tax credit (*Crédit d'impôt transition énergétique* – CITE), which provides for a refund of 30% of the total cost of energy renovation work, up to a limit of €8,000 for a single person and €16,000 per couple (e.g. transboundary DE-FR).

Table 15 Energy policy instruments in all case studies

Instrument	AZ	GR	LV	NL	SE	AND	SAR	SWE	CZ	DE	SK*	DE-FR
Economic penalties			X	X	X	X		X			-	
Economic incentives		X	X	X	X	X	X	X	X	X	-	X
Regulations or legislation	X	X	X	X	X	X	X	X	X	X	-	X
Voluntary regulations					X	X					-	X
Public education & awareness	X	X		X	X	X	X	X	X	X	-	
Organizational change	X						X	X			-	
Dialogue and consultation	X			X		X					-	
Monitoring							X	X			-	

*The Slovak case has not addressed the energy objectives specifically.

Agriculture

For the agriculture sector, various forms of regulations and economic incentives (mostly subsidies) are commonly present across cases as direct emanation of the EU CAP (Table 16). Some of the instruments include:

- Regulation of pesticide trade activities (e.g. Greece);
- Subsidy for modernization of farms (e.g. Latvia);
- Direct payments to farmers (all cases but Azerbaijan);
- Young farmer regulation focused on investments on innovation in agriculture (e.g. the Netherlands, Andalusia);
- Insurance against extreme weather events (e.g. Sardinia);
- Land management practices beyond minimal regulatory compliance, to protect and enhance the environment and wildlife (Countryside Stewardship, Environmental Stewardship and other schemes that offer payments to farmers and other land managers in South-West England);

- Prioritize small farms in the framework of agricultural subsidies (e.g. Czech Republic);
- Subsidies for organic farming and other particularly sustainable overall practices (e.g. DE-FR, Germany).

Table 16 Agriculture and food policy instruments in all case studies

Instrument	AZ	GR	LV*	NL	SE	AND	SAR	SWE	CZ	DE	SK	DE-FR
Economic penalties		X	X		X					X		
Economic incentives	X		X	X	X	X	X	X	X	X	X	X
Regulations or legislation	X	X	X	X	X	X	X	X	X	X	X	X
Voluntary regulations					X			X				X
Public education & awareness	X	X		X		X						X
Organizational change		X		X				X				
Dialogue and consultation				X								
Monitoring		X		X				X	X	X		

*In Latvia assessed together with land use and forestry.

Climate

Three types of instruments are common in this sector: regulation, economic incentives and public education & awareness (used in 6 out of 10 case studies) (Table 17). For example:

- Financing scientific investigation and technology development in the field of RES (e.g. Azerbaijan);
- Protection and reinforcement of sinkholes and GHGs stock not monitored by the Montreal Protocol (e.g. Greece);
- Economic stimuli for market adaptation towards reducing emissions (e.g. Greece);
- Strategy document (Structuurvisies regio's en gebieden) to establish an agenda to increase the competitiveness of The Netherlands by enforcing the spatial-economic structure of country (Netherlands);
- Tax on fossil fuels (e.g. Sweden);
- Improving the premiums related to grid-access conditions and the administrative proceedings to obtain subventions and request connection permission to encourage the installation of small photovoltaic facilities of less than 5 Kw (e.g. Andalusia);
- Emissions Trading (all case studies but Azerbaijan);
- Carbon capture and storage (e.g. Czech Republic);

- Communication campaigns on climate scenarios for France and their consequences on resources and activities (e.g. transboundary DE-FR);
- Promotion of awareness about climate problems (e.g. Germany).

Table 17 Climate policy instruments in all case studies

Instrument	AZ	GR	LV	NL*	SE	AND	SAR	SWE *	CZ	DE	SK	DE-FR
Economic penalties				-	X			-	X	X		
Economic incentives	X	X	X	-	X		X	-	X	X		
Regulations or legislation	X	X	X	-	X			-	X	X	X	X
Voluntary regulations				-	X			-				
Public education & awareness	X	X		-	X	X	X	-		X		X
Organizational change	X			-		X	X	-	X	X		X
Dialogue and consultation				X		X		-				

*The Dutch and South-West England cases have not addressed the climate policy objectives specifically. Climate policy is addressed indirectly via the energy policy for the Netherlands (included via biomass policy) and via energy, agriculture and water policies for South-West England.

3 Vertical policy coherence: from global and European to national and regional policy and transboundary issues

This chapter focuses on the assessment of policy interactions across scales. The case studies assessed the integration of higher level policies into lower level policies and the extent to which lower level policies are supported by higher level policies. Transboundary coherence is a form of vertical coherence because it concerns geographical scales (although on the same national level) and not sectors (which is what horizontal policy coherence is about). The assessment of vertical coherence was done on a 3-levels scale: fully integrated/supported, partly integrated/supported and poorly integrated/supported. The detailed assessment can be found in Appendix 2.

The geographical scale of the case study determined the assessment of vertical coherence. National cases investigated the integration of global and EU policies into national policies. Specifically, Greece, Latvia and the Netherlands assessed both global and EU policy integration. They also assessed to what extent the national policies are supported by EU and global policies. Sweden assessed the integration of EU policies into national ones and how the national policies are supported by EU policies.

As for the regional cases (Andalusia and South-West England), they investigated the integration of national policies into regional policies and how regional policies are supported by national policies.

Finally, the transboundary cases addressed vertical coherence differently. For the transboundary case DE-CZ-SK the vertical coherence analysis was conducted per each individual country and concerned the integration of global and EU policies into national policies in Czech Republic and the integration of EU policy in Germany. How national policies are supported by EU policies was also assessed in both countries. As for Slovakia, the assessment is not available.

The transboundary case DE-FR, whose focus is on the Upper Rhine region, revolved the vertical coherence assessment around transboundary issues, thus providing unique insights on the transboundary dimension.

The following sections presents the findings organized per geographical scale and per case study[5]. Factors hampering vertical policy coherence are identify and summarized section 3.5.

3.1 From global to national policies

The national case studies that assessed the integration of global policies into national ones are Greece, Latvia, The Netherlands and Czech Republic as part of the transboundary DE-CZ-SK case.

Greece, Latvia, The Netherlands and Czech Republic assessed only the integration of the international climate policy into national legislations (UNCCC and related implementation agreements - Kyoto and Paris) as it is the one more closely related to the focus of these case studies.

[5] The text in this chapter is largely reproduced from the case study reports.

All cases reported full integration of the international climate policy, which shows continuity of commitment on addressing climate change in the respective countries - in general, this is the case for all European countries. The Greek case study also reported the assessment of another international agreement, namely the International Convention on plant genetic resources for food and agriculture. The convention, signed in 2001, is reported as fully integrated in the country's legislation and supports the achievement of sustainable food and agriculture production in the country.

Surprisingly, only the Dutch case investigated the integration of the Sustainable Development Goals (SDGs) into its national policies. As no other case investigated coherence of national policies with the SDGs, this may bring up the conclusion that the SDGs currently do not get as much attention by the national governments as climate change policy.

An interesting example of how higher-level policy (in this case global) is turned into action at national scale, which could offer insights for other cases, is provided by the Dutch case study. The Dutch case study reported the full integration of the Sustainable Development Goals Agenda into the national legislation. Since 2016 the issue of SDGs implementation has entered the political and policy agenda and the Dutch government has raised ambitions in national plans as well as initiated actions to turn integration on paper into implementation in practice. These actions include the definition of transition agendas across different sectors and the initiation of sectoral stakeholder dialogues (SDGs, 2018). Specifically, the policy process on the SDGs integration started with an inventory of the state of affairs of the national policy regarding the SDGs in eight Dutch ministries in 2016. The assessment report resulting from the joint work of different national assessment agencies concluded that the Dutch climate and energy objectives were not aligned with the SDGs (Dutch Government, 2016). This led the government to revise its national climate plan by setting more ambitious objectives. The next step, currently undergoing, is the definition of the pathways to achieve such objectives. On this point, stakeholder dialogues including public, private and NGOs actors, have been initiated across sectors to identify approaches to implement the ambitious national climate objectives in a coordinated and participatory fashion. This concerted way of making policy has a long tradition in the Netherlands and is reported to be most of the times effective. In synthesis, the way higher level policy is integrated in national policy and implemented in practice consists of policy assessments of the state of the art, generally conducted by the national assessment agencies whose advise is considered credible and relevant, in combination with stakeholder dialogue across sectors. A similar policy making approach is adopted for horizontal policy integration and implementation.

As for partial integration of global policies into national ones, the only case is reported the Czech Republic and it concerns the land use domain. The case reports the European Landscape Convention, adopted in the year 2000 by the Council of Europe, to be only partly implemented in the national Agricultural Land Protection Act. The case study also explains how the full implementation of this convention would support national and regional landscape restoration initiatives especially in the context of the agricultural landscape (more on the reasons of this partial implementation can be found in section 3.5).

Finally, looking at whether national policies are supported by global policies, there is no report of partly or poorly supported national policies by the national case studies. Greece, Latvia and Czech Republic assessed global climate policies and they all report national policies to find full support in the international climate agreements.

3.2 From European to national policies

All case studies show full integration of EU policies into national legislation across all nexus sectors at the level of policy documents (see Appendix 2). This is not surprising considering that failing to integrate EU policies into national legislation entails penalties for the member states. Similarly, higher level policies fully support lower level policies in most of the cases. However, integration at the level of documents does not necessarily translate into full implementation in practice. The cases reported several examples of partial implementation. Factors hindering implementation in practice are discussed in section 3.3 below and in chapter 5. In the following vertical integration of policies is discussed per case study. Most of the text directly come from the case study reports.

3.2.1 Greece

All European policies in the water, energy, food, agriculture, and climate sectors are reported to be integrated in the Greek national legislation. Furthermore, most of the nexus-related policies are reported to be fully or partially supported by EU policies as they concern common goals and policy priorities between EU and Greece. As a result, common goals such as reduction of GHG emissions, development of a low-carbon economy, promotion of renewable energy sources, sustainable management of water resources, food safety are pursued.

In case of national policies partly supported by EU policies, these concern electricity production from renewable sources, protection of biodiversity and natural resources and the sustainable development of the aquaculture sector. These policies have been assessed as partly implemented because the national policy documents include, besides EU provisions, also other specific local scale policy provisions, not included in the relevant EU documents. However, the achievement of the national nexus policy objectives is reported not to be affected by this partial implementation, as the national provisions concern local scale issues not addressed by EU policies.

Regarding policy implementation, several gaps have been mentioned by the stakeholders. Inconsistencies arising at a practical level are mainly caused by lack of common goals and interests and completion for demand and use of natural resources. According to the stakeholders, the main existing inconsistencies (indicative examples) concern:

- Energy: the share of lignite in the internal electricity market. Despite the fact that national climate and energy policies promote the development and use of RES, energy production still depends on the exploitation of lignite. This is due to the availability of lignite stocks in Greece and the subsequent need for ensuring energy sufficiency in the national level;
- Water: water allocation (irrigation / domestic use / energy production / environmental flow). The effective implementation of water policies is sometimes hampered by conflicts

that concern spatial and temporal water allocation for covering water needs in several regions in Greece;

- Land use: lack of synergies between land policies (policies having mainly to do with spatial planning) and economic-developmental policies. The absence of land use regulations is linked to the relative policy gaps between spatial planning and the distribution of economic activities spatially. As a consequence, there is not a land use policy framework regulating the development and spatial distribution of the several economic activities such as tourism, industry, RES. The National Cadastre will set the base for solving such problems.
- Agriculture: Inconsistency between policies that subsidize water-intensive crops (e.g. cotton) and policies related to the sustainable management of water resources that promote crop restructuring to reduce additional pressure on water resources.

The impact of EU "Cotton aid" and agricultural subsidies on water resources in Thessaly, Greece: trade-offs land-water-agriculture-energy

A series of European agricultural subsidies to cotton farmers, known as *Cotton aid,* was introduced in 1981 by the European Economic Community. This marked the beginning of a series of European and Greek policies that resulted in the heavy subsidization of cotton production at various levels, including subsidies for farmers, for machinery and for the cotton ginning industry. Such EU policies and subsidies have intensified cotton production in Greece. Greece—mainly the Region of Thessaly—is today the main cotton grower of Europe, accounting for 80 percent of European cotton area and 85 percent of European production.

Cotton production requires large amounts of water for irrigation. In Greece, this creates a strongly seasonal water deficit that peaks during the summer months, when precipitation is at its lowest. According to the Greek Ministry of Environment and Energy, the water resources in the Thessaly River Basin District are "bad" in terms of both quantity and quality, with a large deficit in surface and groundwater resources and groundwater nitrate concentrations often higher than 50 ppm. The water table in Thessaly is dropping fast; farmers need to drill down to as far as 250 metres to find water. Seawater intrusion and groundwater salinization are a reality throughout the plain, decreasing the quality and potential usability of the water in the years to come. Furthermore, the effects of land subsidence, due to groundwater depletion, on people's properties and lives is evident throughout Thessaly. In addition, the Pinios River, a major Greek river that runs through Thessaly and is tightly connected with the local community and traditions, often dries up during the hot summer months, when farmers use most of its flow for irrigation.

Cotton production also takes up agricultural land and is extremely resource intensive, without enhancing regional or national food security. Furthermore, the Greek government provides energy subsidies for irrigation to farmers to boost agriculture and food production. As a result, farmers are still able to afford to cultivate cotton in Thessaly. The farmers are not motivated to move to more energy-efficient irrigation systems, as they pay over 30 percent less for electricity than their household counterparts. As the water table drops, pumping becomes even more energy-intensive, further driving the vicious cycle of policies which are not coherent with the nexus concept. Moreover, as agricultural water in Greece is provided free-of-charge to farmers, there are no

incentives for the farmers to minimize water losses. As a result, they continue using sprinkler irrigation and other methods, which are not suitable for the local conditions, such as water scarcity, extensive droughts and desertification. Agricultural water-pricing is expected to be a hot topic in Greece in the years to come, with the government now hinting that farmers will have to start paying for water to cover the environmental cost.

3.2.2 Latvia

The analyses of vertical interactions for Latvia shows full integration of most EU nexus policies in the national legislation. Furthermore, national nexus policies find full support in European policies as the two administrative levels share targets and priorities in the water, energy, climate, food and agriculture sectors.

Latvia has transposed most of the provisions set by the EU legislative framework in the relevant legislative acts – Laws, Cabinet of Ministers Regulations and Orders. Legislative acts adopted before the accession of Latvia in the EU are being updated taking into consideration the most recent developments and changes. Only three EU directives are reported to be partially implemented at national scale. They all concern the energy sector (see below).

Energy
Three EU energy directives are reported to be partially implemented in Latvia. These are: the renewable energy directive (2009/28/EC), the directive on quality of petrol and diesel fuels (2015/1513/EC) and the directive on alternative fuel infrastructure (2014/94/EU).

As for renewable energy (dir. 2009/28/EC), electricity generation from RES has been stimulated through a feed-in tariff and net-metering which had a positive impact on energy production from RES in the country. However, it has been acknowledged that use of natural gas in cogeneration (which requires high investments), and production of energy from renewable sources have created heavy financial obligations for electricity users due to the mandatory purchase mechanism. The burden will remain high for the next coming years. Due to these issues a national support mechanism for electricity production from RES is under discussion and should be proposed in late 2018.

Concerning the use of renewables in the transport sector, this is promoted through a regulation that impose to sell petrol and diesel blended with biofuels and a tax regulation mechanism. However, this may still be insufficient to achieve the target as the share of renewables in the transport sector was 3.9% in 2015 and should reach 10% by 2020.

Regarding implementation of requirements on fuel quality (dir. 2015/1513/EC), the sustainability criteria for biofuels have been set. However, there is no obligation to sell petrol and diesel blended only with biofuels produced according to the sustainability criteria. There are also no exemptions for application of reduced excise duty tax for all biofuels. Amending the legislation with requirements regarding the application of biofuels sustainability criteria and the revision of the excise duty tax would help reach the renewables target in the transport sector.

As for the transposition of requirements related to the promotion of production and use of alternative fuels (dir. 2014/94/EU), this is still undergoing. It includes setting the national policy framework for the market development of alternative fuels and their infrastructure, technical specifications for recharging and refuelling stations and appropriate consumer information on alternative fuels. Especially the part of infrastructure development takes long time.

Finally, with respect to energy efficiency (dir. 2012/27/EU), the directive has been fully integrated in the national legislation but its current implementation will not allow to achieve the binding targets Introduction of Energy Efficiency Obligation Schemes (EEOS), utilisation of Auctioning Instrument of Emission Allowances (AIEA), changes in taxation system, voluntary agreements with entrepreneurs on increasing energy efficiency and with public sector (municipalities) on introduction of energy management systems are some additional measures under discussion to increase energy efficiency.

Climate

In the climate sector, Latvia is on track for achieving the 2020 emission reduction targets but further reduction of GHG emissions for reaching the 2030 targets requires additional measures. These include increasing the amount of carbon sequestration and improve forest management to exploit the full carbon sequestration potential of the abundant Latvian forest (50% of the country is covered with forest). Furthermore, given the horizontal nature of climate policy, the Ministry of Environmental protection and regional development (MEPRD) have pointed out the need for close cooperation and involvement of stakeholders from various sectors to develop national legislation supporting practical implementation of the requirements and achieving the targets.

Latvia has also joined 2 international emission trading schemes which generated resources (250 million Euro between 2009 and 2016) for the implementation of climate change related measures. The Climate Change Financial Instrument (CCFI) and the Auctioning Instrument of Emission Allowances (AIEA) are the funding instruments of the measures. A recent audit from the Latvian State Audit Office have however identified some drawbacks in the management of the funding instruments such as lack of action plan for climate change mitigation and adaptation and allocation of funds for other purposes not directly linked with climate change.

Agriculture

Implementation of the EU Common Agricultural Policy in Latvia is done through the National Rural Development Program (NRDP). According to the Ministry of Agriculture the implementation of the NRDP in the period 2014 -2020 is successful. Availability of EU funds has secured 2.3-fold increase in agricultural production, 3-fold increase in income per person employed in agriculture in the year 2017 as compared to 2004. Within this period the added value of agriculture has increased by 39%. However, there also are a number of reported challenges. These include: low (among the lowest in EU) direct payment per ha in Latvia compared to other EU countries; and increasing shortage of human resources employed in the agriculture sector which has a negative impact on regional development in rural areas. Attention for the future development of the agriculture sector in Latvia is given to adaptation to market fluctuations, innovation, modernisation of production technologies

including increase of efficiency, adaptation to climate change and reduction of GHG emissions. In contrast, environmental NGOs are of the opinion that the current agricultural practices are incompatible with environmental sustainability objectives, resulting for example in loss of semi-natural meadow and increase of GHGs emissions from management of agricultural soils (increase of N_2O emissions because of application of fertilisers, increase of CO_2 emissions because of liming of soils), management of manure and from the enteric fermentation of domestic livestock.

Water

River basin management plans are the back-bone of the implementation of the EU water policy in Latvia. The country has four river basin districts related River Basin Management Plans. However, the implementation of the plans is challenged by lack of man power, capacities, as well as fragmented background data and scarce knowledge of impacts of measures already implemented due to poor monitoring and evaluation. These challenges, in particular the assessment of impacts, create resistance towards new measures. For example, farmers are reluctant to implement more stringent requirements to protect water resources as they question the effectiveness of current measures.

Land and nature

Protection of natural resources through land management is ensured by the implementation of provisions for protected nature areas in Latvia. Regulations on protection and use of these areas - types of allowed and prohibited activities (e.g., tree cutting, specific land uses) are determined on national, regional, and local level. Land owners every year can apply for compensation for restriction of economic activities in the protected nature areas. Although the management system of protected nature areas has been in place for years, land/forest owners reported difficulties related to changes in the protection status of the areas, insufficient information on new restrictions, and on the amount and procedure for receiving compensations. Although supporting protection in general, landowners are dissatisfied of the decrease in income caused, according to them, by nature conservation restrictions. Both nature conservation experts and forest/land owners acknowledge the need for a closer dialogue between stakeholders to find the balance between nature protection needs and economic activities.

Forestry

The forest sector is one of the key pillars of the Latvian economy. Forests cover about 50% of the national territory. Forested land and the total volume of timber has been growing as result of sustainable forest management activities, afforestation of infertile land and land not suitable for agriculture, planting of trees, and application of modern technologies in forestry management. At the same time, environmental NGOs indicated that more attention in the forest management should be paid in relation to the increase of CO2 sequestration potential through improved management of the age structure of forests in the country. Environmental NGOs have also pointed out the need to increase the involvement of society to ensure transparency in the process of forestry policy development. In general, they have emphasized the need to find a compromise between social (e.g. society needs for ecosystem services), economic (e.g. increasing demand in timber), and environmental (e.g. biodiversity protection, adaptation to climate change) issues to ensure sustainable forest development. These aspects need to be better incorporated into the forest

management programs to serve multiple goals. Finally, increasing the knowledge and awareness of forest managers on forest ecosystems, and the capacity of forest owners to take responsibility for sustainable forest management was also identified as important.

3.2.3 The Netherlands

In the Dutch case study, the assessed EU policies are reported to be fully integrated in the national legislative framework except for the Natura 2000 Birds and Habitat directives for which the management plans are still in development.

Energy
In the energy sector, the renewable energy directive is fully integrated with ambitious government plans for energy and climate and major efforts to engage public and private stakeholders for implementation of the plans. In particular, the complexity of the climate and energy regulation and recent raise in ambitions in terms of emission reduction, has led the Netherlands to recently start a consultation with stakeholders on how to implement the national climate policy.

Water
With regard to water, the Dutch government Cabinet has reinforced the implementation of the Water Framework Directive through a revised Delta plan, a comprehensive water and flood management plan at national scale, improved soil and water quality measures, improved monitoring and evaluation measures, and an investment of extra budget (275 mil euros).

Biomass-other sectors
According to stakeholder interviews, the challenges are not at the level of integration but in practice. Two general problems are mentioned: the lack of clarity in the policies about the use of biomass and the proliferation of rules and regulations across multiple policy sectors such as EU policies on nature (as Natura2000), agriculture (CAP) and water (Water Framework Directive). Businesses in bio-energy must deal with rules and regulations coming from the central, regional and local governments. An example reported by stakeholders is the circular economy framework, which requires freedom for businesses to make their own choices, but at the same time there are rules in order to achieve a level playing field and to control the use of public money. The EU Commission has long acknowledged these challenges and is currently attempting to address them in the revision of the Renewable Energy Directive. Concerning the use of biomass, it is often unclear to stakeholders how the EU policy on agriculture, nature, energy and water apply to biomass. Stakeholders active in the biomass sector would like to have more clarity and support from policy.

3.2.4 Sweden

Most EU policies are fully integrated in the Swedish legislation. Some Swedish legislative acts are the almost literal transposition of the EU legislation. This is the case of the Swedish policy on flood

risks, and the national regulations on environmental impact assessments included in the national Environmental Code.

Energy
In the energy sector, Sweden over-perform the EU renewable energy requirements. The EU goal of 20% share of renewables in the energy mix has already been achieved, and Sweden has set a higher goal (50%). This implies that EU climate policy is too limited in relation to the Swedish context as it does not fully support the ambitious Swedish policy goals.

While Sweden has integrated most of the EU policies into its national legislation, the actual implementation on the ground is still facing some challenges especially in the water, land and biodiversity conservation sectors.

Water
In the water sector, the implementation of the Water Framework Directive faces problems related to the lack of coordination between different sectors affecting water management. Water authorities have not much power over forestry authorities, which are rather independent on the choice of their forestry management activities, or over municipalities that are relatively autonomous in their decisions, particularly when it comes to local spatial planning. Although there is some effort to coordinate water-related activities of different sectors, voluntary collaboration is not sufficient and stronger legal instruments to support such coordination would be needed. Similar coordination issues exist for the implementation Groundwater Directive.

Land/nature
In land/nature sectors, a long-standing conflict between conservation and production policies exists. Conservation policies are not fully implemented. For example, the Habitat Directive is not fully implemented yet in Sweden, as this would require large restoration efforts. In addition, the Birds Directive is not treated as priority in the forestry sector because protection of species is seen as hindering production.

These findings were confirmed by stakeholders at the SIM4NEXUS stakeholder workshop held in Sweden. Stakeholders also pointed out that not all EU policies are being fully implemented because the Swedish municipalities have considerable level of autonomy in taking decisions. This means there is not always a national law that directly steers municipalities' work. For example, some aspects of the EU climate policy are not directly transposed into binding national legislation but are rather being adopted as recommendations for the local administration. This gives freedom to municipalities to choose whether to prioritize climate change issues or other policy areas. Similarly, there are no strict forestry regulation for all forest owners. Instead, Sweden promotes a model called "freedom with responsibility" which assumes that forest owner should take their own responsibility to pursue environmental goals on top of production goals, with the advice from forestry authorities. This results in activities that support environmental and conservation objectives in forestry management to be implemented on essentially a voluntary basis.

3.2.5 Transboundary DE-CZ-SK

Czech Republic

Most nexus policies have been assessed as fully integrated in the Czech national legislation. Similarly, most national policies find support in the EU legislation. The case study report emphasises how the EU policies have stimulated the adjustment of the national legislation, especially with specific measures that improved its effectiveness and enforcement. Two examples are reported of partial integration/support in the land and water domains (see below for details).

Agriculture

The CAP has been fully transposed in the Czech legislation through several government orders concerning direct payments, cross compliance, Good Agriculture Environmental Conditions (GAEC) standards, and agri-environmental measures. However, some provisions of the CAP are not fully implemented. Here they are discussed one by one.

Greening

According to the Czech assessment, one CAP provision that has been partly implemented and did not lead to the expected results is the greening mechanism associated to direct payments. The greening mechanism is a policy that at its inception has the potential of greening the landscape, thanks to specific objectives aiming to improve soil quality, water retention, and reduce erosion. The greening measures include: (a) crop diversification; (b) maintenance of at least 5% permanent grassland (c) conservation of 5% or arable land as ecological focus areas (EFAs). Farmers who received direct payments are required to implement such measures as condition to receive the payments.

Concerning EFAs, the great potential to fulfill the purpose of EFA lays in the non-productive variants of the available options, such as headlands, protective belts along rivers (in sufficient width), and introduction of new landscape features. However, according to 2015 data, these measures have been implemented only to a little extent in Czech Republic and only one fifth of the EFA areas have been cultivated with non-productive variants. Similarly, there has been no increase in the share of permanent grassland, as the greening conditions have been met by mowing existing grassland areas. As for crop diversification, this has also been applied to meet the minimum requirements. There are also exceptions to the greening rules, as the diversification of crops apply to farms bigger than 10ha and the EFAs to farms bigger than 15ha. Furthermore, greening measures are often reported as already used management practices, such as mowing grassland, planting specialized crops as greening variant. The reason for keeping the implementation of greening measures (but also other environmental measures such as GAEC and agri-environmental measures) to the minimum appears to be that the introduction of non-productive elements in the landscape interferes with farm practices, lowering their efficiency (it is easier and quicker to plough a big field block with not trees or grass on the way). Overall, greening measures have great potential to contribute improve soil quality and water regime in the agricultural landscape in Czech Republic. They have been integrated in the national legislation and they are also implemented, although, their implementation is maintained to the minimum requirements. This minimum implementation does not allow to exploit the full potential of these measures, and so far, did not lead to the expected results.

Good Agriculture and Environmental Conditions (GAEC)
The GAEC are transposed and in principle implemented in the Czech Republic, but they do not lead to the expected results. The Czech legislation has implemented standards GAEC 1 and 3 (water protection by delimitation of non-fertilized buffer zones along water courses and protection of groundwater against pollution) through the Czech Water Act. In contrast, other standards, GAEC 4, 5 and 6 are not implemented in the Czech legislation. This is because the implementation of the GAEC in the national legislations is voluntary based and member states can choose the stringency of the measures. The only link to GAEC 4, 5, and 6 in the Czech legislation is found in the act no. 334/1992 Coll. on soil land fund protection, where general principles of protection of agricultural land are mentioned. As for GAEC 7, about measures that contribute to the preservation of specified landscape features, it finds support in the government order No. 307/2014 Coll. on land use ownership according to user relations. Overall, there has been transposition and implementation of the GAEC according to the rules, but because the Czech government chose to apply these measures to the minimum, and set not so strict conditions, there is little impact on the quality of the agricultural landscape.

Similarly to greening, the conflict lays between the need to reduce the size of agricultural soil blocks and reintroduce nature elements in the landscape to improve soil quality and water retention and the need of farmers to keep efficiency high to remain competitive in the market, which is what having big soil blocks allow. The problem has created a lock-in situation for which a solution seems difficult to find (see above discussion on land and also section 3.5 for more details on this conflict). On the one hand National Agricultural Strategy for 2030 recognizes the need to tighten the conditions for providing direct payments on the basis of GAEC, and to consistently apply the cross-compliance rules, including limiting the size of soil blocks. On the other hand, the reduction of the size of soil blocks is in contradiction with the prevailing business model of Czech agriculture, as the existence of “landholding concentration” allows companies to benefit from the size in terms of efficiency gains, and therefore market competitiveness. If large soil blocks are not divided, the improvement of retention capacity of the landscape is difficult to achieve.

Agri-environmental and climate measures in agriculture
Agri-environmental and climate measures are voluntary-based measures set by the Second Pillar of the CAP as a part of the rural development program. The objective of the measures is to promote sustainable agricultural land use. Because these measures are voluntary, the success of their implementation heavily depends on the administrative burden for the applicants to obtain the subsidies. For example, the water retention measures under the agri-environmental provisions, in combination with greening and cross-compliance measures, can be very effective in improving the agricultural landscape. However, their effectiveness is limited because only few farmers have chosen to adopt these measures due to the heavy bureaucracy involved in the procedure to obtaining the EU funds. Better awareness of farmers about the importance of the landscape structure in improving water availability and soil quality, may encourage farmers to overcome the administrative burden. At the same time, administrative simplification should be pursued.

Water

The EU water legislation has been fully integrated in the Czech legislation mostly through the National Water Act which also integrates the flood and groundwater directives with provisions about flood protection and droughts. Furthermore, the country has adopted the river basin management principle since 1960s, and river basin districts and management plans have been adopted. The implementation of river basin management plans is ongoing and assessed as successful in for example the reduction of water pollution from point sources. The Czech territory also belongs to three transboundary river basins for which cooperation among neighboring countries has been established through international commissions and treaties for the protection of the Labe river, the Danube river and the Odra river.

However, the EU water legislation does not address issues related to spatial water retention in the landscape, a major problem in Czech Republic and the focus of this case study. The only policy document that addresses to some extent this issue and its root causes is the River Basin Management Plan of the Labe catchment. The plan acknowledges the problem of the size of the agricultural soil blocks (see above) and the negative impacts of energy crops cultivation on soils quality and sets measures to increase spatial water retention. It is argued in the Czech report that to realize all the measures needed for spatial water retention, water should be declared public interest, and water retention should be holistically addressed across multiple sectors including agriculture, water and land. Therefore, the Labe river management plan alone cannot accomplish this task alone but should be embedded in a more comprehensive, nationally driven and EU supported legislative framework. Currently this is not the case, and that is the reason why the plan has been assessed as poorly supported by the EU water policy (which does not address water retention issues).

Land/soil

The land domain is not addressed by an EU framework legislation. Two policies, the European landscape convention and the EU soil directive under discussion are of relevance for the Czech case as they both have potential to solve a national lock-in situation concerning landscape and soil quality and spatial water retention issues. The Czech Republic ratified the European landscape protection convention, and some Czech laws have fully integrated it such as the Czech Forest Act and the Nature Protection Act. However, this is not the case of the Agricultural Land Protection Act. As a consequence, according to the Czech study, agricultural soil and land degradation continues and retention of water in agricultural land is rapidly decreasing. The convention supports a balanced development of the landscape where relations between social needs, economic activity, protection and the creation of the environment are harmoniously integrated. Such an articulated landscape approach is reported to be missing in the Czech policy documents.

As for the EU soil directive, its goal is to create an EU-wide framework for soil protection and the preservation of its ecological, economic, social and cultural functions. To this end, the directive lays down measures to prevent soil degradation processes, whether occurring naturally or as a result of a variety of human activities. Extensive part of Member States' legislation, like the air and water components of the environment, is subject to this directive proposal - among other things, remediation of contaminated areas, rehabilitation of soil functions degraded due to erosion, organic matter loss, compaction, salinisation and landslides. Based on the proposed soil directive, Member

States decide specific measures to achieve the directive goals and establish adequate sanctions. In Czech Republic sanctions related to violation of soil/landscape measures within sectoral policies are almost non-existent. Therefore, a framework directive on soil protection could help solve the Czech lock-in situation on this issue by setting the direction of action and pushing for the establishment of adequate enforcement mechanisms across sector policies.

Energy

The EU renewable energy directive has been fully integrated in the Czech legislation through the Czech National Action Plan. The plan sets the national binding target for the Czech Republic (13,5% share of renewables in the energy mix) and creates the conditions for its achievement, including for example, the production of bioliquids and provisions for issuing certificates of origin of electricity from renewable. These measures support the increase of biofuels production and the use of agriculture biomass as renewable resource. This target, however, has pushed the cultivation of biofuel crops at the expenses of soil quality and local water regime. The trade-off agriculture-energy-land is a major issue in Czech Republic (see above on land).

Climate

The EU climate mitigation policies are fully integrated in the Czech legislation through for example national provisions for emission trading. As for adaptation, the EU adaptation strategy has led to the development of a national adaptation plan. However, according to the Czech assessment these policies are insufficient to address climate change impacts because of the indirect effects of GHGs on climate (Pokorný et al. 2016) which are not accounted for in the climate adaptation measures.

Germany

Most EU nexus policy is reported as fully integrated in the Germany legislation; also, most German laws are supported by the EU legislative framework. Problems are reported in the implementation of some of these policies. The cross-cutting reason for partial implementation is the governance structure of Germany made of rather independent federal states that have quite some legislative power, with the central government mostly providing framework policy guidance in those sectors where the federal states have legislative autonomy. The addition of the EU as new layer on top of the federal construction is perceived as having complicated the implementation of policies, often by slowing it down and by further dispersing responsibility for implementation in a system where responsibility was already rather diffuse. Related to the diffuse responsibility and the layered governmental structure is the difficulty to coordinate action across vertical governmental levels, which adds on top of the complexity to coordinate action across sectors. Again, this leads to slow implementation of policies.

These problems are found particularly in the implementation of the water framework directive, the CAP, the climate policy and the energy policy to a different extent.

Water

The implementation of the water framework directive encounters difficulties especially in the financing phase of projects, when diffuse responsibility makes it difficult to clearly identify whether projects should be funded by the national government or the federal states.

Furthermore, many water objectives collide with the interests of other sectors, particularly agriculture. Therefore, next to the complexity of vertical coordination between levels of governments, the clash of cross-sectoral interests adds up to the difficulties related to vertical interactions. In general, the main impact of these difficulties is delays in implementation, which for the achievement of the water framework objectives is now of about 12 years (expected in 2027).

Agriculture

The common agricultural policy is reported to be fully integrated and generally well implemented in Germany. One problem that is mentioned is the frequent change of subsidies allocation method and procedure by the competent authorities that often leads to mistakes in the implementation of the funds.

Climate

The EU climate policy has been fully integrated in the German legislation. As for the implementation, it is different across sectors. Overall, this affect the achievement of the climate goals, with some sectors, like the energy sector, pushing the implementation further and others, like the agriculture sector, contributing to a limited extent, thus slowing it down. This is a problem in Germany because the country has commmited to highly ambitious emission reduction targets.

Energy

The integration of the EU energy package in the German legislation is complete and its implementation assessed as mostly successful. However, measures taken are not sufficient to reach the sector objectives within the expected time frame. In particular, the improvement of the power network is proceeding at a slow pace. Similarly, switching to renewable energy sources occurs slower than expected with still fossil fuels being exploited. For example, lignite mining and use of lignite power plants is expected to continue, and energy intensive industries benefits from exceptions, which prevent the creation of a level playing field.

Other policies

As for to what extent national policies find support in the EU policy, two examples of partial support are reported. One concerns the protection of forest which is regulated at both national federal level in Germany. However, because of the lack of an EU framework legislation providing guiding principles and rules support from the EU on this topic is considered limited. The second case is that of animal protection, especially of livestock, for which the assessment the EU regulation is reported to hinder the national one. This is explained with the fact that the level of protection established by the EU regulations is considered insufficient by German standards. Furthermore, the EU regulations are sometimes contradicting and include exceptions which are difficult to reconcile with the German legislation on this topic.

3.3 From national to regional policies

The three regional case studies have assessed the integration and implementation of national nexus policies at regional level. Results are presented below.

3.3.1 Andalusia

The case study assessment indicates that all national policies are integrated and implemented at regional level but can be contradictory and have cross sectorial effects.

Water
In the water sector the national water act is transposed in Andalusia through a regional law and implemented through river basin management plans by water authorities. As for irrigation, the national irrigation plan is directly implemented in Andalusia and aims to consolidate modernize and expand the existing irrigated infrastructure.

Energy and climate
In the energy sector, three main national laws and two plans are implemented at regional level that are of relevance for the case study: the electricity laws Royal decree 1/2012, 24/2013, and 900/2015, the national energy saving and efficiency action plan 2014-2020, and the national renewable energy plan 2011-2020.

The national laws regulating the electricity sector aim at the economic sustainability of the sector in the country. In particular, the national Royal decree law 1/2012 puts forth the elimination of economic incentives for renewable energy sources. It was adopted in response to 3 major problems of the renewable energy sector: 1) A large installation of renewables in a period when the technology was not mature and required large public aid, which was poorly designed and very expensive; 2) a crisis that drastically reduced the demand for electricity and has slumped tax revenues; 3) an over-capacitated system - there is much more installed power than what is demanded - based on expensive fossil fuel plants and facilities. To avoid adding new costs to the electrical system, the law eliminated economic incentives for new power generation facilities based on cogeneration, renewable energy sources and waste. The decree was aimed at closing the widening gap between the cost of electricity generation and what consumers pay (tariff deficit). Without these economic incentives, however, the Spanish renewable energy sector came almost to a halt. For example, wind and photovoltaic solar energy production increased only by 0.07% and 0.3% between 2013 and 2015, respectively.

The enactment of the electricity reform laws is in conflict with the Andalusia Energy Strategy 2020, which sets a more ambitious renewable energy goal than the national law (5% self-consumption of electricity from renewable sources and of 25% of total energy consumption from renewable sources). This is because the reform for the electricity market introduced by the national laws (e.g. elimination of subsidies to new power generation based on renewable energies and introduction of tax for self-consumption photovoltaic installations for the electricity they produce) hamper the promotion of renewable energies.

In the agriculture sector, high energy costs are a big challenge for farmers. As a result of modernization of the irrigation system, the Spanish water delivery system was changed from surface irrigation to pressurized systems which is more water efficient but also more energy consuming. This required the installation of usually electric pump systems to guarantee sprinklers or drip irrigation to function properly. Energy has, thus, turned into an essential resource for irrigation agriculture with major increase in energy consumption. The Ministry of Industry used to subsidize energy for irrigation with a special rate (R rate) until July 2008. After July 2008, the energy market was liberated and brought about higher (unsubsidized) energy prices for irrigators. Therefore, the effects of the national Royal decree law 1/2012 on ensuring efficient energy use in irrigation facilities and promote renewable energy are negative. The law has not only discouraged investment in renewable energy generation but also reduced output from existing renewable facilities, therefore, also limiting the reduction of CO^2 emissions. Moreover, the reform triggered major social costs in rural areas given that roughly 55,000 families have invested in small solar farms and are now indebted, leading to even more economic uncertainties in rural areas.

In the climate sector, the Spanish Climate Change and clean energy strategy Horizon 2007-2012-2020 is implemented in Andalusia through the Andalusian Climate Action Plans and the Andalusian Energy Strategy 2020.

Agriculture
The National Rural Development Plan 2014-2020 implemented in Andalusia with the corresponding Andalusian Rural Development Programme 2014-2010, guarantees the coherence between national and regional strategies. The regional programme contributes to preserve ecosystems related to agriculture, enhance resource efficiency and climate and improve social inclusion and local development in rural areas.

3.3.2 South-West England

The South-west of England case study is unique because the UK is in the process of leaving the European Union (so called Brexit process). Brexit is leading to significant policy revision across all nexus sectors (this is particularly evident in the food and agriculture sector) and it is likely to continue to do so for years to come. This is a factor affecting how policies are transposed and implemented at the regional level in the UK.

Some national policies are only partly implemented at the regional level. Common reasons for partial implementation include difficulties in the coordination of statutory bodies and across jurisdictions. Some problems encountered at the regional level include variations in the allocation of national funding, and where national policies do not sufficiently take local needs into account.

The stakeholders involved in the project in the region also provided insights on vertical policy interactions[6]. In particular some of the feedback includes:

[6] These stakeholder interviews are not the official position of South West Water or reflective of company policy/opinion.

- it feels like there is 'almost a lack of policy' at regional and local levels;
- difficulties at the local level in influencing national policy;
- different policy interpretation: conflicts are likely to arise due to inconsistencies in how regulations are interpreted and enforced by regulators at the regional level;
- negative policy interactions result from poor articulation of the policy in the first place;
- 'siloed' thinking in policy making and failure to recognize cross-sectoral issues (one stakeholder said that they were not aware of 'any inter-sectoral relationships among public organisations');
- need for more people to see 'common sticking points' (need to search for a common ground to work together);
- many policies are single issue and don't take others into account;
- need for a mix of policy instruments to facilitate more sustainable practices;
- general concern about enforcement of policy at the regional level;
- policy implementation can be impeded by how the economic regulator (Ofwat), the regulator (Environment Agency) and the water company (in this case SWW) work together.

The above mentioned and other sector-specific issues with policy implementation are discussed in detail in the sections below.

Water

In the water domain, SWE complies fully with national water supply regulations, and the quality of drinking water meets regulatory standards. However, the cost of this provision is among the highest in the UK. Also, some difficulties are expected with the implementation of the National Strategy for Water and the Water Abstraction Plan 2017.

Stakeholders provided insights into the issue of water quality. Some noted that regulation to improve water quality in catchments enforced by the national Environment Agency can be at odds with cost efficiencies at the local level. This can lead to a negative policy cycle with the water company South West Water in the middle, if there is limited dialogue. Another stakeholder commented that there is a disparity between how point discharge of wastewater and diffuse discharge from agriculture are regulated by the national regulator because the aggregated effect of numerous discharges is often greater than that from wastewater. The specific local conditions (agriculture is a major economic sector in the region) can create disparities across the country, with regions such as SWE being more challenged than others to meet nationally required standards. Finally, another stakeholder suggested that there might be confusion over how the 2018 amendment of the Water Supply (Water Quality) Regulations, which implement the Drinking Water Directive into UK law, will be enforced.

Energy and climate

The National UK Energy Strategy is assessed as partly implemented at the regional level although all legal obligations are met. There are issues of inertia in moving the energy system based on fossil fuels and nuclear to a more sustainable, flexible one. For this to happen, the governance system has to move from supporting fossil fuels to supporting a sustainable, smart and flexible energy system.

The Climate Change Act (2008) is the UK's approach to tackling and responding to climate change. Legally binding carbon budgets set a cap on GHG emissions. But there has been no progress in reducing agricultural GHG emissions over the past six years (agriculture is a major industry in the region) despite the requirement of a 36% reduction in UK emissions from 2016 to 2030. Electricity emissions have reduced, but heat and transport remain stationary. In 2016, the government recognised that significant acceleration was required to ensure the UK can meet its legally binding targets under the Climate Change Act.

At the core of the Energy Act (2013) is the need to ensure that, as older power plants are taken offline, the UK remains able to generate enough energy to meet its needs even if demand increases. Nationwide and in the South West there is energy system transformation happening offshore – with increasing amounts of offshore wind - at a local level. There is an abundance of generation from both solar and wind in the region and this offers the opportunity to lead to the development of new localised energy networks (LEMs). However, nuclear power poses issues to the UK in the transition to a smart and flexible energy system. Not only is it a very expensive source of low carbon power but having nuclear power on the system makes it harder rather than easier for system operation with a high proportion of renewables. The variable power renewables that the UK has in abundance (such as solar and wind) requires a system that complements rather than undermines variable power output. Stakeholders raised the issue of how work on the new Hinkley power plant on the region's border will compete with local energy markets.

Stakeholders also highlighted how drastic cuts to energy support mechanisms, in particular the Feed-in Tariffs scheme (FIT), had affected implementation at the local level. These low-carbon support mechanisms have been successful in promoting the development of renewable energy generation in the region, but the policy shift has had a detrimental effect on renewable energy businesses and community energy initiatives. One related outcome of this is that it has motivated community energy groups in Devon to return to their roots by doing more on energy efficiency, fuel poverty, and community engagement, using home visits, gardening, art, housing, and food to involve people in the energy debate.

Agriculture

In the agricultural sector there are problems related to agri-environment schemes, farming-related regulation, and rules for farmers and land managers to prevent water pollution and flooding.

Agri-environment schemes provide funding to farmers and land managers to farm in a way that supports biodiversity, enhances the landscape, and improves the quality of water, air and soil. The payments received from agri-environment schemes through the Countryside Stewardship Schemes and The Rural Development Programme for England (RDPE) 2014 -2020 are highly variable because they depend on the particular environmental assets on each farm and on which elements of the

available schemes have been adopted by the farmer. Also, there has been a drop off in the South West region from farmers and land-owners signing up for these subsidies because of uncertainty post 2022 when current schemes will be replaced post-Brexit (see also below).

Farming-related regulation can also be difficult to implement because of a lack of coordination, through allocation of resources across the statutory bodies, and because of a lack of adequate funding for enforcement mechanisms.

Similar reasons constrain the implementation of rules for farmers and land owners to prevent water pollution and flooding, including a lack of coordination across relevant bodies to monitor pollution from farms, and a lack of coordination across jurisdictional boundaries between local authorities for flood prevention.

One of the major concerns at present in the agricultural sector is the uncertainty related to the Brexit process. The possible outcomes of Brexit were particularly significant for stakeholders in the agricultural sector and were causing high levels of uncertainty. Currently, public funding to farming is paid from the CAP. But when the UK leaves the EU in 2019 (as currently stated) all decisions over farm funding in England will revert to the UK government. Stakeholders reported indecision in the agricultural sector as businesses do not know the parameters for making business decisions and there is uncertainty about profitability. Concerns were also expressed that small farms, that are already struggling, may not survive further consolidation of land ownership.

Other interactions that came up included the challenges for innovation and entrepreneurism because of the enforcement of food and safety regulations in local food businesses that were often seen as too complicated, and issues associated with planning. How planning interacts with farm diversification is a significant area because planning restrictions can make alternative use of farm building unviable and, in the tenanted sector, successful planning applications has meant that tenant farmers lose buildings to residential use. In addition, there were also conflicts between land use planning and renewable energy initiatives.

Finally, SWW, the regional water provider, has recognized that it is cheaper to help farmers deliver cleaner raw water (water in rivers and streams) than it is to pay for the expensive filtration equipment required to treat polluted water after it is abstracted from the river for drinking. There is also recognition that this is highly effective and, as a consequence of this, the Upstream Thinking partnership was initiated with the aim of improving raw water quality and water storage in the natural landscape in order to make the provision of drinking water more sustainable. Further incentives and platforms that encourage multi-stakeholder initiative of this nature would provide additional benefit to the nexus.

Trade-offs energy-agriculture

The UK Renewable Heat Incentive (RHI) provides a financial incentive to promote the use of renewable heat and is a government scheme set up to encourage uptake of renewable heat technologies amongst householders, communities and businesses through financial incentives. The RHI subsidy has been widely taken up at the regional level but as stakeholders pointed out, there is

also recognition that policy support for energy generation can affect conditions in the food system as bioenergy crops compete with the food and feed sector, and with issues associated with the appropriateness of land-use for growing such crops. This has impacted on wider environmental and sustainability systems in the region. One stakeholder noted that short-term policy inducements offered by financial incentives rather than a long-term view of the impacts were 'skewing the picture' and resulting in inevitable trade-offs. Two particular issues stand out:

- although there are good examples of maize being grown for animal feed, some farmers have grown more maize in order to claim the subsidy for bioenergy crops. This has good and bad nexus implications because it may generate energy but it requires water, land can be left bare and subject to soil erosion, and it may use land that could otherwise grow food and livestock feed;
- anaerobic digestion (AD) is being used to process green waste slurries, then in order to maximise incentives, waste heat is being used for other bio-mass burnings. Bio-mass technologies may or may not provide lower carbon sources of heat. They may also be producing heat to attract income rather than to fulfill a real need.

This has resulted in trade-offs as subsidies provided for feed-in tariffs for anaerobic digestion to promote renewable energy do not take efficiency of energy use into account, including long-term impacts of contracts, how this fits with agri-environmental schemes, and rent rises in the tenanted farm sector when they cannot compete for over-priced land.

The South West region is relatively distant from other counties and waste that is generated in the regions needs taking care of in the region. This can be problematic in terms of meeting energy and waste targets (the EU Waste Directive 2018/851 stipulates that by 2025 no biodegradable waste, including food waste, should be sent to landfill) but this is also driving innovation, including the use of AD (supported by the government's 'Anaerobic Digestion Strategy and Action Plan' 2011). However, there is evidence that AD plants are under-used despite their efficacy for recycling food waste. One stakeholder suggested that local authorities need to be incentivised to implement a separate food waste collection service because the costs of additional food collections and treatment are outweighed by savings made by sending food waste to AD rather than landfill (thus saving on landfill tax). There are examples of these schemes being implemented successfully, e.g. Teignbridge Council, but this is not universal.

3.4 Transboundary coherence issues: the DE-FR case (Upper Rhine region)

The transboundary cooperation in place between Germany and France on the shared Upper Rhine river resources offered insight on policy coherence issue specific of transboundary cooperation. Issues that makes it difficult to manage-trade-offs and exploit synergies at transboundary level include:

- Regulatory differences
- Insufficient sharing of information on planning and management rules for shared resources

- Different natural resource management approaches (due to different management experiences)
- Governance structures differences: identify right counterpart to interact to, trust building, human resources availability and capacity
- Lack of financial resources for shared projects

Regulatory issues

Concerning regulatory issues, the differences in regulations about the management of shared natural resources between the two countries have been pointed out by stakeholders as a barrier to coherence in practice. This is, for example, the case of fishing policy. Because of different regulation on fishing season and on the species that can be caught, a fish may be spared on one riverbank, but caught on the other. If there was a coordinated fishing policy on when and what to fish, these impacts could be avoided.

On an implementation level, according to stakeholders, many regulations can be bypassed or adapted, depending on the relations of power between the actors. Some regulations are simply not implemented. A typical example in this case is the land use sector and the Avoid – Reduce – Compensate regulation in France. Formally, the French law can prevent a land use project when an actual compensation is proven impossible. Furthermore, the law set clear goals for preventing the loss of wetlands, alluvial forest, pastures and other environmental resources. In spite the regulation, it seems land-consuming projects (e.g. for residential or industrial uses) often manage to find their way and be eventually implemented in the French side of the transboundary region. This bears effects also on the German side, for example, on water abstraction from shared aquifers when new built residential or industrial areas are constructed.

Information sharing issues

Similarly, insufficient sharing of information between the two neighboring states concerning management plans and regulations for the management of shared resources as well as about environmental impact assessment studies can also generate incoherent outcomes in practice. For example, nature conservation areas are not coherently designed between the two countries. This hampers the improvement of biodiversity in the region because of poor connection between biotopes and nature corridors. A coherent nature policy between the two countries would include the creation of nature corridors to connect natural areas across the border. However, such coherent design may not be easily achieved as, according to stakeholders, the two countries have different nature conservation approaches stemming from their different management experiences. Finally, insufficient communication extends to also environmental impacts of projects, which are reported to be inadequately communicated across borders. This conflicts with the Espoo convention ratified by the European Union, that requires environmental impacts of planned projects should be communicated across the border.

Governance structure issues

The difference between the French centralized and the German decentralized governance structure may be a barrier to cross border cooperation because on one side of the border (France) decision

makers represent, and therefore have to negotiate, the interests of a large area, whereas on the other side more localized interests are represented in the transboundary cooperation institutions.

Any change in these different governance structures can then pose big barriers and delays in implementation of policies and shared projects. For example, the recent governance reform that merged the former Alsace region with other two regions to establish the new Grand Est region in France was mentioned by numerous stakeholders as a potential threat to enhancing cooperation and coherence across the border. Not only now decision makers represent the interests of a greater area, but, it was argued, they may also have a more limited mandate in setting the agenda for the development of transboundary policy proposals and projects.

Other problems that may emerge from changes in governance structures in cooperating countries concern human capital, network relations and trust across the border. Identifying the counterpart civil servants and decision-makers in different governance structures is already difficult because issues may be dealt by different organizations at different administrative levels. When changes occur in these structures it also becomes time-consuming to find out who the new counterpart is. For example, the administrative reorganization of the regions in France may have determined a reshuffling of appointed civil servants to suit the needs of managing the new region. It also may be that in this new architecture there simply is an insufficient number of civil servants available to work on transboundary issues and it may also be that due to the reshuffling these people will be new to the topic and will have to build new knowledge. Furthermore, it is not only about establishing a new network of relationships but also to reconstruct trust in the cooperation. New people need time to show and see the commitment of others to address transboundary issues. This requires building shared understanding of problems, agree on goals, acquire knew knowledge. In general, such changes in governance architectures require time establish and become effectively operational. This in turn, slows down decision-making processes in cooperation initiatives.

Financial resources issues

Another reoccurring theme emerged from stakeholder interviews is the difficulty to obtain financial resources for transboundary projects and research. This is sometime because of lack of awareness about available funds and difficulties in obtaining them. Furthermore, successful projects may not be extended to neighboring countries due to ineligibility of the countries to funding schemes. This was the case for the energy and climate sectors across the border between France and Germany who wanted to work together.

At the same time, the available budget, usually for projects funded through the Regional Cohesion or Interreg funds, is not fully exploited by the eligible partners. This has occurred because of disagreement within the Rhine Conference (misalignment between the secretariat and the working groups within the Conference), resulting in funds not being spent.

3.5 Factors hindering coherence of policies across scales

Table 18 summarizes the factors reported in the case study analysis above to hinder the implementation of policies across scales.

A number of factors hindering vertical coherence are found both in the interaction EU/national policy and national/regional policy. These include:

- Measures taken at lower administrative scale are insufficient to achieve targets set at higher scale;
- Cancelling/hampering effect between regulations at different scales;
- Policies at lower administrative scale that have more ambitious goals, and therefore find little support, in policies at higher scale.
- Lack of coordination of implementation actions across scales and across sectors;
- Lack of power to influence decisions - this is more a national vs regional scale issue that however affects also the implementation of EU policy;
- Lack of continuity of policy instruments.

It should be noted, however, that most of these issues concern interactions across administrative levels within countries. Inevitably, these domestic problems affect the implementation of not only national and regional policies but also EU policies.

Issues that pertain specifically the interaction EU/national policy include:

- Transposition and implementation of EU directives requiring major adjustments of national policy frameworks and infrastructure;
- Partial or limited support to national regulations from EU policy because some issues do not belong to the EU legislative power, or they are specific local issues not addressed at EU level or a new/revised EU directive is in the making;
- Lack of clarity of provisions in EU policy;
- Lack of communication to affected parties on the provisions of EU regulation;
- Overregulation – too many EU rules;
- EU regulation provisions implemented to meet minimum requirements with little impact in practice.

Issues that specifically concern the national/regional interactions include:

- Regional regulation/initiatives are unknown to national governments or there is no interest to support them;
- Centralized regulatory systems only partly account for local needs.

Finally, specific transboundary issues include:

- Regulatory differences across countries;
- Insufficient sharing of information on planning and management rules for shared resources;
- Differences in governance structures;
- Lack of or difficulty to spend financial resources for shared projects.

Table 18 Factors hindering vertical coherence in policy implementation practice

Administra-tive scale	Type of vertical coherence issue	Nexus sector affected	Examples from case studies practice
EU-national issues	Transposition and implementation of EU directives requiring major adjustments of national policy frameworks and infrastructure	Energy	LV - The transposition of the EU directive on the promotion of production and use of alternative fuels (2014/94/EU) requires significant, time consuming policy and infrastructure adjustments.
	National measures insufficient to achieve EU targets	Energy	LV – current measures to increase the use of renewables and energy efficiency are insufficient to achieve the EU targets. DE - measures taken are not sufficient to reach the EU energy targets within the expected time frame
	Cancelling/hampering effect between EU and national regulations	Energy Agriculture Nature conservation Water Forestry	CZ - national financial support to the production of energy crops (wide-row crops) hampers the achievement of EU good water quality objective DE - many water objectives collide with the interests of other sectors, particularly agriculture. LV – national scale social, economic, and EU driven environmental objectives in forest management can be conflicting: need better management of trade-offs in forestry management plans. SE - Habitat and Birds Directives hamper harvesting of forest products for bio-energy production. NL and LV - Nature conservation in Natura 2000 is at odds with local economic development. LV – Design and application of national economic incentives applicable for natural gas in cogeneration does not promote energy production from renewable energy sources thus making it difficult to achieve the EU renewable energy targets.
	Partial or limited support to national regulation by EU policy because: - it is not an EU policy domain	Fishery Land use Energy	GR - the regulation for the spatial organization and sustainable development of the aquaculture sector covers more aspects than the corresponding EU directive. CZ – action for the resolution of conflicts between agriculture interests and soil and landscape protection

	- it is a specific local problem not addressed at EU level - a new/revised EU directive is in the making - national ambitions are higher than EU ambitions		could benefit from the EU soil quality framework directive under discussion. The directive has been put on hold and the Czech government postponed action to solve the domestic lock-in waiting for the directive to be adopted. CZ - the EU water legislation does not address issues related to spatial water retention in the landscape, a major problem in Czech Republic. LV – action in renewable energy sector partly put on hold because of the uncertainty related to the new renewable energy directive in the making. DE – lack of guidance on forestry management due to lack of EU policy framework on forestry. SE - the EU climate policy does not fully support the ambitious Swedish emission reduction targets. DE - the level of animal protection, especially of livestock, established by the EU regulations is considered insufficient by German standards.
	Lack of coordination of implementation actions	Water Climate Energy	SE - the Water Framework Directive 2000/60/EC is partially implemented due to limited coordination with the implementation of the directive on flood protection and groundwater directive. SE - lack of coordination between different sectors affects water management. Water authorities do not have much power over forestry authorities and municipalities on water issues. Voluntary collaboration is not sufficient. LV - need for close cooperation and involvement of stakeholders from various sectors to develop national legislation supporting practical implementation of the law requirements to achieve climate targets.
	Lack of power to influence decisions	Water	SE - the Water Framework Directive 2000/60/EC is partially implemented due to water authorities having no influence on forestry management and the implementation of the Directive on flood protection 2007/60/EC lacks coordination with Water and Groundwater Directives.

	Lack of clarity of provisions in EU policy documents	Nature conservation Water Energy (biomass)	NL - lack of clarity regarding the usage of biomass in the EU Natura2000, CAP, and water policy; there is no clear and binding sustainability criteria for biomass production NL - some biomass is identified as waste for which strict processing and transportation rules apply; this is the case of manure, biomass resource for energy production which is waste and is also regulated by the EU Nitrate Directive
	Lack of communication to affected parties on the provisions of EU regulations	Land Nature conservation	LV - insufficient information on new restrictions of land uses, and on the amount and procedure for receiving compensations in Natura 2000 protected areas.
	Overregulation: too many EU rules make EU policy difficult to implement	Nature conservation Agriculture Water	NL - policies on nature (Natura2000), agriculture (CAP) and water (Water Framework Directive); e.g. Natura 2000 management plans are still not implemented because of strict protection rules that make it difficult to reconcile nature conservation with economic development; owners of land in protected areas are sceptical about the need and the effectiveness of such strict rules. CZ – Agri-environmental measures of the CAP; farmers are discouraged to apply for the funds due to the heavy administrative burden.
	Presence of regulations that are not fully operational because implementation acts are not yet available	Energy	LV – some Latvian energy regulations still miss implementation acts.
	Lack of man power and capacity for proper management	Water Forestry	LV - implementation of the river basin management plans LV - need to increase knowledge and capacity of forest owners to take responsibility for sustainable forest management
	Lack or fragmented knowledge base due too poor monitoring and evaluation	Water	LV – implementation of the river basin management plans; in particular the assessment of impacts, create resistance towards new measures as, for example, farmers are reluctant to implement more stringent

			requirements to protect water resources as they question the effectiveness of current measures.
	EU regulation provisions implemented to meet minimum requirements with little impact in practice	Agriculture	CZ – greening measures implemented to the minimum, often reported as already implemented practices (e.g. mowing existing grass land is sufficient to meet the requirement of maintaining grassland cover). CZ - member states can choose the stringency of the GAEC measures under the CAP; implementation in the Czech legislations is voluntary based.
	Presence of a complex governance structure with multiple administrative levels having responsibility on nexus sector	All nexus sectors	DE - the establishment of the EU on top of the German federal structure is perceived to have often slowed down and further dispersed responsibility for policy implementation in a system where responsibility was already rather diffuse. E.g. diffuse responsibility makes it difficult to clearly identify whether projects should be funded by the national government or the federal states in water management.
National-regional issues	'Siloed' thinking in policy making	All nexus sectors	SWE – "siloed" thinking can lead to a failure to recognize cross-sectoral issues across different scales
	Different policy interpretation across scales	All nexus sectors	SWE - conflicts can arise due to inconsistencies in how national regulations are interpreted and enforced by regulators at the regional level
	Partial or limited support for regional regulation/initiatives by national policy because: - regional ambitions higher than national ambitions	Energy	AND - Andalusia Energy Strategy 2020 sets a more ambitious renewable energy, energy consumption and saving target than the national law.
	Lack of coordination of implementation actions	All nexus sectors	SWE - lack of coordination between statutory bodies and across jurisdictions in nexus sectors that leads to a lack of enforcement at regional level.
	Lack of power to influence decisions	All nexus sectors	SWE – limited power of local actors to influence national policy decisions.
	Uncertainty about continuity of policy instruments	Energy	SWE –policy change can hamper implementation of local policies. E.g. reductions to the feed-in tariff in the energy sector. An additional uncertainty arose because of changes in funding structures associated with the Brexit process.

	Centralized regulatory systems only partly account for local needs	Energy	SWE - conflicts between centralised regulatory system and need for support for smaller scale, more active local participation in energy initiatives.
Transboundary issues	Regulatory differences	Fishery	DE-FR - Because of different regulation on fishing season and on the species that can be caught, a fish may be spared on one riverbank, but caught on the other.
	Insufficient sharing of information on planning and management rules for shared resources	Water Energy Agriculture	DE-FR - insufficient sharing of information between the two neighboring states concerning management plans and regulations for the management of shared resources as well as about environmental impact assessment studies.
	Different natural resource management approaches	Nature conservation	DE-FR - the two countries have different nature conservation approaches stemming from their different management experiences.
	Differences in governance structures	Nature conservation Water Agriculture	DE-FR - identify right counterpart to interact to, trust building, human resources availability and capacity make transboundary cooperation difficult.
	Lack of financial resources for shared projects	Nature conservation Water Agriculture	DE-FR - difficulty to obtain financial resources for transboundary projects and research; but also available budget not always fully exploited by eligible partners due to disagreement on project design and implementation.

3.5.1 Nexus trade-offs in the land domain: an example of a policy dilemma for the EU

Land use policy across administrative scales offers an interesting example of trade-offs that require negotiation at national scale where the EU legislation could either be the problem, worsening conflict on already complex situation or the solution to domestic lock-ins.

Points in case are the Swedish, Dutch and Czech case studies. They all focus on renewable energy production: Sweden is interested in the impacts of further exploiting forest products; the Netherlands explores the potential and impacts of more biomass production, including forest products; Czech Republic explored the impact of biofuel crop production.

They all looked at the interactions between land use, land quality, forestry and biodiversity. Specifically, some of the objectives of the Swedish Forestry Act (SFS 1993:1096) are in conflict with the Habitat and Birds Directives that limit/prevent harvesting forest products. Similarly, in the Netherlands, the implementation of the Habitat and Birds directives conflicts with the possibility of harvesting biomass for energy production. The directives are often perceived (at least from a

business/farming perspective) as highly technocratic in the Netherlands with little flexibility for the country to adjust the Natura 2000 management plans to the local circumstances. This makes it difficult to manage trade-offs such as that between harvesting biomass for energy production and nature conservation. As a consequence, among other reasons, the design and implementation of the Natura 2000 management plans is delayed. These two examples show how framework directives designed equal for all member states, which however are characterized by very different local circumstances, can be a source of delays in the implementation of EU regulation. This could however also be seen as time needed to achieve solutions that are supported by a large group of stakeholders.

In contrast, there are situations where the existence of an EU level policy would function as a stimulus to overcome national lock-in situations, and the very absence of such EU policy is reason for postponing action at national level. This is the case, for example, of landscape and soil quality restoration in Czech Republic. Landscape and soil quality degradation is a highly conflicting issue in Czech Republic because of the trade-offs with agriculture, in particular the cultivation of crop for biofuel. The difficulty to reconcile conflicting interests has led to a lock-in situation with action being postponed until the new EU soil quality directive is adopted. The expectation is that the soil quality directive will provide a clear framework for action to be taken in member states for soil protection. The adoption of such EU framework would force the Czech government to take action, and therefore would put pressure on the conflicting parties to find a common ground to address the issue. Another policy that could give motivation to addressing soil degradation problems in the country is the European Landscape Protection Convention. The implementation of the convention could contribute to soil protection, prevent urbanization of agricultural land and help address the issue of surface water retention. However, for the same above-mentioned reasons the convention is only partly implemented in Czech Republic.

The above examples show a typical problem the EU faces when designing policies. The goal of the EU legislator is to establish a coherent and enforceable, but also fair and equitable, sectoral framework policy for all member states. However, because of the socio-economic and bio-physical difference across member states, the implementation of framework policies may be received and play out differently in member states, as shown by the examples above. The EU is aware of such differences but at the same time it is a persistent problem. Not only is the national, regional and local context usually complex, but often national/regional authorities add burdens of their own, claiming it comes from the EU, a process called ‘goldplating’. More focus on the EU rules and its space for national/regional interpretation could be useful.

4 Horizontal policy coherence: trade-offs and synergies across nexus sectors

This chapter describes and analyses the policy coherence assessments of the WLEFC nexus objectives in the case studies.

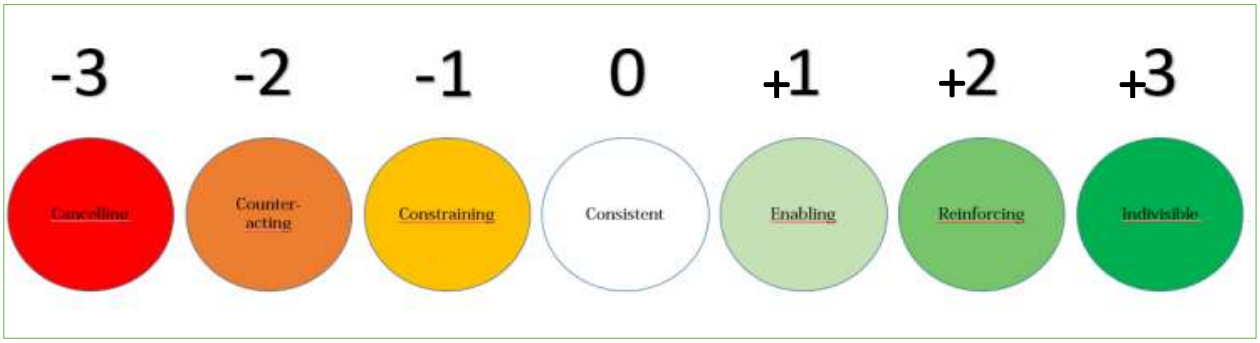
Policy coherence is defined as:

an attribute of policy referring to the systematic effort to reduce conflicts and promote synergies within and between individual policy areas at different administrative and spatial scales.

(Munaretto & Witmer, 2017a, based on Nilsson, Griggs & Visbeck, 2016; Nilsson et al., 2012).

The cases analysed the horizontal coherence of WELFC policies and other relevant policies for their area, using the same method that was applied at European scale (Munaretto & Witmer, 2017a). Coherence between pairs of objectives was scored using a scale according to Nilsson, Griggs, & Visbeck, 2016; Nilsson et al., 2012,Figure 13). When scoring interactions, the question was asked: *What happens to objective X if we make progress on objective Y?*

Figure 13 Scale used to score coherence between policy objectives for Europe and the cases



Source: Nilsson et al., 2016.

Interactions between objectives can be synergistic (positive score), neutral (score zero), conflicting (negative score), or either of them depending on the implementation and context. Interactions are bilateral. The effect of objective X on objective Y may differ from the effect of objective Y on objective X. Scoring matrices of EU and all cases can be found in Appendix 3.

The case studies objectives were related to the EU objectives to see if coherence and incoherence at EU level can be traced down to national and regional level and vice versa if coherence and incoherence at national and regional level is based on EU policies. National and regional policies may be more specific than EU policies due to the lower governance level and focus of the case, but most of them could be well related to EU policies. Based on the EU coherence analysis, six main coherence issues at EU level were chosen to be compared with the coherence issues observed by the cases.
In this chapter the reader can find for the EU and each case:

- An overview of selected policy objectives and for the cases the selected EU objectives they are related to.
- A table that shows for each objective the frequency of the coherence scores.
- Based on this table, an overview of the interlinkages between the objectives with the most interactions.
- A summary of the main coherence issues at EU level that were also observed by the case.

Conclusions are drawn in section 4.11.

4.1 European Union

Most linkages between policy objectives are synergistic (Table 19 and Table 20). Water supply and management of flood risk and scarcity, together with good land use practices, offer many opportunities for synergy, creating positive effects on all other WLEFC sectors. However, sufficient water supply and management of water scarcity may create a rebound effect on water and energy efficiency and economic water use. Also, agriculture and biofuel production may profit from water scarcity management, if priority of supply is given to agricultural water use, which may not be the case. Maintain and enhance forest cover serves climate mitigation and adaptation, water management and production of biomass, but may compete with farmers income and rural economy, and with production of hydropower. Increase resource efficiency in the agri-food sector and in forestry, increase energy efficiency and reduce energy use have positive effects in the nexus. It is a fundamental measure that serves all sectors.

The agricultural sector has opportunities to deliver services to the other nexus sectors, but this is conditional. The positive or negative impact on other nexus sectors of financial support to farms and rural areas and stimulating the competitiveness of the agricultural sector, depends on the implementation. There is synergy if environmental objectives are well taken care of (cross-compliance) and finances are used for climate mitigation and adaptation services, restoration of soils and prevention of degradation, and reforestation, and if increasing competitiveness in the agricultural sector means increasing energy efficiency and resource efficiency.
The impact of climate change mitigation and adaptation on other nexus sectors is mostly positive but may also depend on context and implementation, as is the case for the impact on water quality and supply, reduce water consumption, prevention of ILUC, increase production of biofuel and biomass, and financial support of the agri-sector and rural areas.

Increase the production of biofuel is the most conflicting objective, if assumed that biofuel is made from first generation food crops. This objective may contribute to farms income, support rural economy and reduce GHG emissions, depending on context and implementation, but conflicts with objectives for water quantity, water quality, water use and flood risk management. It also conflicts with all objectives for land use and even two climate objectives, support low-carbon technology and climate-friendly land use.

To compare policy coherence at EU level with national, regional and transboundary levels, the following six observations of coherence and incoherence in the WLEFC nexus at EU level were chosen:

1. The positive effects in the nexus caused by good practices in water and land management, restoration and prevention of soil erosion and reforestation.
2. The positive effects in the nexus of increasing energy and water efficiency, resource efficiency in the agri-food chain, and reduction of the use of water and energy.
3. The in principle positive effects in the nexus of sufficient water supply and management of floods and droughts, but the ambiguity in the implementation, caused by the choice of either technical solutions like building dykes and dams, reservoirs, canals and increasing groundwater abstraction or nature-based solutions like reforestation, river bed re-naturalisation, creation and expansion of natural floodplains, restoration of degraded soils and increase water retention in soil and subsoil. The latter way of implementation realises more positive interactions in the nexus than the former - rebound effects of sufficient water supply, which may hamper water and energy efficiency and economical water and energy use.
4. Competition for scarce water and land resources, that may create negative interlinkages between users and dependency on prioritisation of use. Production of biofuel crops, other agriculture, hydropower, forestry and reforestation, and ecological services may compete in case of scarcity.
5. The ambiguous role of agriculture in the nexus, with opportunities for positive interactions under conditions of cross-compliance and delivery of ecosystem and environmental services and with opportunities if increasing competitiveness means increasing recourse and energy efficiency.
6. The many negative interactions in the nexus that producing biofuels from 1st generation food and feed crops creates, and the ambiguous impact on agriculture and climate.

Table 19 Description of policy objectives used for the assessment of interactions in the WLEFC nexus at EU scale

EU WATER POLICY	
W1	Achieve good water quality status
W2	Ensure sufficient supply of good quality surface water and groundwater for people's needs, the economy and the environment
W3	Increase water efficiency
W4	Reduce water consumption
W5	Assess and manage flood risk and mitigate flood effects
W6	Address and mitigate water scarcity and drought
EU ENERGY POLICY	
E1	Increase production of biofuel
E2	Increase consumption of biofuel
E3	Increase production of energy from biomass (excluding biofuel)
E4	Increase consumption of energy from biomass (excluding biofuel)
E5	Increase hydro-energy production
E6	Increase hydro-energy consumption
E7	Increase energy efficiency
E8	Reduce energy consumption
E9	Push forward important energy infrastructure projects (grid, network, interconnectors, etc.)
E10	Achieve energy supply security
EU LAND USE POLICY	
L1	Restoring degraded soils to a level of functionality consistent with at least current and intended use
L2	Prevent soil degradation
L3	Maintain and enhance forest cover
L4	Prevent indirect land use change from nature to productive use
EU FOOD AND AGRICULTURE POLICY	
F1	Contribute to farm incomes (if farmers respect rules on environment, land management, soil protection, water management, food safety, animal health and welfare - 'cross-compliance')
F2	Improve competitiveness of agricultural sector (including sector-specific support and international trade issues)
F3	Ensure provision of environmental public goods in the agriculture sector
F4	Support rural areas economy (employment, social fabric, local markets, diverse farming systems)
F5	Promote resource efficiency in the agriculture, food and forestry sectors
F6	Reduce and prevent food waste
F7	Reduce intake of animal protein in human diet (non-binding objective; expressed intention on a research phase)
EU CLIMATE POLICY	
C1	Reduce GHGs emissions to keep global temperature increase within 2 degrees
C2	Increase efficiency of the transport system
C3	Support the development and uptake of low-carbon technology
C4	Support the development and uptake of safe CCS technology
C5	Incentivize more climate-friendly land use
C6	Promote adaptation in key vulnerable EU sectors and in MSs

Source: Munaretto & Witmer, 2017a, p. 31.

Table 20 Number of direct interactions per policy objective with policies for other WLEFC sectors

Percentage is calculated on the total number of possible interactions.

	INFLUENCING What happens in the nexus if we make progress on objective X?							INFLUENCED What happens to objective X if we make progress on other objectives in the nexus?						
	Interac-tions	%	Synergies		Conflicts		Syn & Conf	Interac-tions		Synergies		Conflicts		Syn & Conf
Obj. X			+	0/+	-	0/-	+/-		%	+	0/+	-	0/-	+/-
W1	9	*33*	4	0	0	0	5	17	*63*	12	0	3	0	2
W2	14	*52*	7	0	1	0	6	20	*74*	15	1	2	0	2
W3	7	*26*	5	0	0	0	2	7	*26*	3	1	0	0	3
W4	11	*41*	5	0	0	0	5	16	*59*	8	2	3	0	3
W5	11	*41*	9	1	0	0	1	11	*41*	10	0	1	0	0
W6	14	*52*	11	1	0	0	2	16	*59*	12	1	1	0	2
E1	17	*74*	2	0	13	1	1	15	*65*	4	1	4	0	6
E2	3	*13*	0	0	2	0	1	2	*9*	1	0	1	0	0
E3	11	*48*	5	0	1	4	1	10	*43*	5	3	2	0	0
E4	2	*9*	1	0	1	0	0	1	*4*	1	0	0	0	0
E5	9	*39*	2	0	5	0	2	10	*43*	6	0	0	1	3
E6	2	*9*	1	0	1	0	0	0	*0*	0	0	0	0	0
E7	10	*43*	8	2	0	0	0	10	*43*	5	1	1	1	2
E8	9	*39*	9	0	0	0	0	15	*65*	7	1	0	1	6
E9	3	*13*	1	1	0	0	1	1	*4*	0	0	0	1	0
E10	7	*30*	0	4	3	0	0	8	*35*	8	0	0	0	0
L1	14	*48*	14	0	0	0	0	15	*52*	11	1	2	1	0
L2	14	*48*	14	0	0	0	0	16	*55*	12	1	2	1	0
L3	12	*41*	10	0	1	0	1	16	*55*	12	0	2	2	0
L4	17	*59*	10	3	3	0	1	11	*38*	6	0	2	1	2
F1	16	*62*	13	1	0	2	0	19	*73*	12	1	1	0	5
F2	15	*58*	2	0	5	2	6	18	*69*	11	1	1	0	5
F3	15	*58*	11	0	2	2	0	14	*54*	12	0	1	0	1
F4	14	*54*	10	2	0	0	2	17	*65*	12	2	0	0	3
F5	14	*54*	11	3	0	0	0	17	*65*	13	1	2	0	1
F6	11	*42*	11	0	0	0	0	2	*8*	1	0	0	1	0
F7	11	*42*	10	0	0	0	1	0	*0*	0	0	0	0	0
C1	19	*70*	15	0	2	0	2	20	*74*	15	0	2	0	3
C2	8	*30*	7	0	1	0	0	6	*22*	2	1	2	1	0
C3	12	*44*	10	0	0	0	2	12	*44*	5	1	6	0	0
C4	6	*22*	0	2	4	0	0	0	*0*	0	0	0	0	0
C5	16	*60*	11	1	0	0	4	15	*55*	10	2	3	0	0
C6	19	*70*	14	2	0	0	3	15	*55*	13	1	1	0	0

Source: Munaretto and Witmer (2017a).

4.2 Greece

4.2.1 Horizontal policy coherence

The number of positive interactions clearly prevails, followed by the neutral interactions. Most synergistic interactions include: energy-climate, climate-energy and climate-climate, showing that these two policy areas are highly integrated on the national level in Greece. Synergies are also found between agri-food and land, and water-climate. Most conflicts are observed in case of water-food, food-water, energy-water, food-energy and tourism-land. Some of these negative interactions are well known for their major trade-offs, such as water-energy and water-food. Others, such as tourism-land, are less known. The coherence assessment brings to light these less known negative interactions for which negotiation of trade-offs between sectors is required.

Synergies are fully understood as:

- most of energy objectives are strongly related to the prevention of climate change;
- objectives concerning the sustainable management of water resources are closely linked to objectives having to do with combating climate change impacts and adaptation to climate change;
- objectives that place emphasis on the sustainable development of agriculture are in close relationship with the sustainable management of land and the adoption of a balanced land use pattern.

There are no strong conflicts between the WLEFC objectives. However, according to stakeholders, conflicts arise during the policy implementation phase. Such conflicts concern:

- Management of geothermal springs;
- Management of scarce water resources and combating water shortage: water allocation and water use by several sectors. Such conflicts include: water demand and misuse mainly by the agricultural sector for irrigation, water use for environmental flow (farmers' opposition), water supply for domestic use, water demand by the tourist sector, water demand by the Public Power Corporation S.A. for energy production. These conflicts are also closely linked to the seasonality of water needs;
- Use of pesticides and the impacts on water quality;
- Land use management. Current land use conflicts with land use described in several technical studies that regulate land use distribution and the "land use legal rights";
- Energy mix for 2030;
- Use of lignite for electricity production and GHG emission reduction objectives;
- Opposition by some local authorities to the construction of RES infrastructures;
- Hydrocarbons exploitation in the Epirus Region and the impacts on the natural environment and landscape;
- Deregulation of the internal electricity market (Government-PPC-Investors).

4.2.2 Relation with policies and coherence at EU scale

The selected Greek objectives for climate, water and energy can directly be traced back to the selected EU policies, those for tourism and most of the objectives for land are national (Table 21). The objectives to introduce a pricing system for water and energy in Greece are policy instruments to reach water and energy efficiency. For agriculture and food, both selected and non-selected EU policies are addressed as well as national policies, e.g. EU objectives for plant genetic resources, pesticides and food security, and national objectives for livestock and aquaculture.

The Greek case mentions the competition between water users for scarce water resources and the related negative effects in the nexus as a main but seasonal problem.

The observation at EU scale that good practices in water and land management has many positive relations in the nexus is confirmed by the high number of positive scores for these Greek objectives (

Table 22). The Greek case does not mention the ambiguities of water supply and flood and drought management, nor ambiguity in agriculture except its water misuse.

Table 21 Description of policy objectives used for the assessment of interactions in the Greek case study

Climate			
Code	**Heading**	**Detailed description**	Related to EU objectives
C1	Reduction of GHG emissions	Reduction of emissions from all greenhouse gases according to the respective national and European goals	C1
C2	Increase the adaptation ability and resilience against climate change	Reinforcement of the country's adaptation ability against climate change impacts	C6
C3	Mapping out national strategic directions (policies and actions) against climate change	Establishment of specific policy measures for combating climate change	C3, C5
C4	Increase social awareness with respect to climate change	Establishment of participatory actions in order to increase public awareness and involve citizens in actions having to do with climate change confrontation	
C5	Establishment of a GHG emissions trading system	Establishment/adoption of rules which regulate the trade of GHG emissions from the energy and industrial sectors	C1

	(in reconciliation with the 2003/87/EC Directive)		
Water			
Code	**Heading**	**Detailed description**	Related to EU objectives
W1	Protection and sustainable management of surface water	Protection of quality and quantity of surface water	W1, W2
W2	Protection and sustainable management of groundwater	Protection of quality and quantity of groundwater	W1, W2
W3	Preventing further deterioration of aquatic ecosystems	Monitoring sources of pollution and reduction of water resources pollution	W1
W4	Mitigation of floods' and drought's effects	Proactive planning and measures for the management of floods and drought	W5, W6
W5	Establishment of a national water pricing system (establishment of the process)	Definition of water prices / costs of water for several uses (agricultural, domestic, etc.)	
Food and Agriculture			
Code	**Heading**	**Detailed description**	Related to EU objectives
F1	Sustainable development of agriculture	Rational use of resources (mainly land and water) by the agricultural sector, adoption of modern agricultural practices and relative technologies for the sustainable management of agricultural sector	F1, F2, F5
F2	Preservation and sustainable use of plant genetic resources for food and agriculture	Equitable sharing of benefits derived from the use of plant genetic resources in harmonization with the convention for biodiversity, sustainable agriculture and food security	
F3	Spatial organization of livestock	Categorization of livestock activities, mapping of pastures and their specific characteristics, terms and conditions for the development of livestock activities	
F4	Rational use of pesticides	Definition of provisions for the rational use of pesticides, protection of land and water resources from pesticides	
F5	Sustainable development of aquaculture	Determination of measures and criteria for the development and spatial organization of the aquaculture sector, categorization of aquaculture activities	
F6	Ensuring security in the food and fodder sectors	Institution of measures for ensuring food and fodder safety, protection of citizens' and animals' health	
Energy			
Code	**Heading**	**Detailed description**	Related to EU objectives
E1	Attainment of the national renewable energy goals	RES share in the gross final energy consumption, adaptation of the national energy mix: 20%; RES share in the gross final electricity consumption: 40%; RES share in	E2, E4, E6

		the final energy consumption for heating and cooling: 20%; RES share in the transportation sector: 10%	
E2	Expand electricity production from RES	Exploitation of renewable energy sources for energy production, installation of wind parks, hydroelectric power plants, PVs, geothermal power plants, processing of biomass	E1, E3, E5
E3	Expand cogeneration of high performance electricity and heat	Energy and heat cogeneration from two or more useful types of energy sources	
E4	Establishment of a national energy pricing system (establishment of the process)	Determination of a pricing system concerning: energy cogeneration, renewables and conventional energy	
E5	Establishment of a national system for natural gas management	This goal mainly concerns natural gas supply and distribution system	E9
E6	Increase energy efficiency and saving	Increase energy efficiency in all productive sectors, energy saving in buildings (target for 2020: 24,7 Mtoe)	E7, E8
Land			
Code	**Heading**	**Detailed description**	Related to EU objectives
L1	Sustainable and integrated spatial development	Establishment of a balanced spatial pattern of development between urban and rural regions, protection of biodiversity, protection of natural and cultural resources	L1, L2, L3, L4
L2	Development of a balanced and competitive economy	Strengthening economic and social cohesion, strengthening country's position in the regional (EU) and international environment	
L3	Improve spatial organization of aquaculture sector	Development of the necessary aquaculture infrastructures under the framework of environmental protection	
L4	Improve spatial organization of industrial sector	Long-term and sustainable spatial organization of the industrial sector	
Tourism			
Code	**Heading**	**Detailed description**	Related to EU objectives
T1	Sustainable development of the tourist sector	Rational use of resources (water, energy, land) by the tourist sector, adaptation of tourist sector to the special characteristics of each region	
T2	Development of tourist entrepreneurship	Reinforcement and support of tourist entrepreneurship activities	
T3	Development of tourist training	Promotion of tourist training activities, organization and modernization of tourist training schools, definition of goals and responsibilities of the Tourist Training Organization	

T4	Improvement of the Greek tourist product	Upgrading the quality of tourist products and tourist services	

Table 22 Number of direct interactions per policy objective with policies for other WLEFC sectors and tourist sector in the Greek case

Percentage is calculated on the total number of possible interactions

	INFLUENCING What happens in the nexus if we make progress on objective X?							INFLUENCED What happens to objective X if we make progress on other objectives in the nexus?						
	Interac-tions	%	Synergies		Conflicts		Syn & Conf	Interac-tions		Synergies		Conflicts		Syn & Conf
Obj. X			+	0/+	-	0/-	+/-		%	+	0/+	-	0/-	+/-
W1	15	52%	13	1	1	0	0	16	55%	12	1	3	0	0
W2	12	41%	10	1	1	0	0	12	41%	11	0	1	0	0
W3	15	52%	12	2	1	0	0	14	48%	10	1	3	0	0
W4	7	24%	5	2	0	0	0	7	24%	5	2	0	0	0
W5	4	14%	2	2	0	0	0	8	28%	8	0	0	0	0
L1	13	45%	11	2	0	0	0	18	62%	15	3	0	0	0
L2	13	45%	11	2	0	0	0	14	48%	11	3	0	0	0
L3	6	21%	2	1	3	0	0	7	24%	6	0	1	0	0
L4	9	31%	6	1	2	0	0	14	48%	5	9	0	0	0
E1	13	45%	12	1	0	0	0	11	38%	10	1	0	0	0
E2	14	48%	9	1	4	0	0	13	45%	11	0	2	0	0
E3	11	38%	9	2	0	0	0	10	34%	9	1	0	0	0
E4	8	28%	8	0	0	0	0	11	38%	8	2	1	0	0
E5	12	41%	9	3	0	0	0	10	34%	7	3	0	0	0
E6	15	52%	14	1	0	0	0	14	48%	10	4	0	0	0
F1	22	76%	15	6	1	0	0	22	76%	14	6	2	0	0
F2	5	17%	4	1	0	0	0	4	14%	4	0	0	0	0
F3	11	38%	5	2	4	0	0	11	38%	10	0	1	0	0
F4	6	21%	6	0	0	0	0	6	21%	3	0	3	0	0
F5	8	28%	8	0	0	0	0	7	24%	7	0	0	0	0

F6	9	31%	8	1	0	0	0	6	21%	6	0	0	0	0
C1	15	52%	14	1	0	0	0	15	52%	13	2	0	0	0
C2	20	69%	19	1	0	0	0	20	69%	16	4	0	0	0
C3	19	66%	16	3	0	0	0	17	59%	17	0	0	0	0
C4	9	31%	5	4	0	0	0	11	38%	10	1	0	0	0
C5	10	34%	10	0	0	0	0	11	38%	11	0	0	0	0
T1	20	69%	13	6	1	0	0	19	66%	10	8	1	0	0
T2	6	21%	5	1	0	0	0	5	17%	4	1	0	0	0
T3	4	14%	3	1	0	0	0	3	10%	3	0	0	0	0
T4	12	41%	6	6	0	0	0	7	24%	4	3	0	0	0

4.3 Latvia

4.3.1 Horizontal policy coherence

Objectives related to the Energy sector have the highest level of interactions, both synergies and conflicts, with the objectives of other nexus sectors. Particularly the objective to increase the share of renewable energy is interacting with almost all objectives of the other sectors (Table 23 and Table 24).

Synergistic interactions occur between water-water, climate-land use, food-land use and climate-energy sectors. In contrast, potential conflicts are found between water-energy, land use-energy and land use-land use sectors.

- *Climate* mitigation and adaptation objectives show the highest number of synergies with the policy objectives of other sectors. Most synergies have been identified between climate and energy to reach the objectives 'reduce GHG emissions' and 'increase the share of RES in total gross final energy consumption'.
- The *water* sectors show high internal coherence. Progress in this sector also interacts positively with food and agriculture, and with climate.
- Progress in *energy* objectives leads to more conflicts than synergies, except for climate and energy objectives, where more than 50% interactions are positive. This suggests energy policy is internally rather consistent as well as aligned with climate policy but seems to integrate other policies only to a limited extent.
- Progress in *land use* objectives is synergistic both internally and with food and agriculture objectives (50% positive interactions). Internal coherence in land use policy indicates spatial planning is well structured in Latvia.
- *Food and agriculture* objectives are internally coherent and reinforcing energy and climate objectives, because growing of energy crops and fast-growing trees for production of energy biomass helps to increase the share of RES in energy production and to use the local energy sources. Looking at the individual objectives, the positive interactions reveal the

alignment of agriculture objectives with energy security, climate management and biomass production.

The identified conflicts are not strong (no -3 for example). However, according to stakeholders, in practice, the severity of conflicts depends on implementation pathways. The following severe conflicts were mentioned:

- Growing of *energy* crops to produce 1st generation biofuels and production of fast-growing trees for energy biomass help to increase the national and international (export) share of RES in energy production, use the local energy sources, and creates income for the forestry sector, but:
  - increase *water* pollution through the leakages of fertilisers and pesticides and herbicides, and thus conflict with water objectives,
  - reduces *land* available for other agricultural production and cause fragmentation and degradation of land,
  - cause deterioration of (forest) ecosystems and have a negative impact on biodiversity, thus reducing ability for *adaptation to climate change*,
  - cutting of trees for production of wood-based fuels for national use and export reduces the *resources* available for production of high added value products e.g., furniture, and has a negative impact on *climate* objectives, meeting the GHG emission reduction and CO_2 sequestration targets in Latvia (LULUCF);
- *Energy* production from hydropower helps to reach targets for the use of RES, but has a negative impact on:
  - *water* quality and water ecosystems,
  - *land* use e.g., by flooding;
- Unsustainable *forest management* (e.g. clear-cuts) has a negative impact on *forest ecosystems*;
- *Agriculture and food*: expansion of arable land at the cost of forest and (semi) natural meadows and intensification of fertilisation on existing arable land to increase the yields of food or feed production:
  - conflicts with *climate* change mitigation targets (GHG emissions and CO_2 sequestration),
  - has a negative impact on *soil* and *water* quality by leakage of nutrients, pesticides and herbicides.

4.3.2 Relation with policies and coherence at EU scale

All selected policy objectives for the Latvian case can directly be traced back to EU policies.

According to the coherence scoring, good practice in land and water management has many positive relations in the nexus. Renewable energy from biofuels and biomass scores ambiguous, as it does at EU level. Expansion and intensification of agriculture to increase production is mentioned as a severe problem for water, land and climate objectives, showing the ambiguity of the interlinkages of agriculture in the nexus.

Table 23 Description of policy objectives used for the assessment of interactions in the Latvian case study

Energy			
Code	**Heading**	**Detailed description**	**Related to EU objectives**
E1	Increase use of renewable energy sources (RES)	Refers to the increased share of renewable energy (40%) from total gross final energy consumption by 2020	E2, E4
E2	Increase use of RES in transport energy	Refers to the increased share of renewable energy in the transport sector to at least 10% of gross final energy consumption for transport by 2020	E2, E4
E3	Increase the efficiency of use of energy sources	Refers to all sectors where efficiency can be improved (buildings, cars, industry, agriculture, housing, etc.). Targets to be reached by 2020: total cumulative energy savings – 0.85 Mtoe (9897 GWh); total savings of primary resources – 0.67 (28PJ) by 2020; energy performance of residential and non-residential buildings – specific energy consumption for heating – 150 kWh/m^2/year; 3% State owned building space renovation (678 460 m2 in total)	E7, E8, C2
Food and agriculture			
Code	**Heading**	**Detailed description**	**Related to EU objectives**
FA1	Increase the efficiency of use of resources	Refers to prudent use of resources, supporting climate resilient and low carbon economy in agriculture and food sectors, application of innovative technologies	F5, F6
FA2	Prevent deterioration of ecosystems from agriculture and food production	Refers to prevention and reduction of pollution (air, water, land) and waste minimisation from agriculture and food sector	F1 (cross-compliance), F6
FA3	Increase of economic development of rural areas	Refers to reduction of poverty, social integration, and entrepreneurship	F4
Water			
Code	**Heading**	**Detailed description**	**Related to EU objectives**
W1	Sustainable and rational use of water resources	Refers to sustainable and rational use of water resources and sufficient supply to inhabitants with good quality surface water and groundwater	W2
W2	Protection of the aquatic environment	Refers to protection of the aquatic environment, gradually reducing emission and discharge of priority substances, phasing out emission and discharge of substances, which are especially hazardous to the aquatic environment	W1
W3	Prevention of pollution of the sea	Refers to reduction of eutrophication of inland water bodies and the Baltic Sea (HELCOM Convention)	W1
Land			

Code	Heading	Detailed description	Related to EU objectives
L1	Efficient use of land	Refers to prevention to fragmentation, reduction of abandoned areas of usable arable land, efficient use of built up areas and re-cultivation of degraded territories	L1
L2	Quality of soil and biodiversity	Refers to soil protection (including prevention of erosion) and increase of soil quality	L2
Forestry			
Code	**Heading**	**Detailed description**	**Related to EU objectives**
FO1	Sustainable forest management	Refers to maintenance of forest areas, increase of forest productivity (including amelioration) and afforested areas	L3
FO2	Production of high added value forestry products	Refers to increased competitiveness of forestry sector, higher productivity, application of innovative technologies	
Climate			
Code	**Heading**	**Detailed description**	**Related to EU objectives**
C1	Climate change mitigation	Refers to the reduction of GHG emissions by setting GHG emission targets for the ETS and non-ETS sectors	C1
C2	Climate change adaptation	Refers to selection and application of measures for adaptation to climate change in various sectors	C6

Source: Indriksone & Bremere, 2018.

Table 24 Number of direct interactions per policy objective with policies for other WLEFC sectors in Latvia

Percentage is calculated on the total number of possible interactions

	INFLUENCING What happens in the nexus if we make progress on objective X?							INFLUENCED What happens to objective X if we make progress on other objectives in the nexus?						
	Interac-tions	%	Synergies		Conflicts		Syn & Conf	Interac-tions		Synergies		Conflicts		Syn & Conf
Obj. X			+	0/+	-	0/-	+/-		%	+	0/+	-	0/-	+/-
W1	2	14%	2	0	0	0	0	4	29%	3	0	0	1	0
W2	8	57%	6	0	0	2	0	12	86%	7	1	0	4	0
W3	6	43%	5	0	0	1	0	12	86%	7	1	0	4	0
L1	9	64%	5	1	0	2	1	5	36%	3	0	1	0	1
L2	11	79%	9	0	0	2	0	9	64%	5	0	1	2	1
FO1	9	64%	8	0	0	0	1	5	36%	3	0	1	1	0
FO2	4	29%	4	0	0	0	0	6	43%	4	1	1	0	0
E1	13	93%	5	1	1	5	1	9	64%	5	1	0	2	1
E2	10	71%	5	0	1	4	0	7	50%	4	0	0	3	0
E3	6	43%	6	0	0	0	0	2	14%	2	0	0	0	0
FA1	9	64%	9	0	0	0	0	10	71%	10	0	0	0	0

FA2	5	36%	5	0	0	0	0	9	64%	7	0	2	0	0
FA3	10	71%	1	1	4	2	2	8	57%	8	0	0	0	0
C1	10	71%	8	2	0	0	0	10	71%	9	0	0	0	1
C2	7	50%	7	0	0	0	0	11	79%	8	1	0	1	1

4.4 The Netherlands

4.4.1 Horizontal policy coherence

The coherence assessment was conducted between biomass objectives and objectives for water, land use (spatial planning), climate (GHG emissions), food and agriculture, nature and waste. This choice is justified by the fact that the case study investigates the impact of an increase of biomass consumption and production in the Netherlands to achieve the national climate targets.

The progress on biomass objectives mostly interacts neutrally with objectives for the other sectors, and positive interactions prevail over negative ones. 'Increase biomass productivity of agriculture' is the most affected and most affecting biomass objective and causes most conflicts with other objectives. Biomass and agriculture have most interactions. Biomass is most affected by agricultural objectives, with three conflicts and thirteen synergies. Biomass objectives affect the food ones the most, in a synergistic way. There are more interactions with biomass as the affecting objective than with biomass as the affected objective.

Biomass versus agriculture and forestry policy

Increasing productivity and efficiency of agriculture and forestry to harvest more biomass residues has many positive impacts on agriculture. It is synergistic with economic development of rural areas and may support farm incomes. Use of degraded land for biomass production can generate income for farmers and support rural economies, restore, preserve and expand ecosystems that are related to agriculture and forestry, increase sustainable agricultural production and stimulate carbon sequestration. However, an increase of agricultural productivity counteracts improvement of ecosystems, and increase of forest productivity may constrain ecosystem preservation.

The other way around, crop diversification in agriculture, financial support for farmers, economic development of rural areas, ecosystem restoration, preservation and enhancement, and increase of sustainable agricultural production may increase biomass productivity. Financial support to farmers and rural economies, ecosystem restoration and expansion and increase of sustainable agricultural production may stimulate the use of degraded soils for biomass production. Conflicts arise between the maintenance of permanent grassland, conservation of 5% of area of ecological

interest and cross compliance with sustainability and environmental standards on the one hand and increase of biomass productivity in agriculture on the other hand.

Biomass versus food policy
The interactions between the biomass objectives and food objectives are mostly synergistic with one exception, increase of productivity of agriculture may increase emissions of GHGs, nutrients and pollutants in the food production process. Increase of agricultural productivity supports international food security and efficient food production. Improve efficient use of biomass, combat biomass waste and close loops supports the optimal use of biomass, reduce food waste and stimulate high-quality efficient food production. Production of aquatic biomass offers adds to international food security and offers opportunity to develop new protein resources.
The other way around, reducing food waste and optimal use of biomass stimulates the closing of loops and cascaded use of biomass in a circular economy.

Biomass versus spatial planning
Increase of biomass productivity in agriculture (use of residues) may improve environmental quality (the focus on usage of residues might trigger less use of pesticides for instance), but increasing productivity of forests does not necessarily do that (as forest residues could enrich soil and biodiversity, although more forest in general will have positive impacts). Use of degraded soils for biomass production expands the space for sustainable energy supply, improves environmental quality and may expand land available for water storage to combat floods.
Improvement of environmental quality may increase biomass productivity in agriculture and forestry. Conservation of nature puts constrains on increasing biomass productivity in agriculture.

Biomass versus nature policy
Increase biomass productivity of agriculture counteracts protection of nature in agriculture landscapes, balancing biodiversity and food production and restoration of degraded land ecosystems. Increase of biomass productivity of forests puts constrains on restoration of degraded land ecosystems. Increase efficiency of biomass production and energy production from biomass, and combat waste enables sustainable biomass production for electricity and heat, and the closing of loops. Use of degraded soils for biomass production reinforces the restoration of degraded land ecosystems and stimulates function combinations of nature and bio-based economy.

Protection of nature in agricultural landscapes and balancing biodiversity and food production put constrains on the increase of biomass productivity in agriculture. Restoring degraded ecosystems on land reinforces biomass productivity in agriculture and forestry.

Biomass versus waste policy
Increasing the efficiency of biomass production and use, closing loops and improvement of biomass generation from waste positively interacts with all four objectives of waste policy. The other way around, improvement of waste separation enables generation of biomass from residues and closing loops.

Biomass versus water policy

An increase of agricultural and aquatic biomass productivity leads to more use of residues, which make it easier to improve the water quality and it also stimulates the improvement of water ecosystems and it enhances the sustainable socio-economic use of waters. A similar effect on the water quality is likely to come from more biomass generation in general. In sum, the biomass objectives are also likely to make it easier to reduce costs for the water management. Besides, the biomass objectives are also likely to stimulate the climate awareness which is important to the water policy. Use of degraded land for biomass production can improve water quality.
Cost reductions on water quality and use of waste water are however a potential constraint for the quality of biomass and possibly the cascading. The assumption here is that less spending on water quality means less quality. In practice this might not be the case, as other aspects (innovation, technological improvements) might increase the quality at less costs. An improvement of the water quality is in general beneficial for the quality and use of biomass. A focus on climate awareness is also likely to be supportive to more biomass and more cascading.

4.4.2 Relation with policies and coherence at EU scale

The selected energy objectives in the Dutch case focus on the use of biomass as a renewable source (Table 25). Because of this focus, policies for nature and waste were included in the coherence analysis. Most of these objectives are also related to the selected EU policies for several sectors, as national policy objectives in the Netherlands are often formulated cross-sectoral, e.g. nature policies include policies for water, agriculture and energy and improving water quality is one of the agricultural objectives. The objectives for water and agriculture and food can be directly traced back to EU policies.

Increase biomass production has many positive interactions in the nexus, but also ambiguous with environment, ecosystem and nature objectives (Table 26). In the Netherlands, the biggest source of biomass is waste, not feed or food crops, so at national level the environmental problems that are mentioned in EU policies are not encountered. They may exist though outside The Netherlands, related to imported biofuel and biomass. Dutch biomass policy is strongly related to circular economy, resource efficiency and cascaded use of biomass, all included in waste policy. Together with growing biomass on degraded soils, resource efficiency objectives for biomass production scores overall positive.

Table 25 Policy objectives used for the assessment of interactions in the Dutch case study

B	**Biomass objectives**	
Code	**Objective**	**Related to EU objectives**
B1	Increase biomass productivity of agriculture (use of residues)	E3
B2	Increase biomass productivity of forestry (use of residues)	E3
B3	More efforts for efficiency of biomass processing, via bio-refinery and co-production	E3, C3
B4	Improve generation of biomass from residues	E3, C3
B5	Combat waste during harvesting and processing	E3, C3

B6	Stimulate development of alternative ways of producing resources without using soil and biomass (like artificial photosynthesis)	E3, C3
B7	Optimize and close loops (Cascaded use of biomass)	F5, F6
B8	Production of aquatic biomass	E3, C3
B9	Use of degraded soils for biomass production	L1, E3
C	**Climate objective**	
Code	**Objective**	**Related to EU objectives**
C1	49% reduction of GHG emissions in 2030 based on 1990 emissions and 95% reduction in 2050	C1
A	**Agricultural policy objectives**	
Code	**Objective**	**Related to EU objectives**
A1	Crop diversification	F1
A2	Maintaining permanent grassland	F1
A3	Conservation of 5% of area for ecological interest	F1
A4	Compliance with sustainability and environmental criteria	F1
A5	Financial support for farmers	F1
A6	Improvement of water quality	F1
A7	Economic development of rural areas	F4
A8	Restoring, preserving and enhancing ecosystems related to agriculture and forestry	F3
A9	Increasing sustainable agricultural production	
A10	Contribute to negative GHG emissions	
F	Food policy objectives	
Code	**Objective**	**Related to EU objectives**
F1	Enforce international food security	
F2	Reducing food waste from consumer side	F6
F3	High-quality efficient food production	F5
F4	Low emissions in food production process	
F5	Development of alternative protein sources	F7
F6	Reducing food waste from producer side	F6
F7	Optimal utilization of biomass	
L	**Land use/spatial planning objectives**	
Code	**Objective**	**Related to EU objectives**
L1	Space for the main network of sustainable energy supply and energy transition	
L2	Improving environmental quality (air, soil, water)	
L3	Space for conservation and enforcement of (inter)national unique culture historical and natural properties	
L4	Space for water safety	W5

L5	Climate resilient urban (re)development	C6
L6	Deliver (bio)resources for other sectors and contribute to negative emissions	
N	**Nature policy objectives**	
Code	**Objective**	**Related to EU objectives**
N1	More wood from sustainable forests on the Dutch market	
N2	Protection of nature on landscape level in production areas of agro resources	F3, F1
N3	Balancing biodiversity and food production	
N4	Restoring degraded ecosystems on land	L1
N5	Stimulating initiatives for function combinations of nature and bio-based economy	
N6	Sustainable increase in agricultural productivity	
N7	Production of biomass for electricity and warmth is sustainable	E3
N8	Working on closed loops	F5
N9	Providing insight into the economic value of our ecosystem services	
N10	Increasing Dutch wood production	L3
W	**Waste policy objectives**	
Code	**Objective**	**Related to EU objectives**
W1	Stimulating the prevention of waste	F6
W2	Improving the useful application of the total waste with a higher share of recycling	F5
W3	Optimal usage of the energy content of waste that cannot be recycled	
W4	Improvement of waste separation and collection	
Wa	**Water policy objectives**	
Code	**Objective**	**Related to EU objectives**
Wa1	Cost reduction water quality, flood protection, water supply and (re)use of waste water.	
Wa2	Ensure long-term flood risk reduction and water supply in view of climate change	W2, W5, W6
Wa3	Reduce vulnerability of built-up areas to weather conditions/ flood/climate-change	C6
Wa4	Increase climate awareness and adaptation policy/practices	
Wa5	Maintenance of infrastructure for transport and water accessibility	
Wa6	Clean and ecological healthy water for ecosystems and sustainable socio-economic use	W1

Table 26 Number of direct interactions between policy objectives for biomass and WLAFC (A for agriculture) sectors, nature and waste in the Netherlands

Percentage is calculated on the total number of possible interactions. Note that only interactions with objectives for biomass were scored.

	INFLUENCING What happens in the nexus if we make progress on objective X?							INFLUENCED What happens to objective X if we make progress on other objectives in the nexus?						
	Interac-tions	%	Synergies		Conflicts		Syn & Conf	Interac-tions		Synergies		Conflicts		Syn & Conf
Obj. X			+	0/+	-	0/-	+/-		%	+	0/+	-	0/-	+/-
W1	6	67%	2	0	4	0	0	4	44%	4	0	0	0	0
W2	2	22%	2	0	0	0	0	0	0%	0	0	0	0	0
W3	0	0%	0	0	0	0	0	0	0%	0	0	0	0	0
W4	1	11%	1	0	0	0	0	6	67%	6	0	0	0	0
W5	0	0%	0	0	0	0	0	0	0%	0	0	0	0	0
W6	5	56%	5	0	0	0	0	1	11%	1	0	0	0	0
L1	0	0%	0	0	0	0	0	1	11%	1	0	0	0	0
L2	2	22%	2	0	0	0	0	3	33%	2	0	1	0	0
L3	0	0%	0	0	0	0	0	0	0%	0	0	0	0	0
L4	1	11%	0	0	1	0	0	1	11%	1	0	0	0	0
L5	0	0%	0	0	0	0	0	0	0%	0	0	0	0	0
B1	16	39%	10	0	6	0	0	18	44%	11	0	7	0	0
B2	6	15%	3	0	3	0	0	10	24%	9	0	1	0	0
B3	4	10%	4	0	0	0	0	0	0%	0	0	0	0	0
B4	10	24%	10	0	0	0	0	2	5%	2	0	0	0	0
B5	10	24%	10	0	0	0	0	3	7%	3	0	0	0	0
B6	2	5%	2	0	0	0	0	1	2%	1	0	0	0	0
B7	6	15%	6	0	0	0	0	8	20%	7	0	1	0	0
B8	3	7%	3	0	0	0	0	3	7%	2	0	1	0	0
B9	10	24%	10	0	0	0	0	5	12%	5	0	0	0	0

A1	1	11%	1	0	0	0	0	0	0%	0	0	0	0	0
A2	1	11%	0	0	1	0	0	0	0%	0	0	0	0	0
A3	1	11%	0	0	1	0	0	0	0%	0	0	0	0	0
A4	1	11%	0	0	1	0	0	0	0%	0	0	0	0	0
A5	2	22%	2	0	0	0	0	4	44%	4	0	0	0	0
A6	2	22%	2	0	0	0	0	2	22%	1	0	1	0	0
A7	3	33%	3	0	0	0	0	5	56%	5	0	0	0	0
A8	3	33%	3	0	0	0	0	3	33%	1	0	2	0	0
A9	2	22%	2	0	0	0	0	1	11%	1	0	0	0	0
F1	0	0%	0	0	0	0	0	6	67%	6	0	0	0	0
F2	1	11%	1	0	0	0	0	0	0%	0	0	0	0	0
F3	0	0%	0	0	0	0	0	2	22%	2	0	0	0	0
F4	0	0%	0	0	0	0	0	1	11%	0	0	1	0	0
F5	0	0%	0	0	0	0	0	1	11%	1	0	0	0	0
F6	2	22%	2	0	0	0	0	1	11%	1	0	0	0	0
F7	1	11%	1	0	0	0	0	4	44%	4	0	0	0	0
N1	0	0%	0	0	0	0	0	0	0%	0	0	0	0	0
N2	1	11%	0	0	1	0	0	1	11%	0	0	1	0	0
N3	1	11%	0	0	1	0	0	1	11%	0	0	1	0	0
N4	2	22%	2	0	0	0	0	3	33%	1	0	2	0	0
N5	0	0%	0	0	0	0	0	1	11%	1	0	0	0	0
N6	1	11%	1	0	0	0	0	1	11%	1	0	0	0	0
N7	0	0%	0	0	0	0	0	1	11%	1	0	0	0	0
N8	1	11%	1	0	0	0	0	4	44%	4	0	0	0	0
N9	1	11%	1	0	0	0	0	0	0%	0	0	0	0	0
N10	2	22%	2	0	0	0	0	1	11%	1	0	0	0	0
Ws1	1	11%	1	0	0	0	0	2	22%	2	0	0	0	0
Ws2	1	11%	1	0	0	0	0	3	33%	3	0	0	0	0
Ws3	0	0%	0	0	0	0	0	2	22%	2	0	0	0	0
Ws4	2	22%	2	0	0	0	0	1	11%	1	0	0	0	0

4.5 Sweden

4.5.1 Horizontal policy coherence

There are more synergies than conflicts between policies of different sectors (Table 27 and Table 28). The share of synergies is highest (100%) in case of the following interactions: water-water, energy-energy, energy-climate, climate-energy, climate-climate. The share of conflicts is also relatively high in some cases, reaching 100% (land use), 50% (land use-water), 50% (energy-water) and 50% (energy-land use). It is important to note that in this case study land use mostly includes forestry.

The *energy* policy objectives are well aligned with the *climate* objectives. Sweden has become one of the leading actors in the EU in the design of a new regulatory framework for tougher requirements in the climate and energy sectors. The climate and energy objectives set by Sweden are more ambitious than those of the EU.

The *agricultural* sector is least aligned with the policy objectives of other sectors. Particularly, there is a conflict between a market-oriented agricultural sector and a competitive food supply chain on one side, and more *environment*ally and *climate* friendly objectives that would also support high biodiversity on the other side. However, it has been suggested at the stakeholder workshop that if Sweden better utilized its image of "environmentally friendly" *food* producer and built its market competitiveness on it, it would lead to better alignment of the agricultural goal with other goals.

Furthermore, objectives such as *biodiversity* in forest and agriculture as well as good surface *water*, groundwater and wetland quality seem to be difficult to accomplish, while both *agricultural* and *forestry* production dominate. This is reflected in the failure to implement most of Swedish Environmental Quality Objectives in the recent years. Higher priority has been given to most of the production-oriented and economic development-oriented goals as compared to environmentally oriented goals, leading to e.g. more intensive production systems that do not support high biodiversity or lead to decreasing water quality. In addition, highest priority is given to climate change goals, which are not always in line with other environmental objectives. For example, producing more biomass to support climate mitigation may hinder effective biodiversity conservation, as it requires more intensive forest management.

4.5.2 Relation with policies and coherence at EU scale

The selected objectives for Sweden mostly focus on environment and forestry. They are related to EU water quality and ecosystem objectives, and objectives for climate mitigation and adaptation, renewable energy, energy efficiency and public services by agriculture. The only direct economic objectives focus on sustainable timber production and a market-oriented and competitive agri-food sector, of which only the latter is directly related to the selected EU objectives. The ambiguous interlinkages in the nexus of agriculture and biomass production are also noted in the Swedish case.

Table 27 Description of policy objectives used for the assessment of interactions in the Swedish case study

Sector	Code	Objective	Related to EU objectives
Climate	C1	Environmental goal: Reduce Climate Impacts	
	C2	Emission Reduction Targets	C1
Forest	F1	Production goal: Ensure a long-term sustained yield of timber	
	F2	Environmental goal: Forests with high natural, cultural and recreational values	
Water	W1	Environmental goal: Flourishing Lakes and Streams	W1
	W2	Environmental goal: Good-Quality Groundwater	W1
	W3	Environmental goal: Thriving Wetlands	W1
	W4	Reduce the harmful consequences of floods	W5

Energy	E1	Sustainable and environmentally friendly energy supply	
	E2	Increase energy efficiency	E7
Horizontal	H1	Environmental goal: A varied agricultural landscape	F3
	H2	A market-oriented agricultural sector and a competitive food supply chain	F2
	H3	Environmental goal: Zero Eutrophication	
	H4	Environmental goal: Natural Acidification Only	

Table 28 Number of direct interactions per policy objective with policies for other WLEFC sectors in Sweden

Percentage is calculated on the total number of possible interactions

	INFLUENCING What happens in the nexus if we make progress on objective X?							INFLUENCED What happens to objective X if we make progress on other objectives in the nexus?						
	Interac-tions	%	Synergies		Conflicts		Syn & Conf	Interac-tions	%	Synergies		Conflicts		Syn & Conf
Obj. X			+	0/+	-	0/-	+/-			+	0/+	-	0/-	+/-
W1	12	92%	9	0	3	0	0	13	100%	9	0	3	1	0
W2	11	85%	8	0	3	0	0	11	85%	8	0	3	0	0
W3	12	92%	7	0	3	0	2	11	85%	8	0	3	0	0
W4	9	69%	8	0	1	0	0	9	69%	6	0	1	0	2
H1	7	54%	4	0	2	0	1	9	69%	6	0	2	0	1
H2	11	85%	1	0	8	0	2	11	85%	1	0	8	0	2
H3	7	54%	5	0	1	0	1	8	62%	6	0	1	0	1
H4	8	62%	5	0	2	0	1	8	62%	5	0	2	0	1
E1	12	92%	5	0	5	0	2	12	92%	5	0	6	0	1
E2	5	38%	4	0	0	1	0	4	31%	4	0	0	0	0
F1	10	77%	3	0	7	0	0	10	77%	3	0	7	0	0
F2	11	85%	7	0	3	0	1	11	85%	7	0	2	0	2
C1	12	92%	9	0	1	0	2	10	77%	7	0	1	0	2
C2	11	85%	8	0	2	0	1	11	85%	8	0	2	0	1

4.6 Andalusia

4.6.1 Horizontal policy coherence

Synergies between objectives far exceed conflicts. Most synergies occur between water-water, water-food, climate-land use, and climate-climate policies. The highest number of conflicts occur between water-energy, water-climate and energy-water policies (see Table 29 and Table 30).

The *food-land* and *climate-land* objectives have the highest density of interactions, followed by *climate-food*. The interactions in these three domains are largely synergistic, though some ambiguous interactions (+/-) have been observed. Specifically, in the food-land domains 11 interactions show ambiguous relationships. While food and land use objectives have generally positive impacts on the nexus, almost 1/3 of the interactions have no clear direction, indicating possible trade-offs. Similarly, in the climate-food domain 6 interactions or almost 1/5 are ambiguous, indicating possible trade-offs between climate and food objectives.

'Enhance resource efficiency and climate', 'Restoring, preserving and enhancing ecosystems related to agriculture and forestry', 'Support ecological and conservation agriculture' *(Agriculture and Food),* and 'Preserve natural resources to ensure future economic development of the Andalusian coastline' *(Land)* show the highest density of interactions, mostly positively influencing other nexus domains.

As for affected objectives, 'Enhance resource efficiency and climate' *(Agriculture and Food)* shows again the highest number of interactions (100%), followed by 'Preserve natural resources to ensure future economic development of the Andalusian coastline' *(Land)*, 'Improve knowledge transfer and innovation in agriculture, forestry and rural areas' and 'Improve the sustainable competitiveness of the Andalusian agricultural and agro-industrial sector' *(Agriculture and Food)*.

Ambiguous relationships are pronounced in the objective 'Closer coordination of urban and land use policies and instruments' *(Land)* and 'Improve the sustainable competitiveness of the Andalusian agricultural and agro-industrial sector' *(Agriculture)*. The effects on all nexus domains largely depend on how well urban and land use policies are coordinated and, for example, the economic term "competitiveness" may or may not stand in direct contrast to water quality, natural resource preservation, renewable energy and climate goals.

In general, *water* objectives are synergistic with most objectives in the nexus. Moreover, within the water domain, objectives are strongly synergistic. For example, objectives regarding irrigation reinforce other objectives within the water domain. Rational water use to ensure long term water supply supports irrigation efficiency improvements and land use objectives regarding rational water use and quality. It certainly enables sustainable competitiveness of the Andalusian agricultural and agro-industrial sector and advocates more sustainable agricultural practices. Also, it is a necessary condition for restoring, preserving and enhancing ecosystems related to agriculture and forestry and for ecological and conservation agriculture. Nevertheless, to improve policy outcomes, attention must be paid to potential conflicts and ambiguous relationships. For example, progress in modernizing existing irrigation systems may have positive effects on other objectives in the water domain but has largely negative effects on energy and climate due to an increased energy use in modernized irrigation systems.

Regarding the *land* domain, objectives concerning preservation and protection of natural resources are highly related with objectives in other nexus domains. They are coherent with objectives in the water domain that seek to improve water quality and promote rational water use, with objectives

in the agricultural and food domain that seek to restore ecosystems and enhance resource efficiency, with objectives in the climate domain that support ecological and conservation agriculture and increase afforestation. However, these land objectives have ambiguous relationships with improving sustainable competiveness, improving social inclusion and economic development and generation of stable employment in the agricultural sector, given that increased economic activity and development may hamper preservation and protection of natural resources. Internal coherence in the land sector is lower than in other sectors.

Obtain 25% of primary *energy* saving is synergistic with energy efficiency objectives in irrigation, resource efficiency and climate objectives in the agri-food sector and the general GHG emission reduction objectives. However, energy saving stands in contrast with modern irrigation systems and regeneration and desalinization of water, as accomplishing these objectives requires more energy. Internal coherence is high.

Concerning the *food and agricultural* domain, the objectives are usually in conformity with objectives in other nexus domains, except for land use objectives. In general, synergies are observed between resource efficiency in the agri-food sector and other domains, such as water and energy, while conflicts may occur between socioeconomic objectives in agriculture and environmental objectives in land use and agriculture. Internal coherence is lower than in other sectors.

In the *climate* domain, the objectives are largely in synergy with objectives in other nexus domains. Reducing GHG emissions by 18% in 2030 is highly synergistic with primary energy saving and renewable energy objectives, as well as energy efficiency objectives in the water and agricultural domains. Moreover, GHG emission reduction is expected to positively contribute to natural resource preservation in land use and resource efficiency and climate in the agri-food sector. Nevertheless, GHG reduction may have ambiguous effects on organic carbon in the soil, depending on fertilization effects of rising CO_2 levels, and on any objectives that promote economic growth for example in agriculture, as additional economic activity may increase greenhouse gas emissions.

4.6.2 Relation with policies and coherence at EU scale

The selected policies for the Andalusian case are directly related to the selected EU policies, with few exceptions for land. Several objectives are formulated cross-sectoral, e.g. in agriculture, land and climate policies.

Resource efficiency and good practice in the management of land and water score positively in the nexus. The economic objectives for agriculture have ambiguous relations in the nexus. Irrigation as a technical measure for water supply and to combat drought and water scarcity, has ambiguous relations in the nexus. Rebound effects and nature-based solutions are not addressed.

Table 29 Description of policy objectives used for the assessment of interactions in the Andalusian case study

Code	Objective	Related to EU objectives
ANDALUSIAN WATER POLICY		
W1	Good ecological status of all water bodies	W1
W5	Rational water use to ensure long term water supply	W2, W3, W4, W6
W15	Modernize existing irrigation systems	W3, W4
W16	Improve water availability in irrigated areas in particular through regenerated and desalinated water	W2, W3
W23	Promote training and improve professional knowledge transfer to irrigation communities and irrigators especially in areas considered for modernization of the water distribution and irrigation systems	W3
W26	Achieve an effective and efficient use of water for irrigation through improving water saving and energy efficiency	W3, W4, E7
W27	Reduce irrigation water use through improving irrigation infrastructure and monitoring systems	W4
W29	Control illegal water abstraction	W4
W31	Introduce measures to reduce diffuse pollution, both for ground and surface water, caused by inadequate use of fertilizers, especially nitrogen and pesticides, through integrated production and organic farming	W1, F1
W33	Guarantee efficient energy use in irrigation facilities and promote renewable energy use to decrease environmental impacts	E7
ANDALUSIAN LAND USE POLICY		
L1	Closer coordination of urban and land use policies and instruments	
L8	Improve Andalusia's coastal water quality	W1
L9	Rationalize inland water use and decrease water demand	W4
L12	Preserve natural resources to ensure future economic development of the Andalusian coastline	
L13	Protect the Andalusian coastline's natural and cultural heritage	
ANDALUSIAN ENERGY POLICY		
E1	Obtain 25% of primary energy saving	E8
E2	Provide 25% of total energy consumption from renewable sources	E2, E4, E6
E3	Obtain 5% self-consumption of electricity generated from renewable sources	
E4	Decarbonize 30% of the energy consumption with respect to the value of 2007	E2, E3, E6
ANDALUSIAN AGRICULTURE & FOOD POLICY		
A1	Improve the sustainable competitiveness of the Andalusian agricultural and agro-industrial sector	F2
A6	Improve social and economic conditions to generate stable agrarian employment	F1
A9	Advocate more sustainable agricultural practices (organic production, integrated production and conservation agriculture) and technification of farms and agro-industries to improve production efficiency	F5
A13	Improve knowledge transfer and innovation in agriculture, forestry and rural areas through the development of innovative solutions and training courses	
A16	Restoring, preserving and enhancing ecosystems related to agriculture and forestry	F3

A17	Enhance resource efficiency and climate	F3, F5, F6
A18	Improve social inclusion and local development in rural areas by creating 590 kilometres of natural pathways	F4
ANDALUSIAN CLIMATE POLICY		
C1	Promote agricultural sustainability through energy saving and renewable energy in the agri-food industry	F5, F6
C2	Support ecological and conservation agriculture	F3
C3	Increase afforestation of agrarian lands	L3, C5
C5	Reduce by 18% in 2030 the greenhouse gas emissions compared to the 2005 level, which equals approximately 4.28 tons of carbon dioxide (CO_2) per inhabitant and year	C1
C6	Reduce diffuse emissions	C1
C8	Conserve and increase aerial biomass and organic carbon in the soil	C5

Table 30 Number of direct interactions per policy objective with policies for other WLEFC sectors in Andalusia

Percentage is calculated on the total number of possible interactions

	INFLUENCING What happens in the nexus if we make progress on objective X?							INFLUENCED What happens to objective X if we make progress on other objectives in the nexus?						
	Interac-tions	%	Synergies		Conflicts		Syn & Conf	Interac-tions		Synergies		Conflicts		Syn & Conf
Obj. X			+	0/+	-	0/-	+/-		%	+	0/+	-	0/-	+/-
W1	23	74%	23	0	0	0	0	24	77%	22	0	0	0	2
W5	24	77%	24	0	0	0	0	24	77%	22	0	0	0	2
W15	24	77%	17	0	7	0	0	25	81%	20	0	3	0	2
W16	19	61%	15	0	4	0	0	18	58%	16	0	2	0	0
W23	26	84%	26	0	0	0	0	27	87%	27	0	0	0	0
W26	25	81%	23	0	0	0	2	25	81%	23	0	0	0	2
W27	22	71%	22	0	0	0	0	21	68%	20	0	1	0	0
W29	17	55%	16	0	1	0	0	16	52%	16	0	0	0	0
W31	20	65%	20	0	0	0	0	22	71%	22	0	0	0	0
W33	21	68%	21	0	0	0	0	21	68%	21	0	0	0	0
L1	16	52%	0	0	0	0	16	12	39%	1	0	0	0	11
L8	11	35%	11	0	0	0	0	24	77%	22	0	0	0	2
L9	18	58%	18	0	0	0	0	24	77%	22	0	0	0	2
L12	28	90%	24	0	1	0	3	30	97%	22	0	0	0	8
L13	26	84%	22	0	1	0	3	27	87%	19	0	0	0	8
E1	18	58%	15	0	3	0	0	19	61%	16	0	2	0	1
E2	17	55%	12	0	0	0	5	15	48%	12	0	0	0	3
E3	17	55%	12	0	0	0	5	15	48%	12	0	0	0	3
E4	17	55%	13	0	0	0	4	22	71%	18	0	2	0	2
A1	27	87%	12	0	0	0	15	29	94%	17	0	1	0	11

A6	12	39%	7	0	0	0	5	11	35%	6	0	2	0	3
A9	28	90%	24	0	0	0	4	27	87%	27	0	0	0	0
A13	28	90%	28	0	0	0	0	30	97%	30	0	0	0	0
A16	28	90%	25	0	0	0	3	28	90%	23	0	0	0	5
A17	29	94%	27	0	0	0	2	30	97%	28	0	0	0	2
A18	15	48%	11	0	0	0	4	12	39%	6	0	0	0	6
C1	27	87%	21	0	1	0	5	25	81%	22	0	2	0	1
C2	28	90%	24	0	0	0	4	18	58%	16	0	1	0	1
C3	16	52%	12	0	0	0	4	15	48%	10	0	1	0	4
C5	27	87%	23	0	2	0	2	27	87%	23	0	2	0	2
C6	26	84%	26	0	0	0	0	23	74%	21	0	1	0	1
C8	20	65%	20	0	0	0	0	14	45%	12	0	0	0	2

4.7 Sardinia

4.7.1 Horizontal policy coherence

Synergies are ten times higher than conflicts. Most synergies occur between energy-energy, energy-climate, climate-energy, food-water, water-food policies. The highest number of conflicts occur between food-water, tourism-water.

The *food-water*, *food-tourism, climate-food* and *climate-tourism* objectives have the highest density of interactions. These interactions are largely synergistic, except for the *food-water*, in which the objective of expanding agricultural production would increase the demand for water that is already a scarce resource.

'Increase the economic development of rural areas', 'Increase the efficient use of resources' (*Food and Agriculture*), 'Climate change adaptation' and 'climate forecast' (*Climate*) show the highest density of interactions, mostly positively influencing other nexus domains.

As for affected objectives, 'Increase the economic development of rural areas' and 'agricultural expansion' (*Food and Agriculture*) show the highest number of interactions, followed by 'climate change adaptation' (*Climate*), 'Tourism promotion' and 'de-seasonalization' *(Tourism)*. The tourism objectives are positively influenced by all other objectives. However, they may have a negative effect on water objectives and land-use.

Ambiguous scoring were only 2.5% of the interactions. 'Expansion of agriculture' was the objective with the highest number (3) of ambiguous interactions, because the effect of an increase in agricultural yield and economy on other objectives strongly depends on the measures adopted and on the coordination with other sectors. For example, an increase in irrigated area if not supported by measures to reduce and limit water consumption may have a counter effect on the objective to reduce water demand for agriculture.

Notably, most binding interactions are found for the *climate* sector (influencing or influenced) and especially the 'climate adaptation' objective. Here, there is a common agreement that all sectors must innovate in order to adapt to climate change and that adaptation cannot be achieved without funds, policy measures and sufficient energy at a lower price. Costs for energy in Sardinia are considerably higher than in the rest of Italy.

Frequently, interviewees reported a lack of policies for all sectors.

4.7.2 Relation with policies and coherence at EU scale

Most of the chosen objectives can be related to EU policies (Table 31). Exceptions are objectives for tourism and forest fire prevention.

Unlike the other cases, good practices in water and land management do not have strong and frequent positive influences in the analysed nexus (Table 32). Economic development of agriculture, rural areas and tourism appears to be more synergistic with other objectives. This is because water management in the Sardinian case is accounted for only from a quantitative perspective. However, the interactions that water management has with other objectives are vital for the functioning of the region, because agriculture and tourism are the main economic sectors in this region and they both require water. Economic expansion of agriculture has some negative and ambiguous linkages e.g. with increasing the use of renewable energy (competition for water) and development of advanced RES installations to satisfy demand for water pumping. Resource efficiency in the agri-food chain and forestry is positively linked with nearly all other objectives.

Table 31 Description of policy objectives used for the assessment of interactions in the Sardinia case study

ENERGY			
Code	**Heading**	**Detailed description**	**Related to EU objectives**
E1	Increase use of renewable energy sources (RES)	Refers to the increased share of renewable energy to reduce CO_2 emissions well below the targets of the Paris Agreement	E2, E4, E6
E2	Transform the Sardinian Energy System towards an integrated and Smart grid system	Refers to the increased efficiency of energy use with the aid of smart grids (it increases energy loadings from RES)	E9
E3	Methanization	Refers to the construction of gas pipes in the island for distribution as well as technologies to ship methane to the island	E9
E4	Development of advanced RES installations to satisfy energy demands for	Refers to the energy autonomy of the water management authority.	C3

	water pumping in agriculture		
FOOD AND AGRICULTURE			
Code	**Heading**	**Detailed description**	**Related to EU objectives**
FA1	Increase the efficiency of use of resources	Encouraging the efficient use of resources and the transition to a low-carbon and climate-friendly economy in the agri-food and forestry sectors.	F5, F6
FA2	Agricultural expansion	Refers to increasing competitiveness and profitability of the agricultural sector and of the agri-food chain	F2
FA3	Increase of economic development of rural areas	Refers to reduction of poverty, social integration, and entrepreneurship	F4
WATER			
Code	**Heading**	**Detailed description**	**Related to EU objectives**
W1	Reduction of water demand in agriculture	Refers to the uptake of efficient irrigation systems in agriculture and reduction of leakages in the conveyance system	W4
W2	Satisfying multiple demands	Refers to improved allocation of resources to meet multiple demands including Minimum Environmental Flows	W2, W6
W3	Improving water quality	Refers to measures to reduced water pollution and forecast systems of water quality	W1
LAND USE			
Code	**Heading**	**Detailed description**	**Related to EU objectives**
L1	Land for RES	Sets limits to the use of Agricultural or forest land for solar energy plants	L4
L2	Reduction of hydrological risk	Refers to soil protection and sets limits to activities depending on hydrological risk, e.g. landslides and floods	L1. L2
CLIMATE			
Code	**Heading**	**Detailed description**	**Related to EU objectives**
C1	Climate change mitigation	Refers to the reduction of GHG emissions by setting GHG emission targets	C1
C2	Climate change adaptation	Refers to selection and application of measures for adaptation to climate change in various sectors	C6
C3	Climate forecast	Refers to the use of climate change projections in resource management plans	C6
TOURISM			
Code	**Heading**	**Detailed description**	**Related to EU objectives**
T1	Tourism promotion	Refers to the promotion of tourism by re-qualifying tourist infra-structures and offers	
T2	De-seasonalization	Refers to the promotion of tourist offers that are not related to coastal activities	

FORESTRY			
Code	**Heading**	**Detailed description**	**Related to EU objectives**
FO1	Fire protection	Refers to the protection of forest heritage from wild fires	
FO2	Sustainable forest management	Refers to the protection and management of forests as an indispensable asset	L3

Table 32 Number of direct interactions per policy objective with policies for other WLEFC sectors in Sardinia

Percentage is calculated on the total number of possible interactions

	Influencing What happens in the nexus if we make progress on objective X?							Influenced What happens to objective X if we make progress on other objectives in the nexus?						
	Interac-tions	%	Synergies		Conflicts		Syn & Conf	Interac-tions		Synergies		Conflicts		Syn & Conf
Obj. X			+	0/+	-	0/-	+/-		%	+	0/+	-	0/-	+/-
E1	10	53%	7	0	2	0	1	12	63%	10	0	1	0	1
E2	10	53%	9	0	1	0	0	12	63%	12	0	0	0	0
E3	7	37%	6	0	0	0	1	9	47%	7	0	2	0	0
E4	11	58%	8	0	1	0	2	11	58%	9	0	2	0	0
E5	10	53%	9	0	1	0	0	7	37%	7	0	0	0	0
FA1	9	47%	8	0	0	0	1	16	84%	16	0	0	0	0
FA2	18	95%	16	0	2	0	0	11	58%	5	0	3	0	3
FA3	19	100%	16	0	2	0	1	17	89%	17	0	0	0	0
W1	7	37%	4	0	3	0	0	9	47%	8	0	0	0	1
W2	11	58%	9	0	2	0	0	7	37%	7	0	0	0	0
W3	11	58%	9	0	2	0	0	7	37%	7	0	0	0	0
L1	9	47%	7	0	2	0	0	10	53%	5	0	5	0	0
L2	9	47%	8	0	0	0	1	8	42%	6	0	2	0	0
C1	16	84%	13	0	2	0	1	14	74%	12	0	1	0	1
C2	18	95%	17	0	0	0	1	18	95%	16	0	0	0	2
C3	1	5%	1	0	0	0	0	16	84%	16	0	0	0	0
T1	16	84%	16	0	0	0	0	11	58%	6	0	4	0	1
T2	16	84%	16	0	0	0	0	12	63%	12	0	0	0	0
FO1	8	42%	8	0	0	0	0	10	53%	10	0	0	0	0
FO2	13	68%	13	0	0	0	0	12	63%	12	0	0	0	0

4.8 South-West England

4.8.1 Horizontal policy coherence

Many of the synergies evident are between objectives within the same nexus sector, e.g. synergies between water resource objectives, with in most cases a high level of complementarity. Synergies are also evident across sectors, particularly between agriculture/food and water objectives, agriculture/food and land objectives and water and land objectives. Such synergies are fully justifiable for the following reasons:

- most of agriculture/food objectives are strongly related to the water objectives;
- objectives concerning the sustainable delivery of water resources are closely linked to objectives having to do with land and climate change mitigation/adaptation;
- objectives that place emphasis on the sustainable development of agriculture are closely related to the sustainable environmental management of land.

Several climate change-related synergies have been included within the specific sectoral objectives, particularly the water objectives (sustainability and resilience objectives) and land objectives (mitigation), rather than as a separate analytical category.

There were no very strong conflicts between the nexus critical objectives although some weaker conflicts were identified, mainly arising from efforts to improve affordability of water (and to a lesser extent energy) supply. This impacted on some capital investments in other service delivery operations. However, comments from stakeholders indicated that further conflicts arose at more practical levels, mainly during the policy implementation process. Many of the conflicts / trade-offs and multiple effects noted in the scoring are also conditional or potential ones, depending on how the policy is implemented or which aspect the policy implementation focuses on as follows:

- conflicts between decarbonisation and renewable energy generation objectives if decarbonisation concentrates on nuclear energy generation;
- multiple potential conflicts associated with the nuclear energy component of the decarbonisation objective – for the environment, cost implications, etc – depending on the proportion of nuclear vs. renewables implemented.
- potential cost trade-offs between different energy and water objectives and within energy objectives – where they require significant investment this may have an impact on affordability for customers and vice-versa;
- potential cost implications / trade-offs of reducing emissions impacting on affordability for customers and vice-versa; and
- multiple potential conflicts within agriculture objectives e.g. protecting or enhancing agricultural standards will have differential effects on large and small producers (who may not be able to meet the standards) and on costs depending on the nature of the standards; multiple effects of subsidies (farm business development objective) – based on which subsidies are implemented, how achievable the measures implemented are and on the enforcement mechanisms utilised.

4.8.2 Relation with policies and coherence at EU scale

Most selected objectives for the SW-England case are directly related to selected EU policies and the others to non-selected EU policies for energy poverty and drinking water quality (Table 33). Policies show several cross-sectoral objectives, as is the case in The Netherlands and Andalusia. Several energy and climate objectives are included in water objectives.

Positive relations between objectives that protect and restore natural resources and other objectives in the nexus are also found in the SW-England case, with few exceptions of ambiguity(Table 34). Most ambiguities are found in relation to agriculture objectives, followed by decarbonisation and renewable energy, although these are not explicitly related to 1st generation biofuel crops.

Table 33 Description of policy objectives used for the assessment of interactions in the SW England case study

Water			
Code	**Heading**	**Detailed description**	**Related to EU objectives**
W1	Enhance the sustainability of water service delivery	• Implement grey/rainwater water recycling; • maintain or reduce leakage/ingress of water/wastewater networks; • maintain or reduce drinking water demand; • increase use of sustainable urban drainage; • implement wholesale trading of water resources.	W2, W4, W6
W2	Protect and enhance the natural capital of aquatic environments	• implementation of paid eco systems services approach to improve surface water quality; • maintain or optimise abstraction (surface & groundwater) at environmentally sustainable level; • maintain or enhance biodiversity of freshwater habitats; • maintain or enhance resourcing of pollution enforcement activities.	W1
W3	Protect and enhance human health	• maintain or enhance drinking water quality; • maintain or enhance wastewater effluent quality.	
W4	Enhance the resilience of water service delivery	• mitigate impact of climate change on drinking water and wastewater service delivery; • mitigate impact of population growth on drinking water and wastewater service delivery	C6
W5	Reduce reliance on external energy supply	• increase utilization of self-supplied energy from: Hydro, CHP, PV & energy storage; • improve energy efficiency of treatment/distribution of water/wastewater.	E6, E7
W6	Address affordability of water services for consumers	• reduce unit cost to the consumer while maintaining quality of service; • better targeting of support for vulnerable communities e.g. poor urban and rural areas.	

Energy			
Code	**Heading**	**Detailed description**	**Related to EU objectives**
E1	Decarbonisation of energy supply	• increased use of low carbon energy.	E2, E4, E6
E2	Increase energy security	• increase energy efficiency; • enhance the resilience of energy supply; • create a smart and flexible electricity system; • reduce energy demand; • create more balanced renewable supply; • local trading of power and flexibility.	E1, E3, E5, E7, E8, E9, E10
E3	Increase the use of renewable resources.	• financial support for renewables; • unblock barriers to delivery; • develop emerging technologies.	E2, E4, E6, E9, C3
E4	Address affordability of energy services for consumers.	• reduce unit cost to the consumer while maintaining quality of service; • targeting of support for vulnerable communities e.g. poor urban and rural areas.	
Agriculture and food			
Code	**Heading**	**Detailed description**	**Related to EU objectives**
A/F 1	Maintain and improve the agri-environment	• maintain and enhance environmental and biodiversity measures on agricultural land (now and post-Brexit); • enhance agricultural standards for greater sustainability.	F1, F3
A/ F 2	Develop catchment sensitive farming	• reduce diffuse pollution from agriculture; • enhance agricultural management across the whole catchment.	F1
A/F 3	Build farm business development	• support for agricultural diversification; • enhance support for local food producers.	F1, F4
A/F 4	Protect standards of food production	• ensure food is safe and does not damage human health.	
A/F 5	Reduce food supply chain emissions and waste	• reduce environmental pollution and waste from food supply chain	F5, F6
Land			
Code	**Heading**	**Detailed description**	**Related to EU objectives**
L1	Mitigation of flood risk and flooding	• reduce surface water flood risk; • incorporation of flood mitigation measures in housing developments; • improve natural and sustainable drainage (infiltration).	W5, L3
L2	Improve environmental land management	• better management of waste on land; • enhance biodiversity; • enhance natural capital and public benefits of land management; • ensure secure evidence base for implementation of land	L1, L2

		management measures.	
L3	Improve soil structure and composition	• better enforcement of agrichemicals regulations; • reduce reliance on synthetic fertilisers or chemicals; • reduce soil compaction; • reduce soil run-off (loss of topsoil).	L1, L2

Table 34 Number of direct interactions per policy objective with policies for other WLEFC sectors in SW England.

Percentage is calculated on the total number of possible interactions

	INFLUENCING What happens in the nexus if we make progress on objective X?							INFLUENCED What happens to objective X if we make progress on other objectives in the nexus?						
	Interac-tions	%	Synergies		Conflicts		Syn & Conf	Interac-tions		Synergies		Conflicts		Syn & Conf
Obj. X			+	0/+	-	0/-	+/-		%	+	0/+	-	0/-	+/-
W1	15	88%	14	0	0	0	1	13	76%	13	0	0	0	0
W2	15	88%	13	0	1	0	1	14	82%	13	0	0	0	1
W3	14	82%	12	0	1	0	1	12	71%	10	0	1	0	1
W4	16	94%	16	0	0	0	0	16	94%	15	0	1	0	0
W5	12	71%	8	0	3	0	1	12	71%	12	0	0	0	0
W6	16	94%	12	0	1	0	3	7	41%	4	0	3	0	0
L1	15	88%	15	0	0	0	0	16	94%	16	0	0	0	0
L2	16	94%	13	0	0	0	3	14	82%	14	0	0	0	0
L3	10	59%	8	0	0	0	2	13	76%	12	0	0	0	1
E1	6	35%	5	0	0	0	1	14	82%	3	0	1	0	10
E2	14	82%	13	0	0	0	1	13	76%	12	0	0	0	1
E3	9	53%	7	0	0	0	2	14	82%	11	0	0	0	3
E4	13	76%	9	0	1	0	3	6	35%	3	0	1	0	2
A/F1	15	88%	12	0	0	0	3	16	94%	14	0	0	0	2
A/F2	11	65%	10	0	0	0	1	15	88%	15	0	0	0	0
A/F3	15	88%	9	0	0	0	6	15	88%	12	0	0	0	3
A/F4	14	82%	13	0	0	0	1	13	76%	7	0	0	0	6
A/F5	12	71%	10	0	1	0	1	15	88%	13	0	1	0	1

4.9 Transboundary DE-CZ-SK

In the transboundary case DE-CZ-SK, the policy coherence assessment was conducted by country. The assessment for Slovakia is not available.

4.9.1 Czech Republic

Horizontal policy coherence

The Czech and Slovakian cases address regional climate change caused by regional changes in landscape, water management and agriculture (Table 35). Both case studies did not investigate energy and resource efficiency objectives, that could influence the need to grow energy crops. Overall reduction of GHG emission was scored conflicting with most other objectives in both cases, as it distracts the attention from local solutions.

Overall, synergies and neutral interactions prevail over conflicts across WLEFC sectors in the Czech Republic assessment (Table 36). As for internal coherence, the water and the agriculture sectors are internally more coherent than the land and climate sectors, probably because the former are largely shaped by EU regulation.

Progress in the *water* sector is positively affecting the land/soil, agriculture and climate sectors, with conflicts being limited. This is because water objectives target mainly land related issues such as restoration of the landscape water regime and restoration of small water cycles. Similarly, food and agriculture objectives are often enabling, reinforcing and often indivisible parts of the land objectives and of the water objectives, particularly those targeting the improvement of the landscape water regime and mitigation of drought. Land/soil objectives, which mostly focus on improving soil characteristics, land ownership and landscape structure, resonate well with water and climate objectives.

Climate policy has a clear positive effect across the nexus. Progress in climate objectives is particularly synergistic with water and land objectives. However, internally the climate objectives lack coherence. Climate policies are developed on national scale.

There is only one *energy* objective selected by the case study: 'increase biofuel production to cover 13,5 % of all energy sources from renewables'. In the Czech Republic this objective is mostly pursued through increased production of biomass (maize, rape). These water-demanding, land consuming crops are planted on large field blocks, subsidized by state budget mostly reaching large farm enterprises which farm mostly on leased land. Therefore, this renewable energy objective generates conflicts with water, land and agriculture objectives both as affecting and affected objectives.
In the case of food/agriculture, the situation is ambiguous. On the one hand there is the production of energy crops as renewable resource, on the other there is a discrepancy with GAEC and agro-environmental and climate measures. There is an ambiguous relationship also with climate objectives. The use of biofuels may mitigate climate change, but the effect of growing biofuels from

food crops on the water regime, climate, soil characteristics and quality go directly against climate objectives.

Food and agriculture objectives are often enabling, reinforcing and indivisible parts of the land and water objectives targeted on the landscape scale water regime and drought mitigation. They correlate with climate change mitigation and adaptation. The objective of establishing soil blocks evidence can provide information supporting better development of land consolidation, together with landscape planning in terms of a heterogeneous landscape structure and improvement of the water regime.

Land and soil objectives are targeted on improving soil characteristics, land ownership and landscape structure. Soil quality may improve conditions for planting biomass and biofuel crops and non-productive functions of agriculture (NPFA). Because of the direct relation between soil quality and water retention, the highest positive impact is on water objectives, specifically on landscape planning as a tool for water retention. The land property rights influence the land management. Farming on private land will motivate farmers to improve soil and landscape quality, restore traditional sowing procedures and crop diversity, and improve the water regime. State land property usually has an adverse effect on these objectives but will enable the construction of water retention features and measures in the landscape. Ensure a national evaluation of ecosystem services has an "enabling" character that may help to preserve or improve the natural characteristics of the landscape and to protect landscape elements, e.g. floodplains and forests, against harmful activities. Therefore, it is related to nearly all other objectives. Restoration of sowing procedures and crop diversity is a key objective for improving soil quality and water retention, as well as sustainable landscape management and climate issues. Crop diversity will contribute to a heterogeneous landscape.

Water objectives are targeted mainly on the restoration of the landscape water regime and small water cycles thus are directly related to land and soil objectives. Greening and expanding permanent grassland in catchment areas and develop buffer zones along water courses will create a heterogeneous landscape and decrease soil erosion by increase diversity and abundance of soil edaphon (soil fauna), increase the groundwater level and soil water retention capacity and slow down surface runoff. In addition, it will improve water quality, increase humus content of the soil and support NPFA, and help to restore the small hydrological cycles. Grassland development may be supported by a national evaluation of ecosystem services and may be part of the restoration of traditional sowing procedures. Restoration of the water regime and water uptake into the soil is directly related to landscape objectives that concern soil improvement and restoration of the landscape structure. Private land property should ensure better soil management. Dividing of large field blocks into smaller fields can be realized through land consolidation. Water retention measures should be realized by complex arrangements, mainly on state land. Drought mitigation is crucial for the realization of nearly all energy and climate objectives and vice versa, if we do not realize environmental and climate services by agriculture and climate objectives, we cannot reach drought mitigation. Construction of more irrigation systems and reservoirs is not the right way to achieve the restoration of a sustainable landscape water regime and revitalize water courses. These locally targeted measures can be easily realized and supported, however, without producing any significant effect. Spatial water retention measures that have the highest efficiency to solve problems related

to drought, floods, erosion, are more complex. Solving the problems of water retention requires very demanding and comprehensive solutions throughout the country – e.g. mitigation of land consolidation, ownership relations, implementation of technical and biological measures for water retention on the entire surface of the river basin. These measures, similar to the changes in the 1950s that have led to today's degraded state of agricultural land, require changes in the legislation, subsidies and funding, and the strict enforcement of rules for damaging farming practices. There are discrepancies in water policy caused by different attitudes of the Ministry of Agriculture, in charge water policy, and the Ministry of Environment. The Ministry of Agriculture prefers the technological water concept with measures like deepening of streams, flood protective barriers, construction of new water reservoirs, bigger dams, irrigation systems whilst the Ministry of Environment prefers nature-based solutions, natural water retention measures like renaturation of riverbeds, natural flooding, respecting natural floodplains, restoration of floodplains.

Climate change mitigation and adaptation are positively related to nearly all food/agriculture, land and water objectives. In climate mitigation and adaptation strategies, nearly all landscape, water, agriculture management practices and activities are usually mentioned in a connection to climate change. Everything we do is in the name of climate change. Climate change mitigation and adaptation objectives are directly related to reduction of greenhouse gases and this fact distracts the attention from measures that can lead to effective climate change mitigation and adaptation in the landscape. These are spatial water retention in the landscape, restoration of small water cycles, soil quality improvement, sustainable land management and a heterogeneous landscape. Therefore, the impact of the reduction of GHG gas emissions on land and water was labelled as counteracting or cancelling environmental, landscape and climate-oriented objectives for agriculture, land and water.

Relation with policies and coherence at EU scale

All selected Czech objectives are related to the selected EU objectives, except for detailed land management and land ownership objectives.

The choice between technical and nature-based solutions for water supply, water retention and the management of droughts and floods is the main issue in the Czech case, as is the ambiguous relation between growing 1st generation biofuel crops with objectives for natural resources, agriculture and climate. Good practices in land and water management has many positive relations in the nexus, as in most cases.

Table 35 Description of policy objectives used for the assessment of interactions in Czech Republic

Energy			
Code	**Headings**	**Detailed description**	**Related to EU objectives**
E1	Increase biofuel production	Increase biofuel production in order to cover 13,5 % of all energy sources from renewable	E1
Food/Agriculture			
Code	**Headings**	**Detailed description**	
F1	Support of agriculture biomass as a renewable resource	Support maize and rape production in order to cover 13,5 % of all energy sources from renewables; grassland – biofuel for biogas stations	E1
F2	Support non-production functions of agriculture	Support of non-production functions of agriculture in order to protect soil, water quality, air, maintenance of cultural landscape	F1, F3
F3	Establish soil blocks evidence	Information about drainage systems on field blocks, adjacency to water reservoirs, if suitable for greening because of concentrated drainage	
F4	Set up conditions of agri-environmental and climate measures implementation in agriculture	Improve agriculture land quality	F3
F5	keep agriculture procedures favourable to climate	Improve agriculture land quality (increase organic content, stop erosion, etc.) – these procedures are related to water retention and thus influence climate	F3, C5
F6	control of harmful agriculture interference in floodplains and water courses	Improve agriculture land quality, protect water courses against spatial pollution	F1
Land			
Code	**Headings**	**Detailed description**	**Related to EU objectives**
L1	Decrease soil erosion	create a concept for implementation of anti-erosion measures to decrease erosion in the landscape and prepare legislative and financial instruments to implement the proposed measures. Introduce	L1, L2
L2	Increase organics content in soil	In order to improve soil fertility, ability to retain water and improve water infiltration	L1, L2, F3
L3	Increase soil water capacity	In order to retain water, refill groundwater level	L1, L2
L4	Decrease soil sealing	Significantly restrict urbanization of agriculture land – barrier for water retention	
L5	Decrease soil compaction	Improve water infiltration and retention	L1, L2
L6	Restrict taking out arable land from agriculture land fund	Arable land is often built up and used for new industrial buildings or residential areas – support for soil sealing (e.g. the storehouses occupy 7 km^2 in the Czech Rep.)	

L7	Increase land state property	In order to realize technical measures for soil water retention improvements	
L8	Support land ownership	Decrease the share of leased land of agriculture subjects (max. 70 %), support private ownership of agriculture land in order to improve soil management practices	
L9	Support for the implementation of land consolidation	In order to change landscape structure and modify land ownership; Land consolidation as a tool for improvement the environment, protecting and regeneration the soil fund, improving forestry and water management, especially in the field of minimizing the adverse effects of floods and drought and increase the ecological stability of the landscape.	
L10	Heterogeneous landscape structure	Minimize field blocks area by their dividing into smaller ones by landscape features (balks, groves, grass and shrubs belts, wetlands, ponds, etc.) in order to minimize erosion, matter losses, improve soil quality, mitigate climate change, restore small water cycle	
L11	To develop a comprehensive system of sustainable land management	To develop a comprehensive system of sustainable land management in the agriculture landscape and in the forests to enhance the soil and landscape retention capacity	
L12	Ensure national evaluation of ecosystem services	Ecosystem services help to quantify (financially) all services that ecosystems provide (e.g. air conditioning, water retention, anti-erosion etc. functions) and may serve as a powerful tool to protect ecosystems not only from the biodiversity point of view	
L13	Restoration of sowing procedures	Current land management completely distorted the sowing procedures – crop rotation, diversity of crops (now approx. 8 preferred crops instead of 15, no undergrowth crops, etc.)	
Water			
Code	**Headings**	**Detailed description**	**Related to EU objectives**
W1	support of greening areas in catchments	Greening in catchments – mix of permanent grassland and crops to improve water retention	W5, W6
W2	control of buffer zones and vegetated strips along water courses	In order to decrease pollution, improve infiltration	W1
W3	Promoting natural retention and water uptake into the soil	In order to retain water, refill groundwater level	W5, W6
W4	restoration of landscape water regime	create a concept for implementation of measures to increase water retention in the landscape and prepare legislative and financial instruments to implement the proposed measures.	W5, W6
W5	increase natural retention ability of water courses and floodplains	increase natural retention ability of water courses and floodplains (natural and technical revitalization of water courses)	W5, W6

W6	construction of small water reservoirs and irrigation systems	As water reserves for drought periods	W6
W7	reduce spatial and concentrated runoff of surface water	reduce spatial and concentrated runoff of surface water by spatial water retention or by slowing the runoff by optimizing landscape structure and using both natural and technical measures to slow down the runoff.	W5
W8	apply "good agricultural and environmental condition" requirements and "cross compliance"	apply "good agricultural and environmental condition" requirements and "cross compliance" requirements to increase water infiltration - restore and enhance the retention capacity of the landscape (grassing of spring areas and river meadows, planting forests and trees, opening of major drains, renaturation of channels and fortified streams, setting up of pools in sites with increased groundwater levels, etc.)	W1, W5, W6, F3
W9	define the land property as a major barrier for the optimizing and restoration of water regime	define the land property as a major barrier for the optimizing and restoration of water regime (the measures should be realized on state property land); as well as missing legislation and financial support for large changes of landscape structure, construction and maintenance landscape features and measures for increasing water retention	
W10	To set landscape planning as a tool for water retention	Water retention is directly related to landscape structure changes – those can be reached by landscape planning	
W11	Protection and restoration of the natural water regime in forests	By healthy forests, appropriate species composition and forest structure, good soil condition, adjustment of drainage systems etc. Revision of measures for forestry meliorations, streams and forest roads with a focus on protection and restoration of natural water regime in forests; Minimizing technical drainage of forest land using natural and seminatural procedures; Applying procedures and measures for harvesting and restoring forests to avoid or slow down surface drainage and soil erosion; Stabilizing the forest types affected by water and protection of wetlands in forests	W1, L1, L2
W12	Limiting the emergence and impacts of agricultural drought	Measures to mitigate and prevent drought; support in new legislation amendment of Water Act no.254/2001 Coll.	W6
Climate			
Code	**Headings**	**Detailed description**	**Related to EU objectives**
C1	Climate change mitigation	The strategy for climate change mitigation mainly based on decrease of greenhouse gasses in different sectors	C1, C5
C2	Climate change adaptation	Based on government decision No.861/2015,The Adaptation Strategy of the Czech Republic on climate	C6

		changes and its implementation no. 34/2017, National adaptation plan– set of objectives, adaptation measures and tasks from agriculture, water, forestry, urban, biodiversity, industry, energy, health, transport, tourism in order to suggest strategies for climate change adaptation	
C3	To reduce greenhouse gas emissions within the EU ETS by 21%	The strategy for climate change mitigation mainly based on decrease of greenhouse gasses with specified target of emissions reduction	C1

Table 36 Number of direct interactions per policy objective with policies for other WLEFC sectors in the Czech Republic

Percentage is calculated on the total number of possible interactions

	INFLUENCING What happens in the nexus if we make progress on objective X?							INFLUENCED What happens to objective X if we make progress on other objectives in the nexus?						
	Interac-tions	%	Synergies		Conflicts		Syn & Conf	Interac-tions		Synergies		Conflicts		Syn & Conf
Obj. X			+	0/+	-	0/-	+/-		%	+	0/+	-	0/-	+/-
W1	27	79%	22	2	2	0	1	26	76%	24	0	2	0	0
W2	27	79%	22	2	2	0	1	27	79%	25	0	2	0	0
W3	31	91%	25	3	2	0	1	23	68%	23	0	0	0	0
W4	31	91%	27	3	1	0	0	27	79%	27	0	0	0	0
W5	27	79%	23	3	1	0	0	17	50%	17	0	0	0	0
W6	13	38%	10	3	0	0	0	11	32%	11	0	0	0	0
W7	31	91%	26	2	2	0	1	18	53%	16	0	2	0	0
W8	21	62%	17	1	2	0	1	25	74%	23	0	2	0	0
W9	5	15%	4	1	0	0	0	21	62%	13	2	0	0	6
W10	10	29%	10	0	0	0	0	19	56%	18	0	0	0	1
W11	11	32%	9	1	1	0	0	16	47%	16	0	0	0	0
W12	34	100%	29	2	2	0	1	28	82%	28	0	0	0	0
L1	29	85%	24	1	2	0	2	16	47%	16	0	0	0	0
L2	28	82%	23	1	2	0	2	12	35%	12	0	0	0	0
L3	32	94%	26	1	2	0	3	13	38%	13	0	0	0	0
L4	19	56%	17	1	0	0	1	12	35%	12	0	0	0	0
L5	30	88%	25	1	3	0	1	13	38%	13	0	0	0	0
L6	15	44%	13	1	0	0	1	15	44%	8	7	0	0	0
L7	10	29%	6	2	1	0	1	21	62%	11	5	1	0	4
L8	2	6%	1	0	1	0	0	25	74%	1	21	1	0	2
L9	17	50%	12	2	2	0	1	23	68%	23	0	0	0	0
L10	24	71%	18	2	3	0	1	21	62%	19	0	2	0	0

L11	27	79%	22	1	3	0	1	27	79%	25	0	2	0	0
L12	10	29%	10	0	0	0	0	26	76%	24	0	2	0	0
L13	20	59%	16	1	3	0	0	22	65%	20	0	2	0	0
E1	27	79%	12	0	11	0	4	22	65%	3	0	16	0	3
F1	28	82%	13	0	10	0	5	22	65%	3	0	5	0	14
F2	29	85%	28	0	1	0	0	27	79%	25	0	2	0	0
F3	4	12%	4	0	0	0	0	19	56%	19	0	0	0	0
F4	18	53%	15	0	2	0	1	24	71%	22	0	2	0	0
F5	20	59%	17	0	1	0	2	23	68%	21	0	0	0	2
F6	18	53%	16	0	1	0	1	18	53%	16	0	1	0	1
C1	31	91%	28	0	1	0	2	31	91%	27	1	0	0	3
C2	31	91%	28	0	1	0	2	31	91%	27	1	1	0	2
C3	7	21%	5	0	1	0	1	23	68%	2	0	21	0	0

4.9.2 Slovakia

Horizontal policy coherence

Only one *Energy* objective was chosen for the analysis of horizontal policy coherence: increase biofuel production in order to cover 14 % of all energy sources from renewables. In Slovakia it can be achieved by expanding the production of 1st generation biofuel crops(maize, rape). Up to 90% of arable land is currently used for cereals and oil production. The national cereal production must be reduced by at least 40% by setting a limit of a maximum of 50% of the arable land for the production of cereals and oil.

These crops are planted on large field blocks, conflicting with the objective of a heterogeneous landscape structure, subsidized by a state budget that directly supports big companies, farming mostly on leased land, which is against the objective of supporting land ownership. The two objectives 'Increase the production of biofuel' and 'Support of agricultural biomass production as a renewable resource' are in discrepancy with almost all objectives targeted on water, land/soil, and part of the objectives for agriculture. For agriculture, the situation is ambiguous. On the one hand, energy crops are produced as renewable resources, on the other hand there is a discrepancy with good agricultural and environmental conditions (GAEC) and climate objectives. The latter is caused by land-use changes and practices caused by the production of biofuel crops, that are not environment and climate-friendly. Biofuel production also conflicts with objectives for the water regime and quality of the soil.

Ecological and environment oriented objectives for *food and agriculture* are not clearly defined. They are enabling, reinforcing and indivisible parts of most of the land objectives, as well as water objectives that are targeted on the landscape water regime and drought mitigation. They are also positively linked to climate change mitigation and adaptation. The objective of establishing 'soil

blocks evidence' (an administration of information about hydro-technical qualities of the plots) can provide information that supports a better development of land consolidation, planning of a heterogeneous landscape structure and improvement of the water retention capacity of the drainage basin to improve the water regime.

Land/soil objectives are targeted on improving soil characteristics, land ownership and landscape structure. Improvement of the quality of the soil may improve conditions for planting biomass/biofuels and increase ecosystem non-productive functions of agriculture (NPFA). Because of a direct relation between soil quality and water retention, the highest positive impact is on water objectives. Landscape planning is mainstreamed in water objectives as a tool for freshwater retention. The land property rights influence the land management. Farming on private land will motivate farmers to improve the soil and landscape quality, restore traditional sowing procedures and increase crop diversity (depending on the price of crops), and improve the water regime. State-owned land property usually has an adverse effect. However, it will enable the development of technical constructions and measures for water retention in the landscape. Ensure a national evaluation of ecosystem services is the objective with an "enabling" character that may help to preserve or improve the natural characteristics of the landscape and help to protect natural landscape elements like floodplains, forests, etc. against harmful activities. Therefore, it has a positive relation with several water and climate objectives. The restoration of sowing procedures and crop diversity is a key objective for improving soil quality and water retention, as well as environmental public services in agriculture, sustainable landscape management, heterogeneity of the landscape, and climate mitigation and adaptation. Current land management has distorted the sowing procedures, – crop rotation, diversity of crops-, with negative effects on water, climate and soil quality.

Water objectives are targeted mainly on the restoration of the water regime at landscape scale and small water cycles, thus are directly related to land and soil objectives. Greening/grassing in the catchment area and development of buffer zones for water management, will decrease soil erosion as it will diversify the landscape in smaller elements and stimulate soil edaphon (soil fauna). It will increase the groundwater level and soil water capacity and slow down surface runoff. In addition, it will improve water quality, support NPFA, and help to restore small water cycles. Grassland development may become part of the restoration of traditional sowing procedures and may be supported by a valuation of ecosystem services. Restoration of the water regime and water uptake by the soil is directly positively related to landscape objectives that concern soil improvement and landscape structure adaptation. In its turn, private land property could ensure better soil management and a division of large field blocks can be realized through land consolidation. Realization of water retention measures should be realized by complex arrangements, mainly on state land. Drought mitigation is crucial for the increase of biofuel production and climate change adaptation. This relationship has a feedback loop. If ecosystem public services in agriculture and climate change adaptation objectives are not realized, drought mitigation will not be possible. The construction of more irrigation systems and reservoirs is not a right way to achieve the restoration of a sustainable landscape water regime, nor will it revitalize water courses.

Climate change mitigation and adaptation are not clearly and precisely defined objectives. With the exception of administrative objectives for ownership and land consolidation, these climate

objectives are positively related to all other food/agriculture, land and water objectives. Climate mitigation/adaptation strategies are mainstreamed in nearly all landscape, water and agriculture management practices. Climate change mitigation is directly related to reduction of greenhouse gases. The Slovakian case uses the same reasoning as the Czech case to contribute conflicting scores to the linkages between overall climate change mitigation and local and regional focused objectives for water, land, energy and agriculture. The general mitigation objectives leads the attention away from regional available solutions.

Relation with policies and coherence at EU scale

The Slovakian case is very similar to the Czech case. The Slovakian objectives are based on EU objectives, but worked out in far more detail on regional and local scale for water, land, land ownership and landscape (Table 37). They put attention to regional and local trade-offs of EU and national energy and climate objectives, and to regional climate change and local and regional solutions to mitigate these. No attention is paid to national alternatives for expanding the growth of biofuel crops, like energy efficiency and alternative energy sources. This is similar to the Czech case.

The Slovakian case confirms the overall positive influences of good land and water management practices in the nexus (Table 38). It addresses competition for land and water between growing biofuel crops, food crops, nature and forestry, and shows the ambiguity of growing 1st generation biofuel crops for agriculture and climate, and negative impacts on water, landscape and soil.

Table 37 Description of policy objectives used for the assessment of interactions in Slovakia

Energy			
Code	**Headings**	**Detailed description**	**Related to EU objectives**
E1	Increase biofuel production	Increase biofuel production in order to cover 14 % of all energy sources from renewable[7]	E1
Food/Agriculture			
Code	**Headings**	**Detailed description**	**Related to EU objectives**
F1	Support of agriculture biomass as a renewable resource	Support maize and rape production in order to cover 8% of all energy sources from renewables; grassland – biofuel for biogas stations	E1
F2	Support non-production functions of agriculture	Support of non-production functions of agriculture in order to protect soil, water quality, air, maintenance of cultural landscape. Plan is 5% from Agricultural land	F1, F3

[7] http://www.atlasoze.sk/legislativa-pdf/NAP_OZE.pdf

F3	Establish soil blocks evidence	Information about drainage systems on field blocks, adjacency to water reservoirs, if suitable for greening because of concentrated drainage	
F4	Set up conditions of agri-environmental and climate measures implementation in agriculture	Improve agriculture land quality	
F5	Keep agriculture procedures favourable to climate	Improve agriculture land quality (increase organic content, stop erosion, etc.) – these procedures are related to water retention and thus influence climate	F3
Land			
Code	**Headings**	**Detailed description**	**Related to EU objectives**
L1	Stop rainwater runoff from agricultural land and decrease soil erosion	Create a concept for rainwater harvesting, in agrolands implementation of anti-erosion measures to decrease erosion in the landscape and prepare legislative and financial instruments to implement the proposed measures.	L2
L2	Increase photosynthesis process on agrolands and organics content in soil	In order to improve soil fertility, ability to retain water and improve water infiltration	L1
L3	Increase soil water capacity and underground water	In order to retain water, refill groundwater level	L1
L4	Decrease runoff from road infrastructure in agroland and prevent the soil sealing	Significantly restrict urbanization of agriculture land – barrier for water retention	
L5	Decrease soil compaction	Improve water infiltration and retention	L1
L6	Restrict taking out arable land from agriculture land fund	Arable land is often built up and used for new industrial buildings or residential areas – support for soil sealing (e.g. the industrial parks in Slovakia)	
L7	Increase landscape structure diversity and state property	In order to realize technical measures for soil water retention improvements	
L8	Support land ownership	Decrease the share of leased land of agriculture subjects (max. 70 %), support private ownership of agriculture land in order to improve soil management practices. Transfer ownership of agricultural land to cities and municipalities	

L9	Support for the implementation of land consolidation	In order to change landscape structure and modify land ownership; Land consolidation as a tool for improvement the environment, protecting and regeneration the soil fund, improving forestry and water management, especially in the field of minimizing the adverse effects of floods and drought and increase the ecological stability of the landscape.	
L10	Heterogeneous landscape structure	Minimize field blocks area by their dividing into smaller ones by landscape features (balks, groves, grass and shrubs belts, wetlands, ponds, etc.) in order to minimize erosion, matter losses, improve soil quality, mitigate climate change, restore small water cycle. Adopt the principle of "zero drainage of rainwater" from agricultural land	
L11	Develop a comprehensive system of sustainable land management	To develop a comprehensive system of sustainable land management in the agriculture landscape and in the forests to enhance the soil and landscape retention capacity. Adopt the principle of a maximum of 50% of grain crops on the farm	
L12	Ensure national evaluation of ecosystem services	Ecosystem services help to quantify (financially) all services that ecosystems provide (e.g. air conditioning, water retention, anti-erosion etc. functions, biodiversity) and may serve as a powerful tool to protect ecosystems not only from the biodiversity point of view	
L13	Restoration of sowing procedures	Current land management completely distorted the sowing procedures – crop rotation, diversity of crops (now approx. 8 preferred crops instead of 15, no undergrowth crops, etc.)	
Water			
Code	**Headings**	**Detailed description**	**Related to EU objectives**
W1	Support expanding of greening areas in catchments	Greening in catchments – mix of permanent grassland and crops to improve water retention	
W2	Keep sufficient buffer zones and vegetated strips along water courses- minimal 5% of the area of the farm area	In order to decrease pollution, improve infiltration and to strengthen the water, nutrients and soil retention, the principle - zero drainage of rainwater, nutrients from farmland	

	for water and water retention area		
W3	Promote natural retention and water uptake into the soil	In order to retain water, refill groundwater level	L1, W5, W6
W4	Restore landscape water regime	Create a concept for implementation of measures to increase water retention in the landscape and prepare legislative and financial instruments to implement the proposed measures. The principle - agrofarms do not increase the risk of floods and drought, and heal the climate	W5, W6
W5	Increase natural retention ability of water courses and floodplains	Increase natural retention ability of water courses and floodplains (natural and technical revitalization of water courses)	W5, W6
W6	Construction of small water reservoirs and irrigation systems	As water reserves for drought periods – principle - all rain water remains on the farm	W6
W7	Reduce spatial and concentrated runoff of surface water	Reduce spatial and concentrated runoff of surface water by spatial water retention or by slowing the runoff by optimizing landscape structure and using both natural and technical measures to slow down the runoff.	W6
W8	Apply "good agricultural, climate and environmental condition" requirements and "cross compliance"	Apply "good agricultural, climate and environmental condition" requirements and "cross compliance" requirements to increase water infiltration - restore and enhance the retention capacity of the landscape (grassing of spring areas and river meadows, planting forests and trees, opening of major drains, renaturation of channels and fortified streams, setting up of pools in sites with increased groundwater levels, etc.)- Principle - to strengthen the intensity of photosynthesis and organic fertilizer production on farms.	F1, F3
W9	Define the land property as a major barrier for the optimizing and restoration of water regime	Define the land property as a major barrier for the optimizing and restoration of water regime (the measures should be realized on state property land); as well as missing legislation and financial support for large changes of landscape structure, construction and maintenance landscape features and measures for increasing water retention –	

		principle - "zero runoff of rainwater from the farm".	
W10	Establish landscape planning as a tool for water retention	Water retention is directly related to landscape structure changes – those can be reached by landscape planning- Principle - Rainwater is the basic food of all foods	
W11	Protection and restoration of the natural water regime in forests	By healthy forests, appropriate species composition and forest structure, good soil condition, adjustment of drainage systems etc. Revision of measures for forestry meliorations, streams and forest roads with a focus on protection and restoration of natural water regime in forests; Minimizing technical drainage of forest land using natural and semi-natural procedures; Applying procedures and measures for harvesting and restoring forests to avoid or slow down surface drainage and soil erosion; Stabilizing the forest types affected by water and protection of wetlands in forests. Principle - zero drainage of rainwater from forests.	
W12	Limiting the emergence and impacts of agricultural drought	Measures to mitigate and prevent drought; support in new legislation amendment of Water Act no.254/2001 Coll. Principle - the farm is made up of water when it rains for periods without rainfall	W6
Climate			
Code	**Headings**	**Detailed description**	**Related to EU objectives**
C1	Climate change mitigation	The strategy for climate change mitigation is mainly based on decrease of greenhouse gasses in different sectors	C1
C2	Climate change adaptation	Based on government decision No.15433/2014, The Adaptation Strategy of the Slovak Republic on climate changes and its implementation no. 34/2017, National adaptation plan– set of objectives, adaptation measures and tasks from agriculture, water, forestry, urban, biodiversity, industry, energy, health, transport, tourism in order to suggest strategies for climate change adaptation	C6

C3	To reduce greenhouse gas emissions within the EU ETS by 20% to 1990	The strategy for climate change mitigation mainly based on decrease of greenhouse gasses with specified target of emissions reduction C1

Table 38 Number of direct interactions per policy objective with policies for other WLEFC sectors in Slovakia

Percentage is calculated on the total number of possible interactions

	INFLUENCING What happens in the nexus if we make progress on objective X?							INFLUENCED What happens to objective X if we make progress on other objectives in the nexus?						
	Interac-tions	%	Synergies		Conflicts		Syn & Conf	Interac-tions		Synergies		Conflicts		Syn & Conf
Obj. X			+	0/+	-	0/-	+/-		%	+	0/+	-	0/-	+/-
W1	20	63%	18	0	2	0	0	20	63%	18	0	2	0	0
W2	24	75%	21	0	3	0	0	20	63%	18	0	2	0	0
W3	24	75%	21	0	3	0	0	21	66%	21	0	0	0	0
W4	27	84%	26	0	1	0	0	20	63%	20	0	0	0	0
W5	24	75%	23	0	1	0	0	14	44%	14	0	0	0	0
W6	6	19%	6	0	0	0	0	8	25%	8	0	0	0	0
W7	24	75%	21	0	3	0	0	13	41%	11	0	2	0	0
W8	13	41%	10	0	3	0	0	20	63%	18	0	2	0	0
W9	5	16%	4	0	1	0	0	12	38%	12	0	0	0	0
W10	6	19%	6	0	0	0	0	14	44%	14	0	0	0	0
W11	9	28%	8	0	1	0	0	17	53%	16	0	1	0	0
W12	30	94%	27	0	3	0	0	27	84%	27	0	0	0	0
E1	18	56%	7	0	11	0	0	21	66%	3	0	18	0	0
L1	23	72%	18	0	5	0	0	17	53%	15	0	2	0	0
L2	21	66%	14	0	7	0	0	12	38%	10	0	2	0	0
L3	25	78%	21	0	4	0	0	10	31%	9	0	1	0	0
L4	13	41%	11	0	2	0	0	12	38%	10	0	2	0	0
L5	20	63%	15	0	5	0	0	11	34%	10	0	1	0	0
L6	14	44%	9	0	5	0	0	10	31%	7	0	3	0	0
L7	8	25%	4	0	4	0	0	9	28%	6	0	3	0	0
L8	1	3%	1	0	0	0	0	10	31%	6	0	4	0	0
L9	7	22%	5	0	2	0	0	15	47%	10	0	5	0	0
L10	14	44%	11	0	3	0	0	17	53%	13	0	4	0	0
L11	18	56%	15	0	3	0	0	15	47%	13	0	2	0	0
L12	8	25%	7	0	1	0	0	12	38%	11	0	1	0	0

L13	13	41%	10	0	3	0	0	17	53%	14	0	3	0	0
F1	20	63%	8	0	12	0	0	16	50%	2	0	14	0	0
F2	19	59%	16	0	3	0	0	21	66%	19	0	2	0	0
F3	8	25%	2	0	6	0	0	9	28%	7	0	2	0	0
F4	10	31%	7	0	3	0	0	16	50%	12	0	4	0	0
C1	27	84%	26	0	1	0	0	25	78%	25	0	0	0	0
C2	27	84%	26	0	1	0	0	24	75%	24	0	0	0	0
C3	2	6%	2	0	0	0	0	23	72%	3	0	20	0	0

4.9.3 Germany

Horizontal policy coherence

There are more synergies than conflicts between the objectives (Table 39 and Table 40). Especially the objective 'Sustainable and environmental friendly use of land' positively interacts in both ways with other objectives, although there are some negative and ambiguous scores. Raising awareness about the environment and effects of actions is also a supporting factor for objectives in most sectors. Preservation of forest, reduction of water pollution and use have high positive scores, but also ambiguous scores, and ensuring food production has more ambiguous than positive scores.

The reduction of water pollution and emissions is unavoidable if you want to achieve sustainability and protect the environment. Animal protection and ensuring biodiversity is directly linked to the achievement of sustainability and can only be done if natural habitats e.g. forests and water bodies, are protected from mayor harm. Agriculture and with it the production of food could be negatively influenced by the desire to reduce pollution of water bodies, since fertilizers are one of the main reasons for the pollution. A change regarding the usage of fertilizers seems necessary, if a significant improvement of water quality is to be achieved. Similar things could be said about the reduction of water usage.

The end of nuclear energy is an opportunity for the promotion of renewable energy since new energy sources are needed to provide the necessary electricity. Covering the arisen demand for alternative energy sources by lignite would instead damage the achievement of sustainability and sabotage the reduction of emissions. Lignite mining and mining in general is hardly compatible with the protection of the environment and sustainability, therefore constrains the achievement of environment related objectives. The reduction of emissions can only be achieved with the development and promotion of renewable energy sources, which is also directly related to the successful development of the power network. The production of biofuels constrains the production of food, since plants are used to produce biofuels instead of food products. The production and quality of food as well as the protection of animals is directly related to the prevention of animal diseases. An improvement of infrastructure can negatively influence and constrain the achievement of environment related objectives.

Relation with policies and coherence at EU scale

Most of the selected objectives for the German case are directly related to the selected EU objectives, some food policies are related to non-selected EU policies, e.g. for food quality and animal diseases. Ending nuclear power, lignite mining and constructing waterways are national and regional objectives.

Good practice in land and water management has many positive relations in the nexus, with a few exceptions, e.g. ambiguous and negative scores with agriculture and food production. This shows that the ambiguity in the coherence of agriculture and food production with other nexus objectives also exists in the German case. Competition for scarce land and water is mentioned between production of food and biofuels.

Table 39 Description of policy objectives used for the assessment of interactions in Germany

Water			
Code	**Heading**	**Detailed description**	**Related to EU policies**
W1	Reduction of pollutants	Includes all sources of pollution	W1
W2	Reduction of water usage	Includes all sectors e.g. industry and agriculture	W4
W3	Improvement of waterway infrastructure	Construction of e.g. new channels (in Eastern Germany)	
W4	Preservation of biodiversity in water bodies	Protection of animals and plants (in water)	W1
W5	Flood control	Mainly construction and maintenance of dikes	W5
Energy			
Code	**Heading**	**Detailed description**	**Related to EU policies**
E1	End of nuclear energy usage in Germany	Shutdown of nuclear energy plants and disposal of nuclear waste	
E2	Promotion of renewable energy	Includes construction of new e.g. solar plants	E1, E2, E3, E4
E3	Promotion of biofuel	First generation biofuel	E1, E2
E4	Improvement of the power network	Expansion of the power network to meet the needs of renewable energies	E9
E5	Reduction of energy usage	Includes all sectors which use energy	E8
Food and agriculture			
Code	**Heading**	**Detailed description**	**Related to EU policies**
F1	Ensuring food quality	Includes the regulation of e.g. allowed ingredients and procession of food products	
F2	Ensuring food	Includes the regulation of e.g. agriculture areas and their usage	

	production		
F3	Prevention of animal diseases	Includes hygiene regulations. Reduction of risks for humans and animals alike. Focused mainly on livestock.	
F4	Promotion of ecological cultivation	Expansion of environmental friendly sustainable cultivation	F1, F3
F5	Protection of animals	Protection of wildlife and stock from e.g. animal cruelty	
F6	Ensuring biodiversity	Protection of wildlife by e.g. hunting regulations	
Land use			
Code	**Heading**	**Detailed description**	**Related to EU policies**
L1	Improvement of rural infrastructure and agriculture	Construction of e.g. roads and improvement of the agriculture structure (in Eastern Germany)	F4
L2	Sustainable and environmental friendly use of land	Landscape should only be changed if necessary and, if possible, in a non-damaging way	L2, L3, L4
L3	Maintain mining	Acquisition of resources e.g. lignite by expropriation	
L4	Preservation of forests	Ban on forest transformation unless allowed by authorities	L3
Climate			
Code	**Heading**	**Detailed description**	**Related to EU policies**
C1	Reduction of GHG emissions	Includes all sectors with GHG emissions	C1
C2	Promotion of awareness about the environment	Includes the informing about effects of actions on the environment	

Table 40 Number of direct interactions per policy objective with policies for another WLEFC sector in the German part of the transboundary case DE-CZ-SK

Percentage is calculated on the total number of possible interactions

	INFLUENCING What happens in the nexus if we make progress on objective X?							INFLUENCED What happens to objective X if we make progress on other objectives in the nexus?						
	Interac-tions	%	Synergies		Conflicts		Syn & Conf	Interac-tions		Synergies		Conflicts		Syn & Conf
Obj. X			+	0/+	-	0/-	+/-		%	+	0/+	-	0/-	+/-
W1	7	33%	5	0	0	2	0	11	52%	9	1	0	1	0
W2	10	48%	8	1	0	1	0	8	38%	3	3	1	1	0
W3	8	38%	2	0	0	6	0	6	29%	1	0	1	4	0
W4	8	38%	5	1	1	1	0	8	38%	4	2	1	1	0
W5	2	10%	1	0	0	1	0	1	5%	0	0	0	1	0
L1	4	19%	1	0	0	3	0	6	29%	2	0	1	3	0
L2	16	76%	11	1	2	2	0	17	81%	13	1	1	2	0
L3	8	38%	0	0	2	6	0	8	38%	0	0	4	4	0
L4	11	52%	5	1	2	3	0	9	43%	4	1	0	4	0
E1	4	19%	2	1	1	0	0	2	10%	1	1	0	0	0
E2	8	38%	4	2	1	1	0	7	33%	4	1	0	2	0
E3	7	33%	3	2	1	1	0	8	38%	2	2	3	1	0
E4	2	10%	1	1	0	0	0	0	0%	0	0	0	0	0
E5	3	14%	3	0	0	0	0	6	29%	4	0	0	2	0
F1	5	24%	3	0	1	1	0	4	19%	3	0	0	1	0
F2	10	48%	3	0	2	5	0	11	52%	4	0	2	5	0
F3	4	19%	4	0	0	0	0	2	10%	2	0	0	0	0
F4	7	33%	5	1	1	0	0	4	19%	3	0	1	0	0
F5	8	38%	5	0	1	2	0	11	52%	8	0	0	3	0
F6	7	33%	5	0	1	1	0	10	48%	8	0	0	2	0
C1	7	33%	4	1	1	1	0	10	48%	4	3	3	0	0
C2	13	62%	9	3	1	0	0	10	48%	10	0	0	0	0

4.10 Transboundary DE-FR

4.10.1 Horizontal policy coherence

Overall, there is horizontal and transboundary coherence between selected objectives of various policy domains. Advancement on one objective more often enhances than constrains the achievement of another objective from the same or another sector, there are 34 positive and 17 negative interactions, most objectives do not interact (Table 41 and Table 42). Some scores are difficult to determine because the objective can be interpreted in different manners or because the interaction between objectives is determined by external factors.

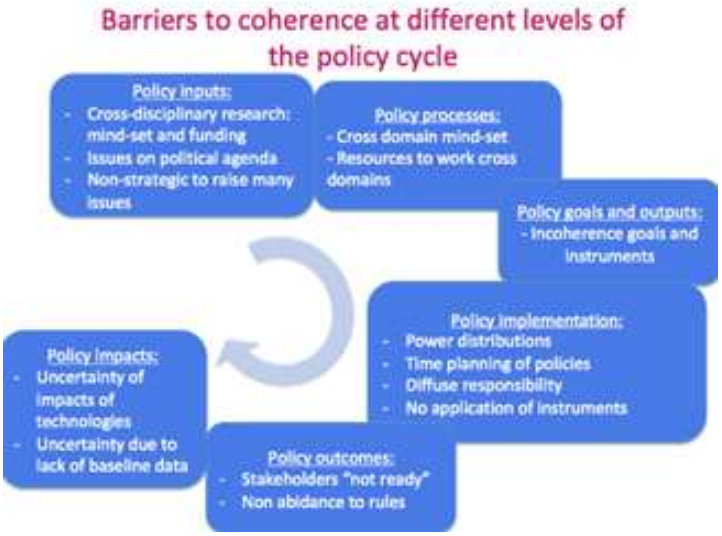
Most constraining interactions occur because of spatial development, aligning agricultural production with market demands and due to increasing renewable energy capacity. The constraining conditions that these objectives create are mostly a consequence of a claim on land that can no longer be used for the advancement of another objective that requires land. Most positive interactions are related to improvement of ground and surface water quality and quantity, biodiversity conservation, forest and landscape maintenance and climate objectives. Water is used by many other sectors and therefore guaranteeing its availability in both quality and quantity impacts many sectors positively. Similarly, biodiversity contributes to the maintenance of ecological functions of water and soil. Mitigating and adapting to climate change is crucial for all policy domains (TBC1).

Renewable energy is synergistic with climate objectives but may produce trade-offs with food production, water quality and affect biodiversity in either a positive or negative manner, according to interviewees. Precise impacts are unknown, because of various views on the stringency of regulations. Despite a 15% annual cap on food crops for biodigesters in France, many interviewees mention food crops for biogas as a pressing issue creating a trade-off with food production. Moreover, bio-digesters can cause groundwater pollution. Whereas in France the impact of energy crops for biogas production was discussed widely, this topic has passed in Germany. The trade-off between food and energy production may have stabilized but a future increase of solar PV on land may reinforce the food trade-off and hamper biodiversity.

4.10.2 Policy integration in practice at regional level in Germany and France in the Upper Rhine

Interviewees explained how discrepancies between policy coherence on paper and implementation could come about. Firstly, preconditions such as an enabling environment and policy inputs influence horizontal coherence. Certain issues may be prioritized over others during the agenda setting stage. As a consequence, incoherence may occur because issues are not sufficiently addressed and integrated into other policy domains. Another barrier to establishing coherence may be that it is considered non-strategic to introduce another potentially conflicting issue. Also, there may be a lack of the right resources to develop policies on a regional level.

Figure 22 Barriers to coherence at various stages of the policy cycle



Source: Strosser et al., 2018.

Barriers to policy coherence may also occur when policies are in development, see Figure 22. Public officials may be required to think beyond their policy domain, which is not always evident. Crossing policy domains is limited not only by the mind-set of people but also an overload of work. At this stage of policy processes, power distribution plays a significant role. Drawing from the interviews, economic interests represented by various kinds of enterprises often prevail. Interviewees, especially from research organizations, stress that political power to influence the management of trade-offs is limited.

Multiple actors conveyed the message that policies may be coherent on paper, but that this does not guide reality. A high level public official underlines the limitation of a policy domain to create truly cross-domain policies: “public policies stay in the world that created them”. At the implementation level, impacted actors try to suit their own interest while navigating rules. As an interviewee states: “There are not just public policies, there are also markets!” Another problem is that certain stringent regulations are never used. Also, diffused responsibility may give way to not achieving objectives. This is especially relevant for strategies that aim to integrate various policy domains. “No one feels responsible for the implementation of general strategy documents”.

Finally, barriers occur that cause incoherence at the level of outcome and impact, see Figure 22. The absence of implementation may be the result of stakeholders “not being ready” for it. Inconsistencies may also occur due to incoherent time planning of policy renewal and implementation. At the impact level, policies may not achieve the desired results. There may be insufficient state control and private individuals may not comply with rules and regulations purposefully or because the complexity is too high. Lastly, there may be uncertainty about the impact of certain technologies that are deployed to achieve objectives.

4.10.3 Relation with policies and coherence at EU scale

Most selected objectives in the DE-FR case are directly related to the selected EU objectives. Exceptions are nature and biodiversity objectives that relate to non-selected EU objectives, and regional objectives for spatial planning and solar PV.

The DE-FR case addresses competition for scarce land between several users, e.g. agriculture and renewable energy, and potentially negative environmental effects of several renewable energy sources. Good practices in the management of land, water and ecosystems has many positive linkages in the nexus. Water supply and climate mitigation and adaptation also positively link to many other objectives in the nexus. The choice between technical and nature-based solutions and rebound effects are not addressed.

Table 41 Description of policy objectives used for the assessment of interactions in the transboundary DE-FR case

Land use			
Code	**Heading**	**Detailed description**	**Related to EU objectives**
GL1	Safeguard biodiversity of plants and animals	The objective aims for the protection of populations of wild plants and animals. Their biodiversity policy is complex: it includes offsetting mechanisms. Source of objective: Law of Nature Conservation and Landscape Development, Law of Nature Conservation and Landscape Development Baden-Württemberg.	
GL2	Further development of polycentric settlement structures	Development of settlements should be located in the central places along development axes and near concentrated traffic, according to this objective. Settlement and traffic development should be interlinked. Source of objective: Regional Plan Southern Upper Rhine 3.0.	
FL3	Ensure the conservation of species biodiversity	This objective comes from the national law and speaks for itself. Regions further define the strategy to reach these common goals. Source of objective: Biodiversity law France.	
FL4	Ensure sufficient housings with 45 000 additional housings	With this specific goal the aim is to meet the current and future needs of the population of Strasbourg by 2030. The city is an attractive place within Bas-Rhin department as it provides half of all jobs in the department. Source of objective: Urbanism local plans (PLU) Strasbourg.	
GL5	Ecological management of cultural landscape by farmers	Farmers play a role in the maintenance of the cultural landscape in Baden-Württemberg. Without maintenance, forests would cover many of the current open areas. Source of objective: Rural development program (MEPL III) and Improvement of Agricultural Structure and Coastal Protection joint task and law.	F4

Water			
Code	**Heading**	**Detailed description**	**Related to EU objectives**
TBW1	Improvement ecological potential of the Rhine river	Good ecological status refers to biological, hydrological and chemical characteristics. All surface water bodies of the upper Rhine stream are designated as heavily modified, 41% of its bodies are targeted. Source of objective: Rhine-Meuse River basin Management Plan and Strategy for the IRBD Rhine for adapting to climate change.	W1
TBW2	Prevent floods in the Rhine-Meuse Basin	The highly modified Rhine river carries flood risks. Floods on the Upper Rhine area are a threat to 96 towns and municipalities, according to the Integrated Rhine Program. The Basin on the French side consists of the Moselle, Nied, Sarre and tributaries of and the Rhine river. Source of objective: Management Plan for Flood Risk Management and Internationally coordinated flood risk management plan for the Rhine basin and Strategy for the IRBD Rhine for adapting to climate change.	W5
TBW3	Good quantitative status of Rhine ground water body	Currently there is abundant water in the large groundwater body of the Alsace region. Also the groundwater body of Sundau, Hagenau and the Vosges are available. Quantity may become a more pressing issue in the future, according to interviewees. Source of objective: Ill-Nappe-Rhine River basin Management Plan.	W1, W2, W6
Food			
Code	**Heading**	**Detailed description**	**Related to EU objectives**
TBF1	Income security for farmers	Farming enterprises receive income that enables them to continue their practices despite competition from other producing regions and countries. Since the reform of the CAP payments are linked to environmental or 'greening' criteria. Source: CAP.	F1
TBF2	Alignment of agricultural production to meet market needs	Produce agricultural products within Europe despite competition from other producing regions. The two regions produce various products, amongst others wine and other specialized products such as biological and regional product. Source of objective: CAP.	F4
Energy			
Code	**Heading**	**Detailed description**	**Related to EU objectives**
GE1	Increase renewable energy supply from solar PV	The renewed German electricity law from 2017 target for solar on land and other renewable energy sources. In the case of solar this is annual gross increase 2500MW. They are capped per year to adjust grid capacities. Source of objective: Renewable Energy Sources Act (EEG).	

FRE2	Promote renewable energy from biogas	The aim is to increase production with 790 GWh or 68 toe by 2020 in Grand Est. Biogas is one of the renewable energy sources promoted nationally and regionally. Source of objective: 5-years Energy Planning (PPE).	E3, E4
Climate			
Code	**Heading**	**Detailed description**	**Related to EU objectives**
GC1	Adapt forestry to climate change to ensure sustainable timber production	Water stress, changes of climate and pests are climate change effects that harm forests. Municipalities own about 40% of the forests and the rest is private and state owned. Source of objective: Regional forest development type guidelines.	C6
TBC2	Reduce GHG emissions by 80%	GHG emissions should be reduced steadily and sustainably by a minimum of 80% until 2050 in the Upper Rhine region (baseline=year 2000). Source of the objective: Tri-national climate and energy strategy for the Upper Rhine region.	C1

Table 42 Number of direct interactions per policy objective with policies for other WLEFC sectors in transboundary case France-Germany

Percentage is calculated on the total number of possible interactions

	INFLUENCING What happens in the nexus if we make progress on objective X?							INFLUENCED What happens to objective X if we make progress on other objectives in the nexus?						
	Interac-tions	%	Synergies		Conflicts		Syn & Conf	Interac-tions		Synergies		Conflicts		Syn & Conf
Obj. X			+	0/+	-	0/-	+/-		%	+	0/+	-	0/-	+/-
TBW1	2	15%	2	0	0	0	0	5	38%	3	0	1	1	0
TBW2	4	31%	4	0	0	0	0	3	23%	3	0	0	0	0
TBW3	5	38%	5	0	0	0	0	4	31%	2	1	1	0	0
GL1	6	46%	5	1	0	0	0	11	85%	7	0	4	0	0
GL2	5	38%	0	0	4	0	1	1	8%	1	0	0	0	0
FL3	6	46%	6	0	0	0	0	11	85%	7	0	2	1	1
FL4	4	31%	0	0	4	0	0	1	8%	1	0	0	0	0
GL5	3	23%	3	0	0	0	0	2	15%	1	0	1	0	0
GE1	4	31%	2	0	2	0	0	0	0%	0	0	0	0	0
FE2	5	38%	2	0	1	2	0	0	0%	0	0	0	0	0
TBF1	0	0%	0	0	0	0	0	2	15%	2	0	0	0	0
TBF2	4	31%	0	0	4	0	0	5	38%	1	0	4	0	0
GC1	4	31%	4	0	0	0	0	3	23%	3	0	0	0	0
TBC1	2	15%	2	0	0	0	0	6	46%	4	0	2	0	0

4.11 Conclusions

Most of the objectives that cases selected from policy documents are directly related to EU policies. There are more synergies than conflicts between policy objectives written in policy documents in all cases, like in EU policies. Policy coherence between sectors is most evident if objectives for one sector are mainstreamed in policies for another sector. This is e.g. the case with the greening objectives in agricultural policy based on the CAP. Objectives for ecosystem services, environment and climate are included in EU agriculture policy. Mainstreaming of objectives can also be found in other policies:

- In The Netherlands, objectives for agriculture, water, soil and waste are integrated in policies for biomass.
- In Andalusia, energy objectives are integrated in water policy; water quality objectives in land policy; agriculture, forest and soil objectives in climate policy.
- In SW-England, flood risk objectives are part of land policy.
- In the Czech and Slovakian cases, land objectives are integrated in water objectives and vice versa.

Mainstreaming policy objectives for one sector in another sector does not take away existing conflicts, but it may serve a shared feeling of responsibility.

Policy coherence in policy documents is not a guarantee for coherence in practice, as was stated by stakeholders in the Greek, Latvian and DE-FR cases. The other way around, policy conflicts 'on paper' could turn out more synergistic in practice than on paper, as was noted by Swedish stakeholders about the conflicting relation between agricultural economic and overall environmental objectives. Policy coherence in practice depends on many factors that should be studied in detail, as the DE-FR example shows. Therefore, starting from the results of this coherence analysis of policies written in documents, cases should focus on implementation processes to verify the findings, distinguishing between objectives that are coherent, incoherent or ambiguous 'on paper'.

There is no difference between governance levels in synergies and conflicts observed. Geographical differences are more prominent, e.g. between countries with a lot of space and forests like Sweden and Latvia, and more densely populated countries like the Czech Republic, Slovakia and The Netherlands, all focusing on biomass. The Mediterranean cases, national as well as regional, focus on water scarcity. The regional case SW-England stands out. As it is the only case lead by a private party, it includes objectives for services to clients and prices of delivered energy and water.

The six policy coherence issues observed at EU level were also encountered in the cases, though they manifest differently.

1. The positive effects in the nexus caused by good practices in water and land management, restoration and prevention of soil erosion and reforestation was confirmed by all cases, except Sardinia.

2. The positive effects in the nexus of increasing energy and water efficiency, resource efficiency in the agri-food chain, and reduction of the use of water and energy was confirmed by all cases that investigated these objectives.
3. The in principle positive effects in the nexus of sufficient water supply and management of floods and droughts, but the ambiguity in the implementation caused by the different impacts of technical and nature-based solutions was described by the Czech and Slovakian cases. Andalusia mentions the ambiguous impacts of irrigation as a technical measure for water supply. DE-FR scores water supply positively with other objectives and does not differentiate between technical and nature-based solutions. Rebound effects were not mentioned by the cases.
4. Competition for scarce water is mentioned by Greece, Czech Republic, Slovakia, Germany and Sardinia, for scarce land by The Netherlands, Czech Republic, Slovakia, Germany, DE-FR and Sardinia.
5. The ambiguous role of agriculture in the nexus is mentioned by Latvia, Sweden, Andalusia, SW-England, Czech Republic, Slovakia, Germany and Sardinia.
6. The many negative interactions in the nexus that producing biofuels from 1st generation food and feed crops creates are mentioned by the Czech Republic, Slovakia and Germany. In more general terms, 'renewable energy' or 'biomass', conflicts are also mentioned by Latvia, The Netherlands, Sweden, SW-England and DE-FR.

Some cases address specific issues. Andalusia mentions e.g. the ambiguous impacts of irrigation improvement, good for water supply, bad for energy saving objectives. The Czech Republic and Slovakia address regional climate change caused by regional and local changes in the use of land and water. SW-England addresses impact on services to clients and prices for delivered goods. Germany and Greece address the use of lignite as energy source and the impact on climate. Greece and Sardinia address the impacts of tourism. SW-England and Germany address nuclear power, SW-England the establishment of a nuclear power plant, Germany the phasing out of nuclear power. Germany and The Netherlands address transport by water and Germany mining.

5 Formal and informal arrangements addressing policy coherence

This chapter focuses on how policy coherence between different sectors is achieved in the planning and implementation phases in the cases, from an institutional and governance perspective. What solutions were found to prevent and mitigate trade-offs and exploit synergies?

Institutional arrangements are defined as a set of rules or agreements governing the activities of a specific group of people pursuing a certain objective (). They can be formal, meaning established by laws and rules and entailing enforcement measures or informal, for example verbal agreements, not entailing binding enforcement measure.

Formal institutional arrangements were analysed, such as process and management rules, and informal practices, such as different forms of stakeholder collaboration. Enabling and hindering factors were identified by the case study partners in the 10 case studies. The type of formal and informal arrangements found in the case studies as well as enabling and limiting factors are separately described for the transboundary, national and regional case studies in the sections below. Detailed descriptions of the arrangements per case study can be found in Appendix 4.

5.1 Transboundary arrangements

The transboundary arrangements described by the DE-FR case are all institutionalised, permanent or temporarily (Table 43). They are public or public-private. The Upper Rhine Conference connects Germany, France and Switzerland through their Foreign Ministries. The Conference has multiple functions, including knowledge sharing, building networks, coordination of policies through proposals, fostering negotiation, promotion of the regions, research and lobbying. In the International Commission for the Protection of the Rhine (ICPR), 29 European states coordinate policies. The Upper Rhine Council functions on a regional level, enabling transboundary cooperation between regions in France, Germany and Switzerland, amongst which are Alsace and Baden-Württemberg.
As the river Rhine basin is the core of all these arrangements, the issues addressed focus on surface water, groundwater and water-related issues in sectors like agriculture, industry, nature.

Enabling factors are the availability of funds, a long-established organisation and a credible agenda aligned with regional needs. Hindering factors are time consuming procedures and complex decision-making structures, different governance structures and legislation between countries and regions, and for the transboundary projects, disagreement about project design and spending of funds, and lack of awareness of financial opportunities.

Table 43 Formal transboundary arrangements: type, functions and enabling and hindering factors

Type	Participants	Functions	Enabling/hindering factors	Examples from cases
Institutionalized form of collaboration <u>between neighbouring countries</u> differently named: - commission - committees - conferences - councils	**Public** - Regional governments - Regional agencies	- Coordination of policy design and implementation on transboundary issues - Building networks - Fostering negotiation across borders - Promoting transboundary regions	**Enabling:** - Interest on topics - Commitment - Flexibility to adjust policy language to different legislative frameworks - Availability of funds through EU funding schemes (e.g. INTERREG) - Trust - Long existence - credible agenda aligned with regional needs **Hindering:** - Building relations and networks is time consuming - Different legislative frameworks - Institutional memory of past conflicts - Different governance structures: centralized (FR) vs decentralized (DE) and legal systems	**DE-FR: Water, Nature, Agriculture, Land** *International Commission for the Protection of the Rhine* Established by the International Convention between Riparian Countries of the Rhine the commission includes 29 countries and aims to coordinate policies on transboundary issues (e.g. natural habitat connection across borders, water use and quality). It enhances transboundary coherence between water sectors and between water and water using sectors to preserve the ecological functions of the river area. The Commission adopted a 2020 Program on the Sustainable Development of the Rhine. An example of coherence between policy domains is that habitat network connectivity is one of the goals outlined in the Climate adaptation strategy. **DE-FR: Water, Nature, Agriculture, Land** *Upper Rhine Conference* The conference connects Germany, France and Switzerland through their Foreign Ministries. National governments and specialized public agencies are represented. There is a common secretary, 11 working groups and 36 expert committees. The Conference has multiple functions, including: knowledge sharing, network building, coordination of policies through proposals, fostering negotiation, promotion of the regions, knowledge generation. The Conference implements projects and initiatives mostly financed through EU Interreg funds and regional government funds. Main outputs of the commission activity are knowledge, projects, educational programs, policy proposals. **DE-FR: Water, Nature, Agriculture, Land**

Type	Participants	Functions	Enabling/hindering factors	Examples from cases
			- Complex decision-makings structures - Employees shuffling - Lack of time and human resources to work on transboundary issues - Funding barriers - -Lack of information exchange	*Upper Rhine Council* The political counter part of the Upper Rhine Conference. It exists since 1997. It consists of representatives from regions in France, Germany and Switzerland and can make resolutions, for example on flood protection. Past competition between the Upper Rhine council and the conference on policy agendas is still in the memory of people.
Institutionalized collaboration in form of **projects** across borders (often funded with EU budget)	**Public-private** - Regional, local governments - NGOs - Research institutes - Consultancy companies - Businesses and their associations	- Cooperation in management of shared natural resources - Knowledge sharing - Development of transboundary knowledge - Coordination of policy design and implementation - Network building - Shared monitoring of natural resources	**Enabling:** - Financial resources - Commitment - Wide range of stakeholders involved increases acceptance **Hindering:** - Disagreement on project design and implementation that leads to not spending funds - Lack of awareness of financial opportunities	**DE-FR: nature and biodiversity** Project (*Ramsar' Rhinatur*) to cooperatively manage Ramsar and Natura 2000 areas along the Rhine. 11 partners including regional governments and their agencies in charge of nature protection, research institutes, NGOs and private businesses. Goals include knowledge sharing and development, coordination and development of management plans and network building. Wide range of stakeholders involved ensured acceptance of decisions. **DE-FR: Nature, Water** Interreg project (ERMES) for evaluating ecological resources and monitoring groundwater in France, Germany and Switzerland. Main objective is creating transboundary knowledge. It facilitated joint work with agriculture, industries and institutions on the groundwater table. **DE-FR: Energy-Water-Ecology** Transboundary policy process for policy development. Goal was to identify conditions for renewing the contract for operating a hydropower station

Type	Participants	Functions	Enabling/hindering factors	Examples from cases
				to the Kembs company. Focus on measures to increase ecological flow, reduce bank erosion and gravel inputs in the dam.

5.2 National arrangements

Cross-sectoral arrangements at national level can be public, private or public-private. They can be formal or informal, permanent or temporary, and may have many functions, as can be seen in Table 39. The arrangements mentioned by the cases cover all sectors of the nexus, with energy and climate most frequently addressed.

About half of the arrangements are considered effective and working. Trust, commitment and common goals, interests and perspectives are the most frequently mentioned enabling factors for cooperation. As these conditions are not obvious in cross-sectoral cooperation, a lot of attention should be paid to these conditions when organising cross-sectoral cooperation. There are many more factors that determine the success of cross-sectoral cooperation, as can be seen in Tables 39 and 40. The most mentioned hindering factors are lack of common goals, perspectives and interests, lack of trust, disagreement on responsibilities and roles, and lack of funding.

Table 44 Formal national cross-sectoral arrangements: type, functions and enabling and hindering factors

Type	Participants	Functions	Enabling/hindering factors	Examples from cases
Institutionalized form of collaboration differently named: - committees - conferences - councils - platforms - working groups	**Public** - National ministries - Governmental agencies - Regional/local governments - Regional/local agencies - Public companies	- Coordination of decisions on policy design and implementation - Long-term planning within and across sectors - Consultation/drafting of policy proposals and policy agenda - Knowledge sharing - Solve intra- and inter-sector conflicts - Support decisions with knowledge - Ensure alignment of regional/local decisions with national policies	**Enabling:** - Expertise - Commitment - Common goals - Common interests - Common perspectives - Trust - Transparency - Collaboration during implementation and not only design - Willingness to share data - Accountability towards citizens - Presence of strong, clear regulatory instruments - Presence of long lasting, well-established routines - Presence of sustained experience in integrating different objectives - High level participation	**GR: Energy-Environment-Agriculture-Tourism** Inter-ministerial committee between the Ministry of Environment and Energy, the Ministry of Rural Development and Food and the Ministry of Tourism. Coordination of policy decisions and knowledge sharing about land use regulations, infrastructures with aesthetic impact in tourist regions and the management of geothermal springs. The committee works effectively. Cooperation is based on common interests and common perspectives. Members trust each other. **LV: Energy-Climate** Inter-ministerial working group on Climate and Energy policy 2020 – 2030. It includes high level officials (e.g., deputy State secretaries, Heads of departments) from the ministries of environment, Foreign Affairs, Economics, Transport, Finances, Agriculture. The working group works effectively and elaborates the national position towards the EU 2030 Climate and Energy Framework. **LV: Energy-Climate-Agriculture** Inter-ministerial collaboration (working group) on Climate and Energy policy for the period from 2020 – 2030. Elaborates coordinated opinions (in consultation with other ministries concerned) on issues related to energy and climate policy developments up to the year 2030. The working group comprises high level officials (e.g., deputy State secretaries, Heads of departments) from the Ministries (MEPRD; Foreign Affairs; Economics, Transport, Finances, Agriculture) involved in the decision making on Climate and Energy issues. The Working group works effectively and elaborates the

Type	Participants	Functions	Enabling/hindering factors	Examples from cases
			Hindering: - Disagreement on responsibility - Different goals - Conflicting interests - Limited financial resources to address shared problems - Non-binding recommendations - Decisions are not prepared in a form that allows direct implementation	national position towards the EU 2030 Climate and Energy Framework e.g. with respect to the national GHG emission reduction targets for 2030. **NL: Climate-Water** Climate Governmental Consultation 2018. Inter-departmental Management Table (*Regietafel Interbestuurlijk Programma*) including the Cabinet, provinces, association of Dutch municipalities, and the water authorities. It has a focus on climate impacts for which it aims to identify workable solutions. **SE: Land- different uses** Swedish spatial planning system. Spatial planning is the responsibility of the municipalities. Established routines in operation for many years, ensure effectiveness of the approach. Authorities usually have long experience in integrating different objectives in decision making. **East DE: Sustainable development** Council for sustainable development appointed by the German Government. Members are fifteen experts on sustainable development issues with different backgrounds from research to economics. The council meets with politicians once a year. **West DE: Climate-Energy** Regional participatory policy development processes in Baden-Württemberg's for the development of an integrated climate and energy strategy with focus on transition from nuclear to renewable electricity generation. **CZ: Water-Agriculture-Land** Inter-ministerial commission addressing drought issues. It consists of 15 experts from ministries of Environment and Agriculture, research organizations, the State land soil fund and 22 members of the advisory board (usually from research organizations and universities). The commission meets

Type	Participants	Functions	Enabling/hindering factors	Examples from cases
				about twice a year. The urgency of the problem led to the adoption of the national strategy for protection from the impacts of droughts. Now the commission is less active.
Institutionalized form of collaboration either permanent or temporary, differently named: - committees - forums - platforms - boards	**Public-Private** - National, regional, local governments - National, regional, local public agencies - Labour unions - Employers' confederation - NGOs - Public and private research institutes - Consultancy companies - Businesses and their associations - Consultancy companies	- Knowledge sharing - Coordinate decisions - Cooperation between public and private parties - Consultation/drafting of policy proposals - Operationalization of policy agenda - Coordination of activities across administrative levels - Solve intra- and inter-sector conflicts - Create links between knowledge, policy and business to enhance mutual understanding	**Enabling:** - Trust - Common goals - Common interests - Joint ambitions - Transparency - Expertise - Commitment - Willingness to share data - Presence of simple, clear process rules - Good representation of authorities - Awareness of problems relevance - Right to submit policy proposals to government - Log history of stakeholder involvement - Accountability towards citizens	**GR: Environment-Energy** Collaboration committee between the Ministry of Environment and Energy and the Hellenic Public Power Corporation. It coordinates decisions and knowledge sharing on issues concerning the management of energy resources, the production of electricity and environmental management. The committee works effectively during the policy design process (exchange of knowledge and expertise). Sometimes conflicts arise concerning the content of policy documents and the role (responsibilities) of the company as a national energy provider but usually a compromise decision is taken as there are common interests and common goals. **GR: Environment-Water-Air-Climate-Land use-Energy** Collaboration between the Athens Labour Unions Organizations with several ministries. Consultation and knowledge sharing on issues having to do with environmental impacts on employees and laborers (urban environment) – Environmental impacts on working conditions. The committee works effectively during the policy design process or the assessment of already implemented policies (knowledge exchange / consultation). There is trust among its members who are working towards the achievement of common goals. One of its basic missions is the elaboration of transparent policy directions. This arrangement supports the goals concerning the protection of urban environment, the confrontation of climate change impacts, the protection of atmosphere, the sustainable use of water resources, land use regulations and energy saving. **LV: Agriculture-Environment**

Type	Participants	Functions	Enabling/hindering factors	Examples from cases
	- Civil society groups	- Long-term planning within and across sectors - Stimulate innovative actions - Agenda setting - Awareness raising	- Ownership: stakeholders decide policy measures - High level participation **Hindering:** - Different goals - Lack of commitment - Disagreement on roles and responsibilities	The Agriculture and Environment Consultative Board promotes cooperation between state and municipal institutions and NGOs in the agriculture sector. Comprises representatives from the Ministry of Environmental Protection and Regional Development, Ministry of Agriculture and their subordinated institutions and environmental NGOs. The Board works effectively. It meets ad hoc depending on the need. It prepares consolidated proposals for the policy development in the field of agriculture and environmental protection to ensure the balanced representation of both interests. The decisions of the Board are of a recommendatory nature. This arrangement supports the goals of sustainable use of land, agriculture and environmental protection. **NL: Biomass-Economy-Waste** National Agreement on the Circular Economy (Grondstoffenakkoord, 2017). Joint ambitions for steps to utilise raw materials more effectively, by reducing the dependency on non-renewable raw materials and produce less waste and pollution. Indirectly effect by its agenda setting power. New is the link to a social agenda for effects on the labour market (prospects for healthy, honest work). Transition Agenda Circular Economy (2018). A major initiative with a multi-stakeholder approach (180 signatures) for the implementation of the Natural Resource Agreement. The agenda is transformed into action by stakeholder working groups. **SE: Land-Agriculture-Environment-Energy** Formal process of public participation (consultations, exhibitions, land owner meetings, etc.), allowing actors outside the formal planning system to participate. Sweden is seen as a pioneer in public participation arrangements and has a long history of stakeholder involvement. However, in practice the quality of participation depends on particular representatives of authorities, thus some participation processes are of low quality (superficial participation).

Type	Participants	Functions	Enabling/hindering factors	Examples from cases
				Supports collaboration of different actors contributing to finding synergies between different critical objectives. Particularly important in land use (agricultural & environmental objectives) and infrastructural (energy objectives) decisions. **East DE: Climate-other sectors** Working group made up of representatives of ministries and of societal groups. Objective is supporting the decision-making process concerning climate change through sharing information and drafting policy opinion papers.
Knowledge platforms (exclusively dedicated to knowledge)	**Public** - National, regional, local governments - Research and education institutes (schools) - Businesses and their associations	- Knowledge sharing - Knowledge development - Consultation on knowledge issues - Coordination of decisions on knowledge issues - Testing of technological innovations	**Enabling:** - Trust - Common goals - Common interests - Engaged individuals - Replicability as potential benefit **Hindering:** - Limited financial resources	**GR: Environment-Energy** Collaboration committee between the Ministry of Environment and Energy and the School of Chemical Engineering (NTUA). Consultation and knowledge sharing concerning the establishment of regional plans for addressing climate change impacts. The committee works effectively during the policy design process on the basis of knowledge exchange (consultation process). There are common goals and interests. Its members cooperate in order to establish draft policy that will turn into implemented policies. There is a high level of trust among the members of the committee. **SE: Environment-Land** Regional development and cooperation in the environmental target system (RUS). Network of county boards collaborating in the implementation of different environmental quality objectives. Main goal is knowledge exchange. Driven by engaged individuals from county boards, it works quite well. Some funding from the environmental protection agency helped development of the important knowledge base. Still resources are lacking for full development of this initiative.

Type	Participants	Functions	Enabling/hindering factors	Examples from cases
	Public-Private - Businesses - State enterprises - Research organisations and universities - Public benefit cooperations - Ministry of Environment - Technological Agency of the Czech Republic - Land owner	- Water and land management in connection with agricultural and non-agricultural use of the landscape - Reuse and recycling of water in industry - Development of systems to support decision-making, monitoring and intelligent technology - Pilot research	**Hindering:** - Irregular activities based mainly on excursions, education, workshops, project preparation, etc… - No political mandate	**CZ: Land-Water-Agriculture-Industry-other land users** Technology Platform for Sustainable Water Resources. It includes: businesses (14), state enterprises (2), universities (4), research organizations (4), public benefit corporations (4). The platform focuses on water and land management in connection with agricultural and non-agricultural use of the landscape, reuse and recycling of water in industry, development of systems to support decision-making and monitoring, and intelligent technology. Irregular activities with mostly knowledge demonstration and educational function. No political mandate. **CZ: Land-Water-Agriculture** Pilot initiative to develop knowledge and measures for a sustainable agriculture landscape. The involved parties are: Ministry of Environment, Technological Agency of the Czech Republic, research organizations and land owner.

Table 45 Informal national cross-sectoral arrangements: type, functions and enabling and hindering factors

Type	Participants	Functions	Enabling/hindering factors	Examples from cases
Collaboration in form of: - trusts - partnerships - meetings - networks	**Public-Private** - National governments - Regional/local governments - Regional/local agencies - Professionals and their associations (e.g. farmers, forestry sector) - Businesses and their associations - NGOs - Research organizations	- Coordination of activities and decisions - Foster achievement of policy goals - Knowledge sharing - Consultation for policy making - Collaboration between local governments, small land owners, small businesses - Collaboration for pollution control	**Enabling:** - Trust - Common goals - Common interests - Common perspective - Commitment - Good will - Engagement - Win-win opportunity - Interest on the topic - Potential to develop and implement a concept considered relevant - Enthusiasm of individual members **Hindering:** - Conflicting interests	**GR: Biodiversity, Climate, Agriculture, Water, Land** Cooperation of WWF Greece and Greenpeace with several Ministries (Ministry of Environment and Energy, Ministry of Rural Development and Food, etc.). The NGOs act as lobbyist and exerts pressure during the policy design and policy implementation processes. They submit proposals having to do with biodiversity, climate change, Common Agricultural Policy, water policy, land use policies, etc.. Sometimes the cooperation works effectively, and the two sides have common interests and common perspectives. Some other times conflicts arise between the two sides and the cooperation meets a dead end. **LV: Various sectors** The Ministry of Economics organises the collaboration with NGOs in the frame of various committees and events relevant to its fields of competences. The ministry collaborates with more than 100 NGOs on various issues, e.g. use of energy sources, energy efficiency, biofuels. This arrangement supports the goals of sustainable development in various sectors. **SE: Water-Forestry** Collaboration organized by water authorities with the aim of coordinating activities across sectors to facilitate implementation of the water framework directive. Water authorities do not have formal power to influence the forestry sector or municipalities, so they only can suggest

Type	Participants	Functions	Enabling/hindering factors	Examples from cases
			- Lack of power to influence decisions and actions - Non-binding recommendations - No political mandate - Limited resources - Endangered economic interest	collaboration. The forestry sector and municipalities participate but do not have strong incentives for common activities. **SE: Nature, Biodiversity, Environment, Land** Informal collaboration between county boards, local municipalities and NGOs in pursuing some objectives. **NL: Climate-Energy** Consultation between government, public agencies, NGOs and businesses on the national climate agenda. The consultation aimed to participatory design the climate policy agenda through consensus. **East DE: Water-Agriculture** Informal collaboration initiatives between farmers and water boards regarding the protection of groundwater. Main topic is the reduction of fertilizer use to avoid groundwater pollution. The cooperation works to a certain degree, if economic interests are not significantly endangered, because both sides need groundwater with good quality. **CZ: Land, Agriculture, Environment, Water** Associations for rural development acting at regional and local scale and supported by the Ministry of Agriculture with EU funds. The associations bring together local municipalities, small land owners, farmers and small entrepreneur living in a region. There are dozens of associations focusing on different activities. They organize educational, communication, knowledge sharing activities on agriculture policy and environmental issues. They rely on interest, commitment and enthusiasm of individual members.

Type	Participants	Functions	Enabling/hindering factors	Examples from cases
	Private - Investors - Banks - Professionals and their associations (e.g. farmers) - Land and forest owners - NGOs	- Coordination, e.g. between farmers and forest owners - Consultation - Funding of projects - Knowledge exchange - Development of the sector - Discussion of specific environment-economy topics - Sharing equipment - Sharing storage for fertilizers - Change towards more environmental friendly cultivation practices	**Enabling:** - Common interests - Respect of informal collaboration rules - Trust - Know each other - Presence of skilled professionals - Presence of remuneration **Hindering:** - Conflicting interests - Lack of trust - Disregard of informal rules - No political mandate - Limited resources - Endangered economic interest	**GR: Agriculture, Energy** Collaboration between Piraeus Bank (consultant) and private individuals (agricultural and energy investors/private initiatives). Coordinate actions having to do with consultation and funding of agricultural and energy investments. The coordination works effectively in case the Bank and the investors have the same interests. It fails to work in case of conflicting interests between the two sides. **GR: Agriculture-Land-Water** Cooperation among farmers on cultivation practices, certification of agricultural products, funding opportunities, trade of agricultural products, training activities, land use conflicts and water allocation. Cooperation work effectively when farmers trust each other and follow the rules having informally agreed upon. In some cases, cooperation does not work because farmers are not willing to follow the “rules” or have conflicting interests (e.g. on water allocation for irrigation). **LV: Energy-Industry** Energy Committee of the Latvian Chamber of commerce and industry. The committee comprises members/experts of the association "Latvian Chamber of commerce and industry”. The decisions of the Committee are of a recommendatory nature. The Committee meets ad hoc upon the need. The committee works effectively. It organizes seminars and working group discussions on actual issues related to the energy sector in the

Type	Participants	Functions	Enabling/hindering factors	Examples from cases
				country. The Committee elaborate proposals for energy pricing policy and promotion of entrepreneurship in the country. **East DE: Forestry-Agriculture** Informal cooperation between forest owner organisations and farmer organizations. Objective is the management of issues related to forest usage and ensuring professional management. Many farmers are also forest owners. The cooperation works if there is shared interests. **East DE: Agriculture-Nature** Informal agreements between farmers and environment organizations mainly regarding wildlife conservation. Objective is the change of cultivation practices to better preserve natural habitats and biodiversity. The agreement only works if the economic interests are not significantly endangered by the proposed changes.
Knowledge platforms (exclusively dedicated to knowledge)	**Public** - Public authorities at regional and local level	- Knowledge sharing	**Enabling:** - Local leader - Good will	**SE: Multiple sectors** Informal arrangements for knowledge sharing. Different authorities at local and regional level organize informal arrangements, working groups. The arrangements are not obligatory/binding and depend on "good will" of participants; thus in some situations they work very well, but not in others. Depend to a large extent on local leaders.
	Public-Private - Forestry authorities - County boards	- Raise funding for collaboration and knowledge sharing	**Enabling:** - Sufficient funding **Hindering:**	**SE: Forestry-Water-Nature- Energy-Environment** EU project funding in the forestry sector. Forestry authorities apply for external funding to increase knowledge base, with focus on linking knowledge from different sectors (e.g. wetlands, forests and water management, fishery, county boards) that will improve collaboration in water-related questions. With sufficient funding there is potential.

Type	Participants	Functions	Enabling/hindering factors	Examples from cases
	- Fishery management organisations		- Long and time-consuming application process for funding	However, the application process is usually very long and time consuming, which may hinder the application.

5.3 Regional arrangements

The cross-sectoral arrangements described by the regional cases are public, private and public-private. Most of them are formal. They mostly address issues related to the connections between water, food and agriculture, land and nature. Several of them address energy and climate.

According to the case studies, a majority of the arrangements is working effectively. Common interests and shared goals appear to be important enabling factors. A crucial factor for regional cooperation is the presence of financial resources to implement joint projects or activate joint initiatives with a long-time horizon. Also, the possibility of economic gains is a driver of joint cooperation.

The main hindering factors are unaddressed trade-offs, insufficient advice from the regional government, not fully explored common interests, competing plans and cuts in subsidies.

Table 46 Formal regional cross-sector arrangements: type, functions and enabling and hindering factors

Type	Participants	Functions	Enabling/hindering factors	Examples from cases
Institutionalized form of collaboration differently named: - committees - conferences - councils - forums - trusts - partnerships	**Public** - National/regional/local governments - National/regional/local agencies - Public companies	- Coordination of decisions on policy design and implementation - Design of practical measures - Promotion of resource efficiency - Knowledge sharing - Advising regional government - Management of resources - Coordination of actions and measures	**Enabling:** - Common goals - Wide range of stakeholders involved - Potential benefits **Hindering:** - Conflicting interests leading to some trade-offs remaining unaddressed	**AND: Agriculture-other sectors** Inter-ministerial Committee for the design of measures for the Rural Development Plan 2014-2020. This collaboration enabled the implementation of targeted measures promoting energy efficiency. However, some trade-offs with water policies were not addressed adequately due to conflicting interests among the parties involved. **AND: Climate-other sectors** Inter-ministerial Committee for drafting regional climate policy measures. This committee aims to facilitate climate mainstreaming into sector policies. **AND: Climate, Energy** Covenant of Mayors for Climate and Energy. Initiative integrated in the Andalusian Urban Sustainability Strategy to meet the GHGs emissions objectives. 546 municipalities in Andalusia have agreed to the initiative. The goal is coordination of action and knowledge sharing. The covenant groups 1700 municipalities in Spain and more than 7000 in Europe. **SAR: Water, Energy, Environment, Agriculture, Climate** Inter-departmental coordination committee for designing a regional climate change adaptation strategy.

	Public-Private - Regional/local governments - Regional/local agencies - Public companies - Research organizations - NGOs	- Knowledge sharing - Determine local economic priorities - Undertake activities to drive economic growth, job creation, improve infrastructure - Advising regional government	**Enabling:** - Continuity in local political leadership - Participatory elaboration of proposals - Shared interests - Shared goals **Hindering:** - Shared interests not fully explored because clouded by conflicting interests	**AND: Multiple sectors** Collaboration between research organizations and the regional government. Research organizations advise the regional government on a range of issues across sectors in the form of knowledge generation and sharing policy making. **AND: Land use, Water, Environment (individual sectors)** Andalusian Land Planning Council, Andalusian Environmental Council and Andalusian Water Council. They are advisory bodes in land planning, environmental issues and water issues. The members are the regional government, trade unions, business associations, research institutes, NGOs, agricultural organizations, resource users. These councils work as a forum to inform and advise the regional government on actions and knowledge on these sectors. **SWE: Water-Nature-Land-Environment** Upstream Thinking plans. Investment of funds at the top of the catchment that leads to lower costs downstream. One example: partnership of South West Water, the Devon Wildlife Trust, the Cornwall Wildlife Trust, the Westcountry Rivers Trust and the Exmoor National Park Authority is building on work begun in 2008 to change land management practices to protect rivers. The programme is part of South West Water's long-term business plan to reduce its environmental footprint and manage the impact of diffuse pollution on customers' bills. The Upstream Thinking Initiative has seen a wide array of innovative catchment management and other environmental interventions delivered, including: mires restoration, culm grassland restoration by Devon Wildlife Trust, pesticide advice and guidance by Cornwall Wildlife Trust.
	Private - Professionals and their	- Coordination of actions - Knowledge sharing	**Enabling:** - Financial availability - Commitment	**AND: Agriculture-Water** Bureau of water formed by the federation of irrigation farmers of Almeria (FERAL) and several agricultural professional organizations (COAG, ASAJA). This

	associations (e.g. farmers) - Businesses and their associations	- Network building - Marketing and promotion of knowledge - Solve problems - Awareness raising - Training and advice - Resources management - Initiation of joint actions	- Trust - Shared interests - Shared goals **Hindering:** - Irregularity in funding provision (cut of subsidies)	forum works as shared platform for farmers to pursue their interests and address water related issues. **AND: Water-Agriculture** Bureau of water formed by the federation of irrigation farmers of Almeria (FERAL) and several agricultural professional organisations (COAG, ASAJA). This forum works as a common platform for farmers to pursue their interests and resolve water problems. **SWE: Energy-Water** Cooperation between the Wadebridge Community Energy Network (WREN) and South West Water (SWW) to install solar to power its water and sewage treatment plants in the area. Strong and committed partnership between energy and water company. **SWE: Agriculture-Environment-Water** Catchment Sensitive Farming (CSF) raises awareness of diffuse pollution from agriculture by giving free training and advice to farmers in selected areas in England, including the SW. The aim of the advice is to improve the environmental performance of farms. Advice is only available in high priority areas for water quality. These areas will contribute most to meeting Water Framework Directive objectives. CSF has been working in specific Priority Catchments where agriculture is having the most significant impact on rivers, lakes and estuaries. This includes the SW River Basin. Enabled through farmers applying for Countryside Stewardship fund to improve water quality and biodiversity and to reduce flood risk. Only available in high priority areas for water quality. **SWE: Agriculture- Nature-Water** Exmoor Coastal Streams is one of 37 groups to receive funding from Defra in the latest national competitive round of Countryside Stewardship Facilitation Fund

				awards (Feb 2018). This includes partnership working by 15 farmer members covering 6938ha of north-west Exmoor. The group aims to focus on landscape scale management including habitats such as moorland, grassland and woodland with a key focus on priority habitats and species. Flood risk and water management also included, along with enhancement of the historic environment. Enabled by funding. 'Working and learning together will help the land managers to improve the resilience of their businesses and will provide multiple environmental benefits'.

Table 47 Informal regional cross- sectoral arrangements: type, functions and enabling and hindering factors

Type	Participants	Functions	Enabling/hindering factors	Examples from cases
Collaboration in form of: - trusts - partnerships - informal meetings	**Private** - sector businesses - NGOs - community groups - sector professionals and their associations (e.g. farmers) - sector groups (e.g. farmer	- Solve resource allocation and management issues - Knowledge sharing - Develop shared projects/actions	**Enabling:** - Commitment - Trust in peer-to-peer network - Shared interests - Shared goals - Presence of a mediator **Hindering:** - Lack of trust - Conflicting interests	**AND: Water-Agriculture-Energy** Irrigation farmers in Almeria collaborate together to develop a project to desalinate a water pond, using solar energy. This initiative works as a measure to face water scarcity and water quality problems in Almeria. **SWE: Energy-Climate-Employment** 23 community energy groups across the county of Devon (the highest number in England). These groups run 62 community owned renewable projects, which have generated 17,431 MWh of clean green energy, saving 6,080 tons of CO2 emissions and helping 2,717 homes to save on energy bills and increase their energy efficiency. The 12.3 MW of capacity installed by community energy groups represents 1.3 per cent of the total renewable electricity installed in Devon. Community energy organisations in Devon have raised £14.1 million of investment, enabling them to create 33 FTE jobs. **SWE: Water-Agriculture**

	irrigation associations)			Devon Wildlife Trust acts as intermediary between water company and farmers. It essentially facilitates knowledge sharing. **SWE: Land-Energy** Informal agreements in tenanted sector avoid long legal processes e.g. when landlord wants to take back land to install solar panels it may offer free electricity, alternative land or farm house/building renovation as compensation.

6 Conclusions

The research questions of this report were:

1) What are nexus-relevant policies at transboundary, national and regional level in the SIM4NEXUS case studies?
2) How are global and European policy goals and targets translated to lower level governance contexts and how are policies implemented?
3) What trade-offs and synergies between policies in the implementation phase can be traced through bottom up information?
4) What solutions were found to address trade-offs and exploit synergies from an institutional and governance perspective?

In the following we answer these questions and provide conclusions.

6.1 What are nexus-relevant policies at transboundary, national and regional level in the SIM4NEXUS case studies?

The cases cover all WLEFC nexus sectors and in addition forestry, economy, tourism and environment especially in relation to biodiversity. They investigate a large variety of aspects of the nexus sectors and related policies**.** All national case studies regard the transition to a low-carbon economy as a driver of change in the other nexus sectors. A common focus of the regional cases is water, energy and agriculture. Both transboundary cases are clustered around the theme of water, with a prevalent focus on its relation to land use in the case of Germany-Czech Republic-Slovakia (DE-CZ-SK) and on biodiversity conservation in the case of Germany-France (DE-FR). Global climate policy together with EU regulation for the water, energy, agriculture and climate sectors are relevant for all case studies. Most national and regional regulations, plans, programmes and laws implement and operationalize EU policy objectives and instruments. Transboundary agreements concern international cooperation between countries and regions for the management of the Rhine river.

6.1.1 Climate change paradigm drives the current policy agenda

Climate change is the main driver of policy interventions and change in all cases. This is particularly the case for climate mitigation policy. This is not surprising considering that climate mitigation is a key European and global policy, regulated by international agreements and EU directives that require implementation at national, regional and local scale. Consequently, there is a proliferation of policies, projects, initiatives observed in the cases that are directly or indirectly related to climate mitigation in the energy sector (addressing efficiency and renewable energy), agriculture sector (addressing biomass and biofuel production), land (addressing different land use and soil and landscape quality issues) and water sector (addressing efficiency and quantity for all uses). In contrast, there was little attention paid by the case studies on the SDGs (only the Dutch case investigated the integration of the SDGs in the national policies).

Both climate change and the SDGs agenda are by nature cross-sectoral requiring mainstreaming into a wide range of different sectors, including the nexus sectors addressed in this study water, land, agriculture, energy, food, but also industry, transport, and more generally the economy. However, currently the SDGs seem not to receive as much attention as climate change in the policy agenda. Probably because of the pervasive nature of the climate change problem in the economy, society and environment and its global character, climate mainstreaming is gradually substituting sustainable development as umbrella paradigm driving long-term global development pathways. However, this paradigm shift may divert attention from the more holistic paradigm of sustainable development where issues like equity, fairness, security in resource management and allocation are also considered. These aspects are particularly relevant in the global arena of relations between developed and developing countries. In this context, a nexus approach is well suited to address climate change as part of sustainable development because, by definition, a nexus approach gives equal weight and priority to multiple sectors. This could help keep the balance between equally valid objectives and make sure the attention to climate change does not undermine the broad sustainable development perspective as core paradigm of the development agenda. This is particularly important, considering the global commitment to the SDGs Agenda.

6.2 How are global and European policy goals and targets translated to lower level governance contexts and how are policies implemented?

6.2.1 Vertical coherence is present more in policy documents (integration) than in practice (implementation): hindering factors

Almost all international policies reviewed by the case studies are assessed as fully integrated at national scale and all reviewed EU policies are reported as fully integrated at national and regional scale. Considering that there are no financial sanctions for not ratifying multilateral agreements, the fact that case study countries report a full integration of the reviewed agreements indicate commitment toward the issues addressed by the agreements. Full integration of EU policies is not surprising considering that failing to integrate EU policies into national legislation entails penalties for the member states.

Integration at the level of documents does not necessarily translate into full implementation in practice. The cases reported several examples of partial implementation. Several factors hindering vertical coherence between policy levels are found both in the interaction between EU and national policy and between national and regional policy. These include:

- Measures taken at lower administrative scale are insufficient to achieve targets set at higher scale;
- Cancelling/hampering effects between regulations at different scales;
- Policies at lower administrative scale that have more ambitious goals, and therefore find little support in policies at higher scale;
- Lack of coordination of implementation actions between scales;
- Lack of power to influence decisions - this is more a national versus regional scale issue that however affects also the implementation of EU policies;

- Lack of continuity of policy instruments.

It should be noted, however, that most of these issues concern interactions between administrative levels within countries. Inevitably, these domestic problems affect the implementation of not only national and regional policies but also EU policies.

Issues that specifically concern the interaction between EU and national policy include:

- Transposition and implementation of EU directives requiring major adjustments of national policy frameworks and infrastructure;
- Partial or limited support to national regulations from EU policy because some issues do not belong to the EU legislative power, they are specific local issues not addressed at EU level or a new/revised EU directive is in the making;
- Lack of clarity about provisions in EU policy;
- Lack of communication to affected parties on the provisions of EU regulations;
- Overregulation – too many EU rules;
- EU regulation provisions implemented to meet minimum requirements with little impact in practice.

Issues that specifically concern the interactions between national and regional level include:

- regional regulation/initiatives are unknown to national governments or there is no interest to support them;
- centralized regulatory systems only partly account for local needs.

Finally, specific transboundary issues include:

- Regulatory differences between countries;
- Insufficient sharing of information on planning and management rules for shared resources;
- Differences in governance structures;
- Lack of or difficulty to spend financial resources for shared projects.

6.2.2 Nexus trade-offs in the land domain: an example of a policy dilemma for the EU

The nature conservation and land domains provide an example of how EU policy can either support or hamper national policies. In Sweden and the Netherlands, the Birds and Habitat directives conflict with the possibility of harvesting biomass for energy production. The directives are also perceived as highly technocratic in the Netherlands with little flexibility for the country to adjust the Natura 2000 management plans to the local circumstances. This makes it difficult to manage trade-offs such as that between harvesting biomass for energy production and nature conservation. Therefore, among other reasons, the design and implementation of the Natura 2000 management plans is delayed.

In contrast, there are situations where the existence of an EU level policy would function as a stimulus to overcome national lock-in situations, and the very absence of such EU policy is reason for postponing action at national level. This is the case, for example, with landscape and soil quality restoration in the Czech Republic. Landscape and soil quality restoration is a highly conflicting issue in the Czech Republic because of the trade-offs with agriculture, in particular the cultivation of crop for

biofuel. The difficulty to reconcile conflicting interests has led to a lock-in situation with action being postponed until the new EU soil quality directive will be adopted, which may never happen. Land use is not a domain of EU legislation, therefore there is no framework directive as for water. However, under the pressure of the land related problems, the European Commission proposed a soil protection directive. Being a highly political issue touching multiple sectors and interests, as well as subsidiarity reasons, the proposal has been withdrawn. The expectation in the Czech Republic is that the soil quality directive could provide a clear framework for action to be taken in member states for soil protection. The adoption of such EU framework would force the Czech government to act, and therefore would put pressure on the conflicting parties to find a common ground to address the issue.

The above examples show a typical problem the EU faces when designing policies. The goal of the EU legislator is to establish a coherent and enforceable, but also fair, equitable and proportional policy framework for all member states in the domains within its legislative power. However, because of the socio-economic and bio-physical differences between member states, the implementation of framework policies may be received and may play out differently in member states. The EU is aware of such differences but at the same time it is a persistent problem. Not only is the national, regional and local context usually complex, but often national/regional authorities add burdens of their own, claiming it comes from the EU, a process called 'goldplating'. More focus on the EU rules and its space for national/regional interpretation could be useful.

6.2.3 The concerted, participated way of implementing policies in the Netherlands: a learning opportunity for the cases

Concerning how policies are implemented, the Dutch case study provided an example that could be transferrable to other cases. The Netherlands has a long tradition of well-established routines of making concerted policy decisions whose foundations are robust assessments, design of an evidence-based transition agenda, and stakeholder dialogues. The way higher level policy is integrated in national policy and implemented in practice consists of 1) assessments of the state of the art of policy and policy impacts, generally conducted by the national assessment agencies whose advice is considered credible and relevant, 2) establishment of a so called transition agenda based on assessments, with actions and measures to be implemented, 3) the activation of stakeholder dialogue involving several sectors for building the support for the implementation of the agenda. A similar approach is adopted for horizontal policy integration and implementation. Far from being perfect, the approach has nevertheless achieved important results in the negotiation of complex issues. However, it is worth noticing that such an evidence-based, structured policy implementation approach requires time to become established routine in the policy making process. Elements such as trust, credibility, reliability of all actors involved is crucial for the success of the process, and it is built only with consistent investment of time, commitment and the presence of reliable and respected individuals who act as ambassadors.

6.3 What trade-offs and synergies between policies in the implementation phase can be traced through bottom up information?

There are more synergies than conflicts between policy objectives written in policy documents in all cases, like in EU policies. Policy coherence between sectors is most evident if objectives for one sector are mainstreamed in policies for another sector or when objectives of one sector are closely related to objectives of another sector, like in the case of climate and energy sectors. This is generally the case of agricultural policy, based on EU policy, which includes objectives for ecosystem services, environment and climate. In The Netherlands, objectives for water, soil and waste are integrated in policies for biomass. In Andalusia, energy objectives are integrated in water policy, water quality objectives in land policy, and agriculture, forest and soil objectives in climate policy. In SW-England, flood risk objectives are part of land policy.

Policy coherence in policy documents is not a guarantee for coherence in practice. However, it was also noted that conflicts 'on paper' could turn out more synergistic in practice, as could potentially be the case with economic and environmental objectives for agriculture in Sweden if more focus is given to organic production. Policy coherence in practice depends on many factors that should be studied in detail, as the DE-FR example shows. Therefore, starting from the results of this coherence analysis of policies written in documents, cases should focus on implementation processes to verify the findings, distinguishing between objectives that are coherent, incoherent or ambiguous 'on paper' and in practice.

Six prominent policy coherence issues observed at EU level were also encountered in the cases, though they manifested differently.

Synergy:

7. The positive effects in the nexus caused by good practices in water and land management, restoration and prevention of soil erosion and reforestation were confirmed by all cases.
8. The positive effects in the nexus of increasing energy and water efficiency, resource efficiency in the agri-food chain, and reduction of the use of water and energy was confirmed by all cases that investigated these objectives.

Ambiguous linkages:

9. The positive effects in the nexus of sufficient water supply and management of floods and droughts may have negative trade-offs depending on the solutions implemented, either technical or nature-based. This was mentioned in the Czech, Slovakian and Andalusian cases.
10. Internal conflicts that may exist in agriculture policy between economic and environmental objectives with trade-offs to water, land, energy and climate objectives. Measures adopted in the EU agricultural policy are contested by the farmers and seem to produce little effects in practice. There was confirmation of that in Latvia, Andalusia, SW-England, Czech Republic, Slovakia and Germany. On the other hand, agriculture has opportunities to deliver environmental public services and positively interact with water, land, nature, energy and climate.

Trade-offs:

11. Competition for scarce water and land, confirmed by The Netherlands, Czech Republic, Slovakia Germany and DE-FR.

12. Negative interactions in the nexus that producing biofuels from 1st generation food and feed crops creates. These trade-offs are mentioned by the Czech Republic, Slovakia and Germany. In more general terms, similar conflicts are also mentioned by Latvia, The Netherlands, Sweden, SW-England and DE-FR with 'renewable energy' or 'biomass, including biomass from forests'.

6.4 What solutions were found to address trade-offs and exploit synergies from an institutional and governance perspective?

Commitment, common goals, perspectives and interests as well as trust are most frequently mentioned as enabling factors for successful cross-sector arrangements. These criteria cannot be taken for granted in inter-sectoral situations. Thus, profound attention needs to be paid to them, when starting to organize a nexus approach.

The *transboundary* arrangements described by the DE-FR case are all formal and institutionalised, permanent or temporary, public or public-private. As the river Rhine is the core of all these arrangements, the issues addressed focus on surface water, groundwater and water-related issues in sectors like agriculture, industry and nature in the river basin of the Rhine. Enabling factors are the availability of funds, a long-established organisation and a credible agenda aligned with regional needs. Hindering factors are time consuming procedures and complex decision-making structures, different governance structures and legislation between countries and regions involved, and for the transboundary temporary projects, disagreement about project design and spending of funds, and lack of awareness of financial opportunities.

Cross-sectoral arrangements at *national* level can be public, private or public-private, formal or informal, permanent or temporary, and may have many functions. The arrangements mentioned by the cases cover all sectors of the nexus, with energy and climate most frequently addressed. About half of the arrangements are considered effective and working. Trust, commitment and common goals, interests and perspectives are the most frequently mentioned enabling factors for cooperation. The most mentioned hindering factors are lack of common goals, perspectives and interests, lack of trust, disagreement on responsibilities and roles, and lack of funding.

The cross-sectoral arrangements described by the *regional* cases are public, private and public-private. Most of them are formal. They mostly address issues related to the connections between water, food and agriculture, land and nature. Several of them address energy and climate.

According to the case studies, most arrangements are working effectively. Common interests and shared goals appear to be important enabling factors. Reaching understanding and agreement on shared interests and goals is a resource (time, personnel, finances) consuming process which however, pays off in terms of avoided deadlocks and conflicts in the implementation of policies.

A crucial factor for regional cooperation is the presence of financial resources to implement joint projects or activate joint initiatives with a long-term horizon. Also, the possibility of economic gains is a driver of cooperation. The main hindering factors are unaddressed trade-offs, insufficient advice

from the regional government, not fully explored common interests, competing plans and cuts in subsidies. A nexus approach that gives equal importance to all sectors can provide the space for open discussion about how to raise resources jointly and initiate joint projects, reveal mutual economic gains, and fully disclose shared interests.

In general, a nexus approach adopted since early stages of any policy process that addresses multi-sectoral issues makes sure that financial and human resources are available, thus providing the institutional infrastructure for common interests and shared goals to emerge. Furthermore, a nexus approach that gives equal importance to all sectors can provide the space for open discussion about how to raise such resources jointly.

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8 Appendices

Appendix 1 - Nexus policy goals and instruments in the case studies

Azerbaijan

Water

Table 48 Policy objectives in the water sector in Azerbaijan

Water policy		
Overarching objectives	**Specific objectives**	**Reference documents**
Services and functions on water supply and discharge of sewage	Supply of consumers with water of proper quality and in necessary quantity Creation of reliable system of treatment and discharge of sewage and wastes Development of the centralized systems of water supply and sewerage Supply of consumers with water meeting the norms of quality and corresponding state standards depending on the purposes Efficient use of water resources	The Law of Azerbaijan Republic on Water Supply and Sewage
Regulation of the legal relations connected to use and protection of water objects	Protection of water bodies Ensure sufficient amount of good quality water to all uses Organization of management in the field of use and protection of water bodies	Water Code of the Azerbaijan Republic
Services and functions on melioration and irrigation	Establishment of favourable conditions for agriculture Establishment of state policy in the area of melioration and irrigation Provision of stability and increase of volumes of agricultural production via maintenance and improvement of productivity of lands Involvement into agriculture of low productivity non-agricultural lands Management of melioration and irrigation networks	Law on Melioration and Irrigation
Conducting observations, monitoring of the environment	Improvement of hydro-meteorological observations Develop hydrometeorological forecasts and warnings Study, analyze and forecast hydrometeorological events and processes Modernizing monitoring stations To provide operative collection, verification and analysis of hydro-meteorological data as well as dissemination of information to local, regional	Law on Hydrometeorology

	and international organizations in the manner prescribed by law	
Use and protection of the water structures located within a territory of municipalities	Organization and Management of the Water Economy of Municipalities Efficient use of the Municipal Water Economy Structures	Law on Water Management of Municipalities
Ensuring safety of hydro-technical constructions	Effective use hydro technical constructions and organization of their protection Provision of necessary means to control technical condition	Law of the Republic of Azerbaijan "On safety of hydro-technical installations"
Qualitative improvement of environment	Proper use and rehabilitation of natural resources Regulating the ecological balance of environment	Law on Environmental Protection
Environmental protection from industrial and domestic waste	Protection of public health and ecological balance Promote recycle and re-use of waste	Law on industrial and municipal wastes
Safe environment for human beings	Improve water supply services and sewer system Provide cities and villages with water purifying installations Install new heating systems in cities	Decree endorsing "Strategic road maps for the national economy and main economic sectors".
Development water supply utilities	Ensure access of all groups of population to safe drinking water Ensure balance between economic needs and replenishment ability of water resources Ensure the right of present and future generation to use environmentally valuable water resources	Decree endorsing "Strategic road maps for the national economy and main economic sectors".

Table 49 Policy instruments in the water sector in Azerbaijan

Water policy		
General instrument or instrument category	**Specific policy instruments**	**Reference documents**
Regulatory instruments in the field of water supply and sewerage	Granting of permission on use of water bodies Rules for recovery of the expenses of water supply services, discharge of sewage and discharge of wastes Neutralization of sewage and discharge thereof into the environment or water basins Measures for elimination and prevention of leaking out of sewage from sewer systems in the environment	The Law of Republic of Azerbaijan on Water Supply and Sewage
Regulatory, planning and	Harmonization of the administrative-territorial principle with the river basin principle	Water Code of the Azerbaijan Republic

financial instruments in the field of water quantity, quality and use	Analytical description of the participation-consultation process Regulation of rights and duties of water-users Regulation of use of water objects for different purposes Separation of the functions of management in protection of water bodies from the functions of use of water objects and water economy functions Establishment of special measures against pollution by each region Economic regulation of actions on use and protection of water objects Resolution of disputes in the field of use and protection of water bodies Development of programmes and measures for monitoring of water resources status	
Regulatory, planning and financial instruments in the field of melioration and irrigation	Implementation of national programs in the area of melioration and irrigation Financing of melioration and irrigation activities and attraction of investments into the area of melioration and irrigation Implementation of uniform scientific and technical policy in the area of melioration and irrigation Establishment of limits for water intake from melioration and irrigation networks of regions and districts (cities) Certification and registration of melioration and irrigation networks Rights of ownership on melioration and irrigation networks Responsibility of executive power bodies and municipalities in the area of melioration and irrigation Procedure for implementation of melioration and irrigation activities Mechanisms for resolution of disputes in the area of melioration and irrigation Liability for violation of legislation on melioration and irrigation Control over compliance with legislation in the area of melioration and irrigation	Law on Melioration and Irrigation
Regulatory and planning instruments	Programs and projects for the development of hydrometeorology Studies on hydro-meteorological regime and climate specifics of the territory of the Republic of Azerbaijan Keep records of surface waters, to solve issues arising from the State Water Cadastre Systematic observations on surface water bodies, agricultural crops, specially protected natural areas, forests, pastures, onshore and atmospheric radiation state Warnings on hazardous hydro-meteorological events (floods, strong winds, hurricanes, shores, avalanches, strong mines, droughts, etc.) as well as to disseminate the information to the state management bodies, and to aware the population about it Monitoring of hydro-meteorological processes in atmosphere, on land and water basins of Azerbaijan section of the Caspian Sea	Law on Hydrometeorology

	Investigate the impacts of regional climate change and other global hydro-meteorological problems on the country population and economy Recommendations for policy-makers on improvement of methodological instruction and guidelines in order to apply advanced methods in the field of hydro-meteorology Studies on global and regional climate change Implement a national climate program	
Regulatory instruments for water use at municipality	Rights and Duties of Municipalities to Regulate Water Relations Responsibilities for Violation of the Legislation on Water Management of Municipalities and Settlement of Disputes	Law on Water Management of Municipalities
Regulatory, planning and financial instruments concerning the safety of hydro-technical installations	State Register of hydro-technical installations including information about: their intended use, technical properties, safety level and security classification of installation Requirements to ensure safety of hydro-technical installations Risk assessment of hydro-technical installations Certification of safety of installations Establishment of safety criteria Preventive measures to avert emergency situations at installations Financing measures to ensure installation safety Assessment of the responsibility for actions (or inaction) that can cause lowering safety levels from the established limit Responsibility for violation of the legislation on safety of hydro-technical installations and settlement of disputes Maintenance of the required technical professional degree of staff	Law of the Republic of Azerbaijan "On safety of hydro-technical installations"
Regulatory instruments for environmental protection	Rights and duties in environment protection and nature use Rules on ecological requirements for industry and other activities Education, research, statistics and information on ecology and environment protection The state ecological audit and its implementation Responsibilities against violation of legislation on environmental issues and dispute settling	Law on environmental protection
Regulatory instruments for industrial and municipal waste management	Principles of the state policy on waste use and disposal Estabishment of main requirements to waste control Economic regulation of waste disposal Measures for protection of public health and ecological balance of the environment Economic and other stimulating mechanisms with the purpose of introduction of waste in economic circulation Coordination of activity of the enterprises and organizations with the purpose of recycling of waste Infrastructure for re-use and disposal of waste	Law on industrial and municipal wastes
Planning instruments for water management	Identification of water resources used for drinking water supply Construction of new water treatment plants in regions	Decree endorsing "Strategic road maps for the national economy and main economic sectors".

Planning and financial instruments in the water sector	Assessment of areas where infrastructure is not available Increasing the use of meters for assessing water consumption Financial resources for water infrastructure Making a comprehensive assessment of the water network Measures for reducing water losses Taking measures to effectively use water resources Preparation of social programs on special consumer groups using water and sanitation services	Decree endorsing "Strategic road maps for the national economy and main economic sectors".

Energy

Table 50 Policy objectives in the energy sector in Azerbaijan

Energy policy		
Overarching objectives	**Specific objectives**	**Reference documents**
Increase energy production from alternative and renewable energy sources	Create sustainable energy system in the country Create legal framework conditions for the usage of REC Determine key directions for the production of electricity ad thermal energy from renewables Establish conditions for the promotion of renewable energy (productions, transfer distribution and delivery) 20% of RES-E in total energy consumption in 2020 By 2020 20% of electricity consumption of Azerbaijan must be met by electricity generated from renewable energy sources In 2020 9,7% of total energy consumption must be met by renewable energy sources. Reach a cumulative renewable power capacity of 2GW by 2020 Promote the active participation of the private sector Raise awareness of energy consumers on renewables Accelerate the use of renewables	State Strategy on Use of Alternative and Renewable Energy Sources
Rational use of energy resources	Increase energy efficiency Increase energy saving Determination legal, economic and social basis of state policy in the field of use of energy resources Linking interests of energy resources producers, distributors and consumers Awareness raising on energy saving economic, environmental and social advantages	Law on the Utilization of Energy Resources 1996
Sustainable use of energy	Assessment of energy demand Rational and sustainable energy use Prevention of negative environmental impact of activities in the field of power	Law on Energy 1998
Ensure provision of electric energy and heat	Preparation of plans for developing electrical and heat energy Management and implementation of projects	Law on Electric Power and Heat Stations 1999

	Designing, construction, operation and use of the permanent installations (further - power plants) developing electrical and heat energy	
Provide full diversified and ecologically clean electricity	Reducing electrical energy losses Improving the quality of electricity transmission and distribution Increase productivity in consumption Increasing efficient use of power plants' capacities	Strategic Road Map for the development of utilities (electricity and thermal energy, water and gas supply) in the Republic of Azerbaijan

Table 51 Policy instruments in the energy sector in Azerbaijan

Energy policy		
General instrument or instrument category	**Specific policy instruments**	**Reference documents**
Regulatory, organizational and planning instruments	Rules on the relationships between state, legal entities and physical persons in the field of renewables Assessment of RES in Azerbaijan Create legal framework conditions for the usage of RES Identification of suitable areas for the renewable energy sources Connection of RES power plants to the national electricity distribution system / network Warranties of the origin of the produced electricity - Identification of organizations responsible for publishing and monitoring the relative electricity origin warranties Establishing a committee for the promotion of large-scale investment projects for RES and large scale investment projects Scientific and technical capacity building Flexible regulation of energy tariffs Enforcement of legislative framework	State Strategy on Use of Alternative and Renewable Energy Sources
Regulatory, planning, organizational and financial measures	Requirements on energy saving Definition and application of energy resources' utilization progressive norms Rate fixing and standardization in the sphere of energy saving and energy resources efficient utilization, power engineering standards and allowance observance Compulsory energy resources stock-taking utilized by enterprises and organizations Energy appraisal for newly constructed and rehabilitated facilities Economic sanctions in connection with the energy resources irrational utilization Intergovernmental cooperation on energy saving	Law on the Utilization of Energy Resources 1996

	Creation and utilization of new energy saving technologies	
Planning instruments on energy utilities	Prediction of the country's electricity needs Determination of Investment Funding Sources Evaluation of alternative and renewable energy potential Public consultations Consideration of privatization opportunities of power plants Installation of meters for reduction of losses Informing the public about the casualties Prioritization of energy losses reduction projects Enforcement mechanisms to increase effectiveness Feasibility studies to identify priorities for energy sources	Strategic Road Map for the development of utilities (electricity and thermal energy, water and gas supply) in the Republic of Azerbaijan

Agriculture and food

Table 52 Policy objectives in the food and agriculture sector in Azerbaijan

Agriculture policy		
Overarching objectives	**Specific objectives**	**Reference documents**
Support acquisition of insurance by producers of agricultural products	Increase the number of farmers involved in insurance schemes Provide legal and economic basis for insurance of producers of agricultural products	Law No. 344-IIQ "About stimulation of insurance in agricultural industry"
Support environmental friendly agriculture	Promote cultivation of agricultural plants and cultivation of farm animals without use of chemical and synthetic (artificial) substances Ensure health and safety of the population	Law of the Azerbaijan Republic of June 13, 2008 No. 650-IIIG "About environmentally friendly agricultural industry"
Development of vine production and vine industry in Azerbaijan	Strengthening scientific support and staffing potential in viticulture and vine production Improving the infrastructure of viticulture and vine production Provide state support measures in viticulture and wine-making	State program on developing of vine in Azerbaijan
Sustainability of food security	Improvement of existing legislation on the basis of advanced international experience Development of consulting and information services, (post 2025) measures Improving business environment in the sphere of agriculture Improving quality of professional education Promoting the growth of agricultural and processing industry products that are potentially able to replace import Formation of support infrastructure for agribusiness development Stimulation of the expansion of small and medium-sized fruit and vegetable processing enterprises in the regions	"Strategic road maps for the national economy and main economic sectors" Strategic Road Map for the manufacture and processing of agricultural products in the Republic of Azerbaijan

Table 53 Policy instruments in the food and agriculture sector in Azerbaijan

Agriculture policy		
General instrument or instrument category	**Specific policy instruments**	**Reference documents**
Regulatory instruments for insurance in agriculture	Proprietary insurance in agricultural industry Establishment of types of property for insurance purposes	Law No. 344-IIQ "About stimulation of insurance in agricultural industry"
Regulatory and financial instruments	Subsidies to farmers Provisions for production, conversion, turnover and certification of environmentally friendly agricultural Provisions for production, transportation, storage and use of agricultural products	Law of the Azerbaijan Republic of June 13, 2008 No. 650-IIIG "About environmentally friendly agricultural industry"
Regulatory instruments in the viticulture sector	Rules for the development of viticulture and vine production	State program on developing of vine in Azerbaijan
Regulatory and planning instruments in the agriculture sector	Simplifying access to financial resources: The Road Map comprises short-term (until 2020), medium-term (until 2025) and long-term measures simplifying the access to financial resources Establish an agricultural insurance fund: analysis of the potential impact of the fund's creation on insurance of producers Developing consulting and information services Conducting regular monitoring of risk assessment in terms of food supply and stability in the country Creation of data base on production of food products, import, stocks and trade flows Simplifying access to the markets for manufacturers; Developing market infrastructure Promoting the growth of cotton, tobacco and barley production Promoting the creation of large livestock complexes based on the intensive farm modelling Support for expansion of small and medium-sized meat and dairy processing facilities in the regions Support for development of beekeeping, fishing, including aquaculture Adoption of the Law on Agricultural Co-operation Identify the support mechanism for the development of public-private partnerships Formation of network Agropark (including agrarian industrial clusters) Establishment of industrial neighbourhoods	"Strategic road maps for the national economy and main economic sectors" Strategic Road Map for the manufacture and processing of agricultural products in the Republic of Azerbaijan

	Formation of a farm partnership in agriculture and development of cooperation

Climate

Table 54 Policy objectives in the climate sector in Azerbaijan

Climate policy		
Overarching objectives	**Specific objectives**	**Reference documents**
Develop climate adaptation and mitigation measures for Azerbaijan	Preparation of National Adaptation Plan Preparation of mitigation action Develop Action Plan for air quality and climate changes	Action Plan on improvement of ecological situation and efficient use of natural resources for 2015-2020
Development of renewable energy sources	Assessment of renewable energy sources Improvement of using renewable energies	State Strategy on Use of Alternative and Renewable Energy Sources
Reduction of GHG emissions	Forecasting future GHG emissions Scenario describing the expected progress	State Program for the Socioeconomic Development of the Regions of Azerbaijan
Reduction of air pollution and emissions	Regulation in the area of protection of atmospheric air State registry of harmful influences on atmospheric air and sources thereof, economic regulation	Law on Protection of Atmospheric Air
Mitigation of climate change	Limitation and reduction of GHG emissions not monitored by the Montreal Protocol	Law Verification of the Kyoto Protocol in the United Nations Framework Convention on climate change
Reinforcement of country's resilience against climate change impacts	Systemization and improvement of decision making process (short-term and long-term decisions) with respect to climate change adaptation Establishment of a linkage between climate change adaptation and sustainable development patterns through the design and implementation of regional/local plans of action Mapping out national strategic directions Establishment of a mechanism for monitoring, evaluation/assessment and update of the relative adaptation actions and policies Reinforcement of the society's adaptation ability – Increasing Improve citizen's awareness about climate change	United Nations Framework Convention on Climate Change

Table 55 Policy instruments in the climate sector in Azerbaijan

Climate policy		
General instrument or instrument category	**Specific policy instruments**	**Reference documents**
Regulatory and planning instruments for climate mitigation	Reduction of methane emissions Preparation of national programmes Use and promotion of green technologies Enhancement of knowledge, experience and information sharing and dissemination Promotions of scientific investigation and development in the field of RES	Law Verification of the Kyoto Protocol in the United Nations Framework Convention on climate change
Regulatory, planning, financial and organizational instruments for climate mitigation	Adoption of a methodological framework for emissions Maintenance or replacement of boilers used for central heating (households and tertiary sector) Lighting automation Solar collectors for water and space heating Roof-top solar systems Improvement of traffic lights Promotion of public transportation Forecasting energy consumption and GHG emissions Exploitation and promotion of natural gas for heating and cooling Energy saving by the industry sector Construction of wind parks and solar system areas Deregulation of the electricity market Regulation of land uses Use of biofuels Promotion of natural gas, solar systems and biomass in the industry sector Reduction of nitrogenous fertilizers Funding programmes concerning agricultural sector's adaptation to climate change Design of regional plans for the sustainable development of agricultural sector Acquisition of knowledge concerning climate change	State Program for the Socioeconomic Development of the Regions of Azerbaijan

Forestry

Table 56 Policy objectives in the forestry sector in Azerbaijan

Forestry policy		
Overarching objectives	**Specific objectives**	**Reference documents**
Sustainable management and use of forest resources	Protection, preservation and reproduction of forests and lands of forest fund, not covered with forest vegetation	Forest Code 1997
Sustainable management and use of forest resources	Preservation of ecological and protective functions of forests Reducing of negative impacts on forests Restoration of forest Increase public awareness on the vital bio-ecological functions and important social, cultural and economic benefits of forests for sustainable development Improvement and strengthened of institutional capacity, financial mechanisms and regulatory (legal) framework for sustainable forest management Management of forests in line with integrated multipurpose management plans, elaborated based on reliable information and modern methodologies for forest resource inventory, and assessment Sustainable management, improved use and trade of non-wood forest products' (NWFPs) Efficient use of wood from sanitary and improvement fellings Removal of human-induced harmful effects and damages on forest resources, with particular attention on illegal logging, over-grazing, recreation and tourism pressures	The National Forestry Program 2015-2030

Table 57 Policy instruments in the forestry sector in Azerbaijan

Forestry policy		
General instrument or instrument category	**Specific policy instruments**	**Reference documents**
Planning and regulatory instruments	Linkage and complementarity of the forest policies with the other national, sectoral and regional development policies Creation of plantations of fast growing tree species Certification system for sustainable forest management Development of institutional and legal framework for national forest management Restoration of the degraded forests and afforestation of suitable open forest fund lands Regular monitoring and assessment of forest based on updated reliable information	The National Forestry Program 2015-2030

	Support to scientific and applied research for development and implementation of forestry programs

Greece

Water

Table 58 Policy objectives in the water sector in Greece

Water Policy		
Overarching objectives	**Specific objectives**	**Reference documents**
Protection and management of surface water and groundwater	Preparation of analytical reports describing the state of the art of the Greek river basins Determination of administrative issues (administrative bodies responsible for water resources management)	Law 3199/2003: Protection and management of water resources – Reconciliation with the WFD 2000/60/EC
Implementation of several national legislative provisions concerning sustainable management of water resources (Law 1650/1986 and Law 3199/2003) Reconciliation of the national legislation for water resources management with the WFD 2000/60/EC (sustainable use of water) Incorporation (in the national legislative framework) of definitions included in the WFD 2000/60/EC	Preparation of specific measures and procedures for the integrated protection and management of inland surface waters, transitional waters, coastal water and groundwater Protection of water resources quality Preventing further deterioration of aquatic ecosystems Long-term protection of the available water resources Protection and improvement of the aquatic environment Reduction of discharges and emissions into water resources Reduction of groundwater pollution Mitigation of floods' and drought's effects Protection, upgrading and restoration of surface water systems and artificial or particularly modified water systems (water quality, chemical status, ecological potential)	Presidential Decree 51/2007: Determination of measures and procedures for the integrated protection and management of water resources in compliance with the WFD 2000/60/EC
Protection of groundwater against pollution and deterioration	Institution of proactive measures for monitoring pollution and deterioration of groundwater	Decision 39626/2208/E130 (2009): Measures for the protection of groundwater from pollution and deterioration in compliance with the European Directive 2006/118/EC
Assessment and management of flood risk	Limitation of flood effects on: human health, natural environment, cultural heritage and economic activities related to floods	Common Ministerial Decision 31822/1542/E103 (2010): Assessment and management of flood risk

	Implementation of the decision in the 14 national water districts	in compliance with the provisions of the European Directive 2007/60/EC
Sustainable use of water resources Establishment of a national water pricing system	Determination of water prices for water services Determination of costs for water services Recovery of costs for water services	Common Ministerial Decision 135275 (2017): General rules regulating the costs and pricing system of water services. Method and processes for recovery of costs for water services and for relative water uses
Sustainable management and protection of water resources	Description of the specific characteristics of the river basins located within the 14 national water districts Preparation of a register containing information and operational directions for the integrated management of the Greek river basins Determination of specific goals for each water district	River basin management plans

Table 59 Policy instruments in the water sector in Greece

Water Policy		
General instrument or instrument category	**Specific policy instruments**	**Reference documents**
Preparation of analytical reports including: the characteristics of each river basin, the possible effects of human activities on surface water and groundwater, the economic analysis of water uses in each river basin Preparation of a national register including protected areas Establishment of a national monitoring network (quality and quantity of water) Preparation of regional river basin management plans Development of programmes and measures for monitoring water resources status Establishment of general rules regulating water use (water supply, irrigation, industrial use, energy production, recreation activities)	Establishment of a National Committee for Water Resources responsible for water policy design, water management and protection, monitoring and control of policy implementation, acceptance of national programmes concerning protection and management of water potential in Greece Establishment of a National Council for Water Resources Establishment of a Central Water Service whose main responsibilities are: generation of national programmes concerning protection and management of water potential in Greece, monitoring the implementation of the aforementioned programmes, coordination of the relevant public services, introduction of general rules for water prices, maintenance	Law 3199/2003: Protection and management of water resources – Reconciliation with the WFD 2000/60/EC

Permissions for water use and implementation of projects for water exploitation Definition of penalties concerning water pollution	of a database for the management of hydrological and meteorological data at national level Establishment of a Water Resources Directorate in each Greek region (NUTS 2), responsible for the protection and management of the river basins extended within its administrative boundaries Establishment of regional Water Resources Councils, responsible for promoting participatory actions and public involvement in issues related to management and protection of water resources Establishment of special measures against pollution by each region (achieving high ecological quality) Cost recovery for water services	
Identification of Greek river basins (water districts) Measures for preventing deterioration of surface waters, limitation of groundwater pollution, preventing further deterioration of groundwater Identification of each river basin's and each water district's characteristics, overview of environmental impacts caused by human activities at both surface waters and groundwater, economic analysis of water use Incorporation of the WFD 2000/60/EC annexes in the Greek legislative framework for water resources	Identification of water resources used for drinking water supply Combined approach for monitoring point and diffuse sources of pollution (discharges into surface waters) Monitoring the status of surface waters, groundwater and protected areas Programme of measures (part of the river basin management plans) concerning the implementation of EU legislation for the protection of water resources, recovery of costs for water services, sustainable water use, etc. Programme of specific measures against water resources pollution Publication of river basin management plans - Public consultation (preparation-elaboration-revision-update of river basin management plans) Submission of progress reports to the European Commission	Presidential Decree 51/2007: Determination of measures and procedures for the integrated protection and management of water resources in compliance with the WFD 2000/60/EC
Definition of evaluation criteria for assessing the chemical status of groundwater	Definition of groundwater quality standards Definition of maximum accepted values for pollutants	Decision 39626/2208/E130 (2009): Measures for the protection of groundwater from pollution and

Definition of the evaluation process for assessing the chemical status of groundwater	Monitoring the chemical status of groundwater in pre-determined points (network of control points) Registration of groundwater pollution trends (pollution indicators) Determination of threatened groundwater systems Special measures for the limitation of pollutants' penetration into groundwater	deterioration in compliance with the European Directive 2006/118/EC
Identification of the Public Authority (Special Secretariat for Water), responsible for the implementation of this Decision Preparation of a national program concerning flood risk management	Monitoring (and evaluating) the implementation of the national program concerning flood risk management Proactive assessment of flood risk for each river basin Description of floods having taken place in each river basin during the past Assessment of potential future effects of floods on human health, natural environment, cultural heritage and economic activities Preparation of flood risk maps Determination of special zones with high flood risk Public participation / consultation in flood risk management processes Increasing public awareness with respect to flood risk	Common Ministerial Decision 31822/1542/E103 (2010): Assessment and management of flood risk in compliance with the provisions of the European Directive 2007/60/EC
Rules and measures (directions) aiming at the improvement of water services Establishment of a common process for water services pricing system Determination of water pricing for: water supply, sewerage and wastewater treatment Establishment of a general framework regulating agricultural water use	Stimuli for water users aiming at the efficient use of water resources Establishment of rules regulating the financial cost Establishment of rules regulating the environmental cost Establishment of rules regulating water resources cost Volumetric charge per cubic meter of water (charge fee) Establishment of general rules regulating agricultural water pricing in case of organized collective agricultural networks Establishment of general rules regulating agricultural water pricing	Common Ministerial Decision 135275 (2017): General rules regulating the costs and pricing system of water services. Method and processes for recovery of costs for water services and for relative water uses

	in case of non-organized and nom-collective agricultural networks Establishment of a mechanism for monitoring water services	
Description of the most important pressures imposed by humans on water resources Register of environmental goals concerning water resources in the 14 Greek water districts Register of water resources and their characteristics	Monitoring ecological, chemical and quantitative status of water resources in the 14 national water districts Economic analysis of water uses in the 14 national water districts Summary of the programmes of measures that will be set in each river basin Analytical description of the participation-consultation process Analytical description of each water district (rainfall, river basins, geographical and social characteristics, water demand, etc.) Analytical description of water bodies (surface water, groundwater) of each water district Analytical description of pressures put in the aquatic environment (e.g. pollution) Analytical description of the status of each aquatic system Analytical economic analysis of water uses in each water district	River basin management plans

Land use

Table 60 Policy objectives for land in Greece

Land Policy		
Overarching objectives	**Specific objectives**	**Reference documents**
Identification of strategic directions for the integrated spatial and sustainable development of Greece for the next 15 years	Sustainable spatial development Development of a balanced and competitive economy (economic development) Strengthening economic and social cohesion Strengthening country's position in the regional and international environment	Decision 6876/481-2008: General legislative framework for spatial planning and sustainable development
Development of a national strategy for spatial and urban planning	Determination of administrative issues concerning spatial planning Design of national, regional (NUTS 2) and specific local spatial plans for national, regional (NUTS 2) and local spatial development	Law 4269/2004: Spatial and urban planning reformation – Sustainable development

	Definition of a legislative code regulating spatial and urban planning	
General directions, rules and criteria for the spatial structure, spatial organization and development of the aquaculture sector	Development of the necessary aquaculture infrastructures under the framework of environmental protection Support competitiveness of the aquaculture sector Support of national aquaculture products	Decision 31722-2011: Special legislative framework for spatial planning and sustainable development of the aquaculture sector and the respective strategic environmental impact assessment
Transformation of the spatial structure of the industrial sector towards the direction of sustainable development National directions for the spatial organization of the industrial sector	Long-term spatial organization of the industrial sector Development of the industrial sector in the local level Strengthening the competitiveness of industrial sector Enhancement of industrial entrepreneurship Broadening the geographical scale of the industrial sector (regional and inter-regional scale)	Decision 11508-2009: Special legislative framework for spatial planning and sustainable development of the industrial sector and the respective strategic environmental impact assessment

Table 61 Policy instruments for land in Greece

Land Policy		
General instrument or instrument category	**Specific policy instruments**	**Reference documents**
Land use regulation (spatial organization of several sectors and activities) Measures for biodiversity protection Promotion of unique natural and cultural resources Greece as a transport, energy and telecommunication hub Development of transboundary and other synergies in several sectors (European and international synergies) Promotion of research, technology, innovation and tourism Limitation of urbanization - Development of rural regions (increasing complementarity between urban and rural regions) Protection and promotion of the local identity	Promotion and development of the transportation, energy and telecommunication sector Development of an 'economy of knowledge' Promotion of entrepreneurship Spatially-dependent and specialized policy incentives (comparative advantages of each region) Elimination of land use conflicts Production of high quality national products Management - Elimination of spatial inequalities Development of isolated mountainous regions and islands Improvement of access to transportation, energy and telecommunication networks – Infrastructures	Decision 6876/481-2008: General legislative framework for spatial planning and sustainable development

Adaptation to / mitigation of climate change impacts (energy saving, promotion of RES, protection of forests and wetlands) Dynamic incorporation of Greece to the European and international environment Balanced and multi-central national development (several urban centers) Development of a well-organized spatial structure of strategic infrastructure networks and transportation-energy-telecommunication services	Strengthening social infrastructures (education, health, social welfare, etc.) Proactive planning for possible natural disasters and restoration of damaged areas Improvement of spatial and urban planning quality - Regeneration of deprived areas Integrated development of transportation means - TEN-T Connection with European economic hubs Incorporation of Athens and Thessaloniki to the international and European metropolitan networks Development of a well-organized urban network – Enhancement of synergies among urban centers Spatial organization of the main national poles (network of poles) and the international and inter-regional entries / gates of Greece Promotion of specialization and complementarity among productive sectors Use of spatial planning indicators for monitoring and evaluating progress	
Design of national strategic directions for spatial planning Design of regional (NUTS 2) strategic directions for spatial planning (more specific strategies, based on the special characteristics of each Greek NUTS 2 region) Design of local strategic directions for spatial planning (more specific strategies, municipality level, comparative advantages and weaknesses of each region)	Establishment of a national council for spatial planning (public consultation, public participation actions related to spatial planning and sustainable development, consultant during the design of national legislative frameworks for spatial planning) Development of specialized spatial plans (local level) by taking into consideration the existing local conditions (regions of specific characteristics, special regulations for land uses, special terms of local development) Definition of building coefficient / building restrictions of each region Monitoring urban plans implementation Register (database) of determined land uses (terms, data and information of land uses)	Law 4269/2004: Spatial and urban planning reformation – Sustainable development

	Classification / categorization of land use (domestic use, tourism, urban centre, trade, urban green, technological parks, etc.)	
Spatial organization of the aquaculture sector – Land use regulations Establishment of a national pattern for the spatial organization of the aquaculture sector	Classification / Categorization of several types of aquaculture activities Definition of criteria for assessing the compatibility of aquaculture activities with the special characteristics of human and natural environment Rational use of the available land / space by the aquaculture sector - Protection of vulnerable resources Identification of the available land for aquaculture development	Decision 31722-2011: Special legislative framework for spatial planning and sustainable development of the aquaculture sector and the respective strategic environmental impact assessment
Spatial organization of the industrial sector – Land use regulations Development of the industrial sector with respect to land use regulations Coordination of policies concerning the industrial sector with policies containing the spatial dimension (e.g. spatial planning policies) Sectoral directions and directions of special characteristics for the strategic spatial organization of the industrial sector	Promotion of a spatial pattern that creates external economies in the industrial sector Promotion of a multi-centric pattern of industrial development – Decentralization of the industrial sector Definition of terms regulating the scattering spatial pattern of the industrial sector - Special terms for special categories of industrial activities Promotion of organized industrial spatial patterns (organized industrial areas, etc.) - Terms for the development of organized industrial areas Design of a national pattern for the spatial organization of the industrial sector (poles and axes of industrial development, areas of intense industrial activities, categorization of space based on the comparative advantages and constraints of each region) with respect to the existing potential for the development of industrial activities Promotion of organized receptors for the development of industrial activities Criteria assessing the compatibility of industrial activities (location of new industries or industrial receptors) with the particular characteristics of each region	Decision 11508-2009: Special legislative framework for spatial planning and sustainable development of the industrial sector and the respective strategic environmental impact assessment

Energy

Table 62 Policy objectives in the energy sector in Greece

Energy Policy		
Overarching objectives	**Specific objectives**	**Reference documents**
Identification of rules and criteria for the sustainable management of RES Attainment of the national energy goals for climate change adaptation and mitigation	Definition of policies regulating the installation of RES power plants for electricity production Determination of the procedures needed for RES power plants installation – Permissions	Decision 49828-2008: Special legislative framework of spatial planning and sustainable development for the renewable energy sector and the respective environmental impact assessment
Incorporation of the Directive 2001/77/EC: 'Promotion of electricity produced from RES in the internal electricity market'	Electricity production from RES and cogeneration of high performance electricity and heat in the internal market	Law 3468/2006: Electricity production from RES and cogeneration of high performance electricity and heat
Reconciliation with the Directive 2004/8/EC: 'Promotion of cogeneration based on a useful heat demand in the internal energy market and amending Directive 92/42/EEC'	Energy cogeneration from two or more useful types of energy	Law 3734/2009: Promotion of cogeneration from two or more types of energy – Issues concerning the 'Mesochora' hydroelectric plant project
Attainment of national energy goals (2020) - Energy production from RES	RES sharing in the gross final energy consumption: 20%, RES sharing in the gross final electricity consumption: 40%, RES sharing in final energy consumption for heating and cooling: 20%, RES sharing in the transportation sector: 10%	Law 3851/2010: Acceleration of RES development for combating climate change
Incorporation of the Directive 2009/72/EC: 'Common rules for the internal market in electricity and repealing Directive 2003/54/EC' Incorporation of the Directive 2009/73/EC: 'Common rules for the internal market in natural	Identification of general principles concerning the undertaking of activities related to the energy sector (e.g. power plants for energy production, energy supply, etc.) Determination of energy pricing system	Law 4001/2011: Operation of electricity markets and natural gas markets – Research, production and transmission networks for hydrocarbons

gas and repealing Directive 2003/55/EC'	Establishment of a national system for natural gas management	
Introduction of a new framework supporting electricity production from RES and cogeneration of high performance electricity and heat	Incorporation and increasing share of RES power plants and cogeneration power plants to the electricity market Exploitation of national RES potential for electricity production aiming at environmental protection, differentiation of the national energy mix, safety of energy supply and economic development Increase RES sharing to the final gross energy consumption Energy efficiency and energy saving	Law 4414/2016: Support of electricity production from RES and high performance electricity and heat cogeneration – Legal and operational separation of natural gas supply and distribution

Table 63 Policy instruments in the energy sector in Greece

Energy Policy		
General instrument or instrument category	**Specific policy instruments**	**Reference documents**
Identification of suitable areas for the installation of wind parks and wind turbines (spatial and environmental criteria) Identification of areas where the installation of wind parks and wind turbines is prohibited Identification of suitable areas for the installation of small scale hydropower plants Identification of areas where the installation of small scale hydropower plants is prohibited Definition of criteria for the installation of photovoltaics (barren or low-productivity land, invisible areas, connection capabilities) Definition of criteria for the installation of biomass/biofuels	Definition of special criteria for the installation of wind parks in the mainland (maximum land cover percentage, minimum distances, integration of wind parks to the landscape) Definition of special criteria for the installation of wind parks in the islands (maximum land cover percentage, minimum distances, integration of wind parks to the landscape) Definition of special criteria for the installation of wind parks in the region (NUTS 2) of Attica (maximum land cover percentage, integration of wind parks to the landscape) Definition of special criteria for the installation of wind parks in the sea and uninhabited islands	Decision 49828-2008: Special legislative framework of spatial planning and sustainable development for the renewable energy sector and the respective environmental impact assessment

processing units (next to agricultural areas, large farms, landfills, etc.) Identification of areas where installation of biomass/biofuels units is prohibited Definition of criteria for the installation of geothermal plants (geothermal potential / geothermal fields) Exploration of the possibility for energy production from the sea (waves)	(construction rules, minimum distances, prohibitions) Definition of 'Wind Priority Areas' and 'Wind Suitability Areas' Identification of water districts with exploitable hydraulic potential Definition of special criteria for the installation of small scale hydropower plants (minimization of visual effect, accessibility) Definition of criteria for the assessment of hydropower receptors' carrying capacity (satisfaction of water supply, irrigation and ecological needs, etc.) Restoration of landscape	
Regulations concerning installation and operation of RES power plants and plants for high performance electricity and heat cogeneration Determination of a pricing system for the electricity produced from RES power plants and cogeneration power plants Establishment of a national programme concerning the development and promotion of photovoltaics	Definition of processes for obtaining the necessary permissions concerning electricity production from RES (installation of the relative infrastructure / equipment, location, installed power, etc.) - Cases where permission is not needed (exceptions) -Permissions concerning hybrid RES power plants, RES power plants and plants for high performance electricity and heat cogeneration Determination of procedures for the access / incorporation of RES power plants and electricity and heat cogeneration power plants to the national electricity distribution system / interconnected power network Incorporation / inclusion of RES power plants and electricity and heat cogeneration power plants to the non-interconnected islands	Law 3468/2006: Electricity production from RES and cogeneration of high performance electricity and heat

	Connection of RES power plants to the national electricity distribution system / network Warranties of the origin of the produced electricity - Identification of organizations, responsible for publishing and monitoring the relative electricity origin warranties Establishing a committee for the promotion of large-scale investment projects for RES and large scale investment projects for electricity and heat cogeneration power plants Generation of reports concerning RES development (share of RES in the national energy mix)	
Use of two or more energy resources for energy cogeneration Promotion of energy cogeneration	Adoption of cogeneration technologies Establishment of a methodology for the computation of electricity production from cogeneration Establishment of a methodology for the computation of cogeneration performance Specific measures for the promotion of cogeneration and high performance cogeneration (energy pricing, transmission and distribution of the produced electricity) Warranties concerning the origin of electricity produced from high performance cogeneration Regulations concerning cogeneration power stations that are not characterized as high performance plants Assessment of the national cogeneration potential	Law 3734/2009: Promotion of cogeneration from two or more types of energy – Issues concerning the 'Mesochora' hydroelectric plant project

	Commitments of the owners of cogeneration power plants for providing data and information concerning cogeneration power plants operation and electricity production – Penalties	
RES environmental impacts assessment study Amendment of older energy legislative provisions for the efficient combating of climate change Regulation of issues concerning location and installation of RES power plants (spatial and urban plans, special legislative framework of spatial planning and sustainable development for the renewable energy sector and the respective strategic environmental impact assessment, etc.)	Definition of criteria for the release of permissions for energy production from RES and cogeneration Special duties and incentives to domestic users in the areas where RES power plants are installed Development and promotion of RES use in buildings Promotion of energy saving in buildings Foundation of a special RES service	Law 3851/2010: Acceleration of RES development for combating climate change
Identification of general principles concerning the undertaking / implementation of activities in the energy sector (rational management of energy resources, competitive prices, development and promotion of RES, balanced regional development among Greek NUTS 2, combating energy poverty, etc.) Establishment of a national system for the management of natural gas Development and promotion of natural gas market	Organization and operation of a Greek Regulatory Authority for Energy (monitoring, regulation and supervision of the Greek energy market, security of energy supply, publish of relative permissions, infrastructures development, electricity and natural gas transmission network, energy pricing, monitoring and supervision of electricity market, protection of consumers, regional cooperations, collection of economic-technical and other energy data, public consultation, etc.) Definition of commitments of the energy suppliers (equal treatment of customers, protection of	Law 4001/2011: Operation of electricity markets and natural gas markets – Research, production and transmission networks for hydrocarbons

	susceptible customers, awareness, etc.) Transparency of pricing system (charges) and information availability Adoption of smart systems for measuring energy consumption Permissions for the construction of natural gas infrastructures, ownership of natural gas infrastructures, natural gas distribution Exploration of the available hydrocarbons potential, research and exploitation of hydrocarbons	
Development and support of RES and cogeneration power plants in the internal energy market – Increase of sharing in the total energy mix	Operational incentives (compensation-economic incentives) for RES and cogeneration power plants owners Establishment of a methodology for the computation of a special price for buying RES and cogeneration technologies Competitive procedures for submission of quotes for RES and cogeneration power plants Supporting measures for the development of RES and cogeneration power plants in the non-interconnected islands Supporting the operation of hybrid stations in the non-interconnected islands	Law 4414/2016: Support of electricity production from RES and high performance electricity and heat cogeneration – Legal and operational separation of natural gas supply and distribution

Agriculture and food

Table 64 Policy objectives in the food and agriculture sector in Greece

Agricultural Policy		
Overarching objectives	**Specific objectives**	**Reference documents**
Preservation and sustainable use of plant genetic resources for food and agriculture	Fair and equitable sharing of benefits derived from the use of plant genetic resources in harmonization with the convention for biodiversity , sustainable agriculture and food security	Law 3165/2003: Sanction of the International Convention on plant genetic resources for food and agriculture
Determination of regulations for the development of livestock activities and livestock facilities	Determination of special measures and criteria for the development and spatial organization of livestock activities Categorization of livestock activities	Law 4056/2012: Regulations for farming activities, livestock and livestock facilities
Reconciliation with the Directive 2009/128/EC: 'Establishing a framework for Community action to achieve the sustainable use of pesticides'	Definition of provisions for the rational use of pesticides	Law 4036/2012: Pesticides market in Greece – Rational use of pesticides
Sustainable development of aquaculture	Determination of measures and criteria for the development and spatial organization of the aquaculture sector Categorization of aquaculture activities	Law 4282/2014: Development of the aquaculture sector
Identification of pastures and grazing lands in Greece	Mapping pastures and their specific characteristics	Law 4351/2015: Pastures and grazing land in Greece
Creation of a register containing farmers and their plots	Determination of the necessary individual procedures needed for the creation of the register	Law 3874/2010: Register of farmers and farms
Determination of processes regulating the establishment of agricultural associations	Definition of administrative and procedural issues	Law 4384/2016: Agricultural associations, types of collective organization of the agricultural land (rural areas)

Ensuring security in the food sector	Implementation of EU and national legislation in the food sector, fodder sector and the sector of animals' protection and health	Law 4235/2014: Administrative measures, processes and penalties for the implementation of the EU and national legislation in the food, fodder and health sector and protection of animals

Table 65 Policy instruments for food and agriculture in Greece

Agricultural Policy		
General instrument or instrument category	**Specific policy instruments**	**Reference documents**
Establishment of close links between the Convention on plant genetic resources for food and agriculture and the United Nations Organization for food and agriculture as well as the Convention for biodiversity Preservation, exploration, collection, identification, assessment and documentation of plant genetic resources for food and agriculture Establishment of international co-operations - Promotion of cooperation among international plant genetic resources networks Cooperation of contracting parts (Convention on plant genetic resources for food and agriculture) for the development and promotion of an international information system for plant genetic resources	Adoption / implementation of differentiated agricultural systems, promotion of research, promotion of differentiated crop patterns, locally adapted crops, etc. Creation of a register of plant genetic resources for food and agriculture Technical assistance Protection and promotion of farmers' rights Sharing of benefits Facilitation of access to plant genetic resources for food and agriculture	Law 3165/2003: Sanction of the International Convention on plant genetic resources for food and agriculture
Classification of livestock facilities (criteria: buildings, capacity) Register (database) of farms (Ministry of Rural Development and Food) - Enhancement of transparency - Mapping out pastures	Determination of permission processes for the establishment of livestock activities and the installation of livestock facilities Determination of suitable locations, minimum area and minimum distance among livestock facilities Monitoring livestock activities - Administrative, sanitary and spot tests	Law 4056/2012: Regulations for farming activities, livestock and livestock facilities

	Special regulations for the installation of farms in forest or public land Management of animals (sheep, goats and cattle) living outside of the farms	
Monitoring plant protection products Measures for the sustainable use of pesticides Regulation of pesticides trade activities Monitoring the rational use of pesticides Promotion of integrated plant protection activities	Processes for obtaining permissions (published by SEA) for the development of pesticide market Establishment of a 'Pesticide Scientific Committee' (consultant) Monitoring residues of plant protection products Establishment of training programmes for the sustainable use of pesticides Creation of a register including pesticide industries / pesticide small-industries Creation of a register (database) including certified pesticides - electronic register of pesticides distribution / trade Increasing awareness (public involvement) concerning pesticides Check the equipment for pesticide use Monitoring crop dusting Reduction of pesticide use in specific areas Regulations for the management, application and storage of pesticides Monitoring the prices of plant protection products	Law 4036/2012: Pesticides market in Greece – Rational use of pesticides

Establishment of a National programme for aquaculture development (public involvement during the decision making processes, production of high quality food products, employment, research and development, permission processes, land use regulation) Management of areas where organized aquaculture development activities are taking place (areas of organized aquaculture development) Expansion and relocation of waterborne aquaculture units Definition of procedures regulating the installation of aquaculture units – Prohibitions	Establishment of a National Council for the Aquaculture Sector (consultant on policy issues concerning aquaculture) Regulations concerning direct leasing of water areas – Leasing renewal - Commitments of lease-holders / renters Installation of anchorages Limitations for leasing sea and lake water areas Regulations for using water areas without exchange Regulations for the private use of public mainland areas for the development of aquaculture activities	Law 4282/2014: Development of the aquaculture sector
Development of grazing management plans Mapping of pastures	Creation of a National geo-database named: "Pastures - Grazing Lands of Greece" including the Greek grazing land / pastures - Register of Greek pastures Establishment of committees for monitoring the preparation and implementation of grazing management plans Determination of grazing (land use for grazing) rights within pastures National programme for the collection and management of dead animals Creation of databases including 'animal origin' for food sector and 'animal origin' for animal sub-products	Law 4351/2015: Pastures and grazing land in Greece

Creation of a national register (database) including farmers and their plots	Clarification of the registry process Constant update of the register Unification of relative databases	Law 3874/2010: Register of farmers and farms
Clarification of processes concerning the establishment of agricultural associations – Definition of penalties	Memorandum of agricultural associations – Commitments and rights – Capitals / Financial management – Member responsibilities – Supervision of agricultural associations by the State of Greece / government Classification of the several types of agricultural associations (networking among agricultural and other firms, trade contracts, protection and management of PDOs, PGIs) Training and awareness activities concerning agricultural networking and agricultural partnerships supported by a specific funding mechanism Digital database for the traceability of agricultural products offered by agricultural associations (products certification) Foundation of an organization responsible for the management of agricultural land and the respective equipment	Law 4384/2016: Agricultural associations, types of collective organization of the agricultural land (rural areas)
Identification of pertinent authorities for the implementation of the articles 1-36 of the Law 4235/2014 Definition of relative penalties in case of non-compliance (compliance recommendations, administrative penalties, constraints or prohibitions for food and beverages trade)	Determination of specific administrative measures for compliance with EU legislation Monitoring, confiscation, withdrawal or destruction of non-secure food or fodder Constraints and prohibitions concerning the market of animal by-products / sub-products	Law 4235/2014: Administrative measures, processes and penalties for the implementation of the EU and national legislation in the food, fodder and health sector and protection of animals

Controls in food and fodder industry and imposition of penalties in case of offenses Rules and measures ensuring food and fodder security	Compliance measures concerning imports from third countries Definitions of commitments for non-Greek food businesses or food businesses that do not have even a branch in Greece	

Climate

Table 66 Policy objectives in the climate sector in Greece

Climate Policy		
Overarching objectives	**Specific objectives**	**Reference documents**
Advancement / Promotion of sustainable development Limitation and reduction of emissions	Limitation and reduction of GHG emissions not monitored by the Montreal Protocol	Law 3017/2002: Verification of the Kyoto Protocol in the United Nations Framework Convention on climate change
Reduction of GHG emissions	Forecasting future GHG emissions Scenario describing the expected progress	Action 5 (27.02.2003) – Action of the Council of Ministers: National programme for the reduction of GHG emissions 2000-2010
Limitation and reduction of emissions	Amendment of Annex B of Kyoto's Protocol (quantitative commitments for the limitation or reduction of emissions – 80% of the base year for Greece) Common implementation (EU members) of the quantitative commitments for the limitation or reduction of emissions (second period of Kyoto's Protocol)	Law 4345/2015: Verification of the Doha's amendment on Kyoto Protocol in the United Nations Framework Convention on climate change, having been verified by the Law 3017/2002
Reduction of GHG emissions Reinforcing the implementation of the United Nations Framework Convention on climate change Reinforcing global response against climate change threat and elimination of poverty	Increase the adaptation ability and resilience to climate change impacts Hold the increase of the global average temperature below 2^0 C above the pre-industrial levels Constant efforts to hold the increase of the global average temperature below $1,5^0$ C above the pre-industrial levels	Law 4426/2016: Verification of the Paris Convention in the United Nations Framework Convention on climate change

Reinforcement of country's (Greece) resilience against climate change impacts Mapping out national strategic directions Definition of actions and policies for the adaptation of all economic sectors (emphasis is placed on most vulnerable sectors)	Systemization and improvement of decision making process (short-term and long-term decisions) with respect to climate change adaptation Establishment of a linkage between climate change adaptation and sustainable development patterns through the design and implementation of regional/local plans of action Establishment of a mechanism for monitoring, evaluation/assessment and update of the relative adaptation actions and policies Reinforcement of the society's adaptation ability – Increasing social awareness	National strategic plan for climate change adaptation
Protection of climate	Establishment of a national GHG emissions trading system Inclusion of air transport in the GHG emissions trading system Limitation of GHG emissions in a cost-effective and economic-efficient way	Common Ministerial Decision 54409/2632 (2004): GHG emissions trading system in reconciliation with the 2003/87/EC Directive Common Ministerial Decision 57495/2959/E103 (2010): Amendment of Common Ministerial Decision 54409/2632 (2004) in order emissions by air transport to be included in the relative activities

Table 67 Policy instruments in the climate sector in Greece

Climate Policy		
General instrument or instrument category	**Specific policy instruments**	**Reference documents**
Increasing energy efficiency in several economic sectors Promotion of research and development in the field of RES Broad adoption of RES for energy production	Protection and reinforcement of sinkholes and GHG stock not monitored by the Montreal Protocol Promotion of sustainable agriculture Use of technologies that 'capture' Carbon Dioxide - Use of innovative	Law 3017/2002: Verification of the Kyoto Protocol in the United Nations Framework Convention on climate change

Adoption of policy measures for the reduction of GHG emissions, not monitored by the Montreal Protocol Establishment of broad co-operations among the parts subscribing the Kyoto Protocol in order to enhance policy implementation effectiveness	and environmental friendly technologies Market adaptation towards reducing emissions (economic stimuli) Reduction of methane emissions Enhancement of knowledge, experience and information sharing and dissemination Preparation of national programmes for combating climate change	
Forecasting energy consumption and GHG emissions Deregulation of the electricity market Promotion of RES, cogeneration and energy saving Exploitation and promotion of natural gas for heating and cooling Energy saving by the industry sector Construction of wind parks Construction of hydroelectric plants Installation of central photovoltaic systems Exploitation of the available geothermal potential Promotion of biomass for electricity production	Adoption of a methodological framework for emissions forecasting (ENPEP model) Specific measures for the reduction of GHG Reduction of emissions of new-technology cars Improvement of buildings' thermal behavior (households and tertiary sector) Maintenance or replacement of boilers used for central heating (households and tertiary sector) Shading and roof fan-systems, night aeration Use of effective air conditioning systems Use of effective electrical appliances Use of high performance lamps Lighting automation Solar collectors for water and space heating Roof-top solar systems	Action 5 (27.02.2003) – Action of the Council of Ministers: National programme for the reduction of GHG emissions 2000-2010

	Exploitation of biomass for tele-thermoscope purposes Maintenance of cars and trucks Buses that use natural gas Improvement of traffic lights Promotion of public transportation Use of biofuels Promotion of natural gas, solar systems and biomass in the industry sector Development of natural gas cogeneration systems Reduction of nitrogenous fertilizers - promotion of biological crops Reorganization of the chemical industry	
Measures for the implementation of the national quantitative commitments for the limitation or reduction of emissions	Common implementation of commitments with the other EU members Reduction of emissions by 80% in comparison to the base year for Greece	Law 4345/2015: Verification of the Doha's amendment on Kyoto Protocol in the United Nations Framework Convention on climate change, having been verified by the Law 3017/2002
Register of emissions and contribution of each part (of the Paris convention) towards the reduction of GHG emissions Formulation and dissemination of long-term strategies for the limitation of GHG emissions Enhancing the scientific knowledge about climate Assessment of climate change impacts and the respective susceptibility	Preservation and improvement of GHG tanks Sustainable management of forest land Incentives to the private and public sector for the limitation of GHG emissions Monitoring and evaluation of climate change impacts and the respective susceptibility	Law 4426/2016: Verification of the Paris Convention in the United Nations Framework Convention on climate change

Improvement of socioeconomic resilience and ecological systems resilience		
Measures for the sustainable management of natural resources (soil, water, biodiversity, pastures) Risk and disaster management (climate change impacts) Monitoring, preservation and restoration of biodiversity components Measures of the preservation of vulnerable NATURA2000 ecosystems Regulation of land uses Promotion of alternative tourism Sustainable management of biological sea resources Projects for the management of climate change impacts on water resources (monitoring climate change impacts on groundwater, improvement of existing meteorological network, etc.) Coordination of measures concerning the energy sector with measures concerning the agricultural sector, water resources and built environment Adaptation of urban planning (architecture of buildings, urban green space, etc.) Limitation of thermal and energy needs	Increasing public awareness – Consultation and promotion of public dialogue Innovative knowledge dissemination and sharing between experts-trainers and farmers (training of farmers) Establishment of a National Council for Climate Change Construction of a database containing climate change impacts on agricultural sector Funding programmes concerning agricultural sector's adaptation to climate change Changes on biological material and cultivation techniques Design of regional plans for the sustainable development of agricultural sector Protection-preservation of forest biodiversity - Limitation of forest fires (mapping out forest land, legislative framework, afforestation, proactive planning, etc.) Production of usable water by forests Acquisition of knowledge concerning climate change impacts on fishery (temporal differentiation of fishery production, spatial and temporal differentiation of adopted techniques, etc.) and aquaculture sector Water resources saving-Effective use of water-Limitation of pumping	National strategic plan for climate change adaptation

	Differentiation of tourist activities with respect to the region (spatial scale) and seasonality (temporal scale) (region attractiveness, thermal convenience indicators)	
Development of integrated policies Reduction of "human-produced" GHG emissions	Categorization of activities producing emissions Adoption and use of suitable technologies Categorization of greenhouse gases Establishment of a national authority having the responsibility for the implementation of the respective ministerial decisions Establishment of processes and conditions for the acquisition of permissions for GHG emissions and relative rights (emissions trading system) Establishment of a national GHG emissions distribution system Transfer, return and cancellation of "emissions rights" Creation of a national registry for the assignment, occupation, transfer and cancellation of "emissions rights" Incorporation of annexes (Directive 2003/87/EC) including activities with GHG emissions and classification of greenhouse gases	Common Ministerial Decision 54409/2632 (2004): GHG emissions trading system in reconciliation with the 2003/87/EC Directive Common Ministerial Decision 57495/2959/E103 (2010): Amendment of Common Ministerial Decision 54409/2632 (2004) in order emissions by air transport to be included in the relative activities

Tourism

Table 68 Policy objectives in the tourism sector in Greece

Tourist Policy		
Overarching objectives	**Specific objectives**	**Reference documents**

Sustainable development of the tourist sector Development of tourist entrepreneurship	Strengthening tourist entrepreneurship Reorganization of the Greek Tourism Organization	Law 4179/2013: Simplification of procedures that support tourist entrepreneurship – Reformation of the Greek Tourism Organization
Development of tourist training	Organization of tourist training schools Definition of goals and responsibilities of the Tourist Training Organization Improvement of the Greek tourist product	Law 3105/2003: Tourist training and regulations concerning the tourist sector

Table 69 Policy instruments in the tourism sector in Greece

Tourist Policy		
General instrument or instrument category	**Specific policy instruments**	**Reference documents**
Promotion of organized and sophisticated tourist investments Specific land use regulations for the development of tourist activities Definition of measures, terms and conditions for the development of organized receptors for the establishment of tourist activities (minimum distances from transportation networks, building coefficients, minimum distance from the coastline, etc.) Establishment of a tourist observatory Enhancement and promotion of tourist training activities and tourist expertise	Determination of building coefficients concerning tourist infrastructures Differentiation of tourist activities and tourist product according to the special characteristics of each region Definition of terms and conditions for the development of complex / sophisticated tourist infrastructures (e.g. conference centers, ski resorts) - Building coefficients, land suitability, minimum available area Identification of areas that are suitable for the development of Integrated tourist activities Generation of hostels for youths Online services by the Greek Tourist Organization (documents concerning permissions, digitization of archives, etc.) Definition of rules for the operation of tourist ports (marinas)	Law 4179/2013: Simplification of procedures that support tourist entrepreneurship – Reformation of the Greek Tourism Organization

	Identification of areas satisfying the criteria for the establishment and operation of tourist ports (marinas) Rules for the development of other activities within marinas' zone Rules and directions for the development of ski resorts and mountainous shelters (lodges) Regulations concerning the administrative role and the respective services of the Greek Tourism Organization Terms and conditions for the development of spa and medical tourism Responsibilities of the hotels chamber Procedures for the publication of permissions for the development of tourist activities Terms and conditions for the development of fishery tourism	
Organization of tourist education and training Networking / development of synergies between public and private tourist organizations	Tourist training courses in a theoretical and practical level Modernization of the tourist training Increasing tourist training awareness Foundation, organization and operation of tourist training schools Strengthening research in the tourist sector (studies, statistical researches, proposals for tourist development) Certification of the available 'tourist skills'	Law 3105/2003: Tourist training and regulations concerning the tourist sector

	Networking among tourist entrepreneurships Training of employees (seminars, educational programmes, publications, conferences, etc.) Production of tourist educational material Funding of the Tourist Training Organization Identification of responsibilities of the Tourist Training Organization Establishment of higher education schools for tourist training Regulation of issues concerning touristic ports (marinas), tourist real estate, mountainous shelters (lodges)	

Latvia

Water, climate and environment

Table 70 Policy objectives in the water, climate and environment sector in Latvia

Environmental policy		
Overarching objectives	**Specific objectives**	**Reference documents**
Ensuring possibility for inhabitants to live in clean and tidy environment, implementing sustainable activities, preserving quality of environment un biodiversity, ensuring sustainable use of natural resources, as well as public participation in decision making and awareness on state of environment	Ensuring good management of environment at all levels, as well as good communication about environment based, promoting public participation in dealing with environmental issues Ensuring sustainable use and protection of soil Ensuring the society with updated and actual information about soil resources and current geological process that is considered for development planning; Preventing waste generation and ensuring reduction of waste to be	Environmental policy guidelines 2014-2020

	deposited, ensuring rational use of waste resources, as well as safe disposal of waste; Ensuring high quality of ecosystems, balancing environmental, social, and economic interests, promoting the "green" image of Latvia; Reducing air pollution impact on inhabitants and ecosystems up to the level that does not create a threat to human health and does not create degradation of ecosystems Ensuring contribution of Latvia to the global attempt for reduction of climate change, considering environmental, social, and economic interests of Latvia; Promoting the readiness of Latvia to adapt to climate change and the related impacts; Ensuring good water quality and sustainable use of water resource; Ensuring sustainable use and protection of natural resources stimulating minimisation and management of environmental risks Reducing negative environmental impacts on human health and well-being; Ensuring timely and comprehensive information on environment and climate change to set the policy goals and relevant measures to improve the state of environment and timely response towards climate change as well as to evaluate the effectiveness of implemented measures and investments.	
Waste reduction	Preventing generation of waste, ensuring significant reduction of total amount of waste; Ensuring rational utilisation of waste; Ensuring that waste generated is not hazardous and creates only minor	National waste management plan 2013-2020

	risk to environment and human health; Ensuring reduction of waste to be deposited and safe disposal.	

Table 71 Policy instruments in the water, climate and environment sector in Latvia

Environmental, Water and Climate policy		
General instrument or instrument category	**Specific policy instruments**	**Reference documents**
Requirements for management of protecting belts around the water bodies	Restrictions of activities with coastal dunes	Protection Zone Law (adopted in 11.03.1997)
Requirements for water protection and management	Requirements for protection and management of surface and groundwater	Water Management Law (adopted in 2002)
Quality requirements for water	Regarding the Quality of Surface Waters and Groundwaters	MK Nr. 118, adopted in 12.03.2002
Restrictions to build dams on rivers	Restrictions to build or restore dams for hydro-power plants on certain rivers or river stretches	MK Nr. 27, adopted in 15.01.2002
Requirements for waste management	Requirements for rational utilization of waste reducing emissions and the total amount of waste	Waste Management Law adopted in 18.11.2010; MK Nr.788, adopted in 13.12.2016. MK Nr.564, adopted in 12.07.2011
Waste management fee	Fee for management of various types of waste	Waste Management Law adopted in 18.11.2010
Requirements for waste management	Requirements for separate collection of waste and regeneration, reuse, and recycling	MK Nr.184, adopted in 02.04.2013
Requirements for waste management	Requirements for waste separation fields and composting of waste	MK Nr.898, adopted in 22.11.2011

Requirements for waste incineration	Requirements for waste incineration and operation of waste incinerators	MK Nr.401, adopted in 24.05.2011
Subsidies for waste management	Subsidies for development of separate collection of waste	MK Nr.494, adopted in 26.07.2016
Requirements for landfills	Requirements for erection of landfills and landfill management, including requirements for collection, treatment and use of landfill gas for energy generation or incineration	MK Nr.1032, adopted in 27.12.2011
Requirements for wind turbine location	Limitations for location of wind turbines e.g. with respect to nature protection areas,	Protection zone Law (1997) Law on Specially Protected Nature Territories (1993)

Energy

Table 72 Policy objectives in the energy sector in Latvia

Energy policy		
Overarching objectives	**Specific objectives**	**Reference documents**
Competitive economy, sustainable energy to be reached by increasing energy efficiency and use of renewable energy	The Strategy sets non-binding targets to be reached by 2030: 50% of renewable energy in total energy consumption to be reached by increasing the share of renewable energy sources in heat supply, electricity, and transport sectors; 50% reduction of import of energy and energy sources from third countries (in comparison to 2011); 50% reduction energy demand for heating of buildings (current heat energy demand is 200 kWh/m2/year).	"Long-Term Energy Strategy of Latvia 2030 - Competitive Energy for the Society"
Sustainable energy considering economic, social, and environmental aspects	The Guidelines set targets to be reached by 2020: 40% share of RES of total energy consumption; 10% share of RES in total energy consumption in transport sector; 6% reduction of GHG emissions per fuel or energy unit supplied; Energy savings of 0,670 Mtoe (28 PJ);	"The Guidelines for the Development of Energy Sector for 2016-2020"

	Mandatory total energy saving of the country 0,850 Mtoe; Refurbishment of 3% of the total area of public buildings (the total area of refurbishment 678 460 m^2); 50% reduction of average heat energy consumption for heating compared to the consumption in 2009 (202 kWh/m^2), up to 150 kWh/m^2 per year by the year 2020; Reduction of energy intensity from 372,9 kg oil equivalent per 1000 *euro* of GDP in 2010 to 280 kg oil equivalent per 1000 *euro* of GDP in 2020; Limitation of GHG emission in economic branches of non-ETS sector not exceeding 17% of increase of emissions compared to the level in 2005; Limitation of total GHG emissions not exceeding 12,16 Mt CO_2 equivalent in 2020.	

Table 73 Policy instruments in the energy sector in Latvia

Energy policy		
General instrument or instrument category	**Specific policy instruments**	**Reference documents**
Provisions and support for energy production from RES (Feed-in-tariffs, subsidies)	Provisions to generate and sell energy produced from RES; provisions for mandatory purchase obligation; subsidies to support use of energy produced from RES in municipal buildings	Energy Law (adopted in 1998) Electricity Market Law (adopted in 2005) Law On the Energy Performance of Buildings (adopted in 2013) MK Nr. 262, adopted in 16.03.2010 MK Nr.152, adopted in 08.03.2016
Energy efficiency requirements	Requirement to reduce heat losses in centralized heat supply systems (heat losses ≤ 19% since 2018; 17% since 2019)	MK Nr. 243, adopted in 19.04.2016.
Provisions for energy production in co-generation (feed-in-tariffs, taxes)	Criteria for co-generation stations to obtain a permit for selling electricity within the mandatory purchase obligation; level of taxation	Electricity Market Law (adopted in 2005) Subsidised Electricity Tax Law (adopted in 2013) MK Nr. 221, adopted in 10.03.2009 MK Nr. 262, adopted in 16.03.2010 MK Nr. 1521, adopted in 17.12.2013

Energy performance of buildings (requirements, subsidies)	Requirements for implementation of measures increasing energy performance of buildings; Subsidies for refurbishment of dwelling houses; Target (12.31.2023): energy consumption for heating in buildings < 120 kWh/m2/year	Law On the Energy Performance of Buildings (adopted in 2013) MK Nr. 28, adopted in 15.01.2008 MK Nr. 138, adopted in 10.02.2009 MK Nr. 1332, adopted in 17.11.2009 MK Nr. 905, adopted in 28.09.2010 MK Nr. 907, adopted in 28.09.2010 MK Nr. 272, adopted in 05.04.2011 MK Nr.152, no 08.03.2016 Law On Assistance In Solving Apartment Matters (adopted in 2001) MK Nr. 237, adopted in 05.04.2005
Minimum requirements for energy performance of buildings	Requirements for energy performance certification and minimum energy performance of buildings	Law On Administration of Residential Houses (adopted in 2009) Law On the Energy Performance of Buildings (adopted in 2013) MK Nr. 383 (adopted in 09.07.2013)
Electricity net payment	Order for electricity net payment for households	Electricity Market Law (adopted in 2005) MK Nr. 50, adopted in 21.01.2014
Quality criteria for biofuels	Criteria for sustainability of biofuels	Biofuel Law, adopted in 15.04.2005 MK Nr.545, adopted in 05.07.2011 MK Nr. 772, adopted in 18.10.2005
Natural resource tax	Natural resource tax is 0% for the energy produced in cogeneration and for the energy produced from renewable energy sources and peat	Natural Resources Tax law, (adopted in 2005)
Permits, emission limits	Permits for polluting activities, emission limit from combustion installations	Law On Pollution (adopted in 2001) MK Nr.187, adopted in 02.04.2013 MK Nr.1082, adopted in 30.11.2010 MK Nr.1015, adopted in 14.12.2004
Subsidy for energy production	Subsidy for energy production from agricultural or forestry biomass	MK Nr. 268, adopted in 16.03.2010.
Subsidy for increasing energy efficiency and use of RES	Subsidy for increasing energy performance and use of RES in industrial buildings or industrial processes	MK Nr. 590, adopted in 06.09.2016
Quality criteria for biofuels	Criteria for sustainability of biofuels	Biofuel Law, adopted in 15.04.2005 MK Nr.545, adopted in 05.07.2011 MK Nr. 772, adopted in 18.10.2005
Excise tax	Reduced excise tax for biofuels (0 EUR excise tax is for biofuel completely obtained from rape seed oil)	Law On Excise Duties (adopted in 01.05.2004)

Agriculture and food

Table 74 Policy objectives in the agriculture, food and forestry sector in Latvia

Agricultural, Forestry and Land use policy		
Overarching objectives	**Specific objectives**	**Reference documents**
Sustainable agriculture	Promote knowledge transfer in agriculture, forestry, and rural areas; Increase rentability and competitiveness of enterprises, promote innovative technologies in agriculture and sustainable management of forests; Promote organisation of food supply chains; Restore, maintain, and improve ecosystems related to agriculture and forestry; Promote efficient use of resources and support economy resistant to climate change, having low carbon dioxide emissions in agriculture, food and forestry sectors; Promote social integration, reduction of poverty and economic development in rural areas.	Latvia – Rural Development Programme (National) 2014 – 2020
Sustainable forest management	Sustainable and internationally acknowledged management of forests, including CO_2 capture; Competitive forestry products with high added value reflecting the needs of clients; Relevant educational and scientific potential and skills of human resources.	The Guidelines for the development of forestry and related branches 2015.-2020

Table 75 Policy instruments in the agriculture, food and forestry sector in Latvia

Food, Agricultural, Forestry and Land use policy		
General instrument or instrument category	Specific policy instruments	Reference documents
Requirements for food quality schemes	Requirements for food quality schemes and its certification	MK Nr. 461, adopted in 12.08.2014
Subsidy for taking part in food quality scheme	Subsidy for agricultural enterprises to join food quality scheme	MK Nr. 1524, adopted in 17.12.2013

Subsidy for planting of trees	Subsidy for planting of trees in land not suitable for agriculture	Law On Agriculture and Rural Development (adopted in 2004) MK Nr. 1182, adopted in 13.10.2009.
Subsidy for rural development	Subsidy for rural development - improvement of environment, climate and rural landscape	MK Nr. 17, adopted in 07.04.2015.
Subsidy to improve melioration systems	Subsidy for reconstruction or renovation of melioration systems (and for new melioration system in agricultural land)	MK Nr. 792, adopted in 23.09.2008.
Direct payments (subsidies)	Subsidy for agricultural activities beneficial to climate and environment	MK Nr. 126, adopted in 10.03.2015.
Requirements and norms for organic fertilization of soils	Requirements and norms for organic fertilization of soils (amount of nitrogen on field)	MK Nr. 834, adopted in 23.12.2014. MK Nr. 17, adopted in 07.04.2015.
Subsidy for modernization of farms	Subsidy for construction and reconstruction of manure storage facilities	MK Nr. 1026, adopted in 01.11.2010.
Requirements for activities with manure	Requirements for collection, storage and distribution of manure	MK Nr. 829, adopted in 23.12.2014.
Subsidy for development of agriculture	Yearly amounts of subsidies for development of agriculture	Law On Agriculture and Rural Development (adopted in 2004)
Subsidy for activities not directly related to agriculture	Subsidies promoting the tourism	MK Nr. 320, adopted in 24.05.2016
Subsidy for fruits and vegetables to be delivered in short distances	Subsidy for fruits and vegetables if they have been grown applying integrated plant protection principles and are delivered to the educational establishment not longer than 300 km	MK Nr. 519, adopted in 08.09.2015.
Requirements for limitation of water pollution	Requirements for limitation of water pollution from point and diffuse sources	Water Management Law (adopted in 2002)
Requirements for application of sewage sludge	Requirements for application, monitoring and control of sewage sludge	MK Nr. 362, adopted in 02.05.2006.
Permits, requirements for polluting activities	Requirements to elaborate emission limit projects of stationary sources to reduce emissions of air polluting substances	Law On Pollution (adopted in 2001) MK Nr. 1082, adopted in 30.11.2010. MK Nr. 769, adopted in 13.11.2012. MK Nr. 182, adopted in 02.04.2013.
Natural resource tax	Tax for GHG emissions from stationary installations	Natural Resources Tax law (adopted in 2005)

Environmental impact assessment	Requirements and limitations for emissions of polluting substances to air, water, and soil	Law On Environmental Impact Assessment" (adopted in 1998) MK Nr. 157, adopted in 23.03.2004. MK Nr. 300, adopted in 19.04.2011. MK Nr. 18, adopted in 13.01.2015.
Arranging agricultural land within forest areas	Procedure and limitations for arranging agricultural land within forest areas	Law On Agriculture and Rural Development (adopted in 2004) MK Nr. 118, adopted in 05.03.2013.
Requirements for forest protection	Requirements for forest protection when carrying out forest management activities (e.g., tree cutting)	MK Nr.947, adopted in 18.12.2012
Requirements for renovation of forests	Requirements for growing of trees to renovate the forest	MK Nr.159, adopted in 26.03.2013 MK Nr.308, adopted in 02.05.2012
Requirements to preserve the genetic bank of forests	Requirements for keeping the biodiversity and setting the minimum number of tree specimens in forests	MK Nr.177, adopted in 02.04.2013
Limitation of vehicle emissions	Limitation of emissions for tractor engines	MK Nr.535, adopted in 27.06.2006
Subsidies for forest management	Subsidies for renovation of forests and planting of trees (e.g., in areas not suitable for agriculture)	Law On Agriculture and Rural Development, adopted in 24.04.2004 MK Nr.455, adopted in 04.08.2015
Requirements for maintenance of melioration systems	Requirements for maintenance and use of melioration systems	Amelioration Law, adopted in 25.01.2010
Requirements for forest management	Requirements for forest management plan and forest management measures	Law on Forests, adopted in 17.03.2000 MK Nr.67, adopted in 04.02.2014 MK Nr.248, adopted in 07.05.2013
Payment for causing negative environmental effects	Payment to state for causing negative environmental effect due to deforestation (reducing CO_2 capturing potential)	MK Nr.889, adopted in 18.12.2012 MK Nr.228, adopted in 29.04.2003
Tree cutting limitations	Limitations for tree cutting in biologically valuable areas	MK Nr.936, adopted in 18.12.2012
Requirements for forest management	Requirements for tree cutting within and outside the forest	MK Nr.935, adopted in 18.12.2012 MK Nr.309, adopted in 02.05.2012
Subsidies for enterprises	Subsidies for agricultural and forestry enterprises to elaborate innovative technologies and products	MK Nr.593 adopted in 13.10.2015

Transport

Table 76 Policy objectives in the transport sector in Latvia

Transport policy		
Overarching objectives	**Specific objectives**	**Reference documents**
Sustainable transport	Using less amount and cleaner energy in vehicles, better application of modern infrastructure, reduction of negative impact on environment and natural resources; Integrating all modes of public transport into a unified public transport system; ensuring quality of regional and local roads; improving accessibility of information; ensuring conformity of vehicles to European technical standards and environmental requirements.	"The Guidelines for the Development of Transport Sector for 2014-2020"
Reduction of negative impact of transport to the environment	Promoting alternative fuels (i.e. electricity, natural gas and biomethane, hydrogen, biofuel, synthetic and paraffinic fuel) and the related infrastructure.	"Plan for development of alternative fuels 2017 – 2020'

Industry

Table 77 Policy objectives in the transport sector in Latvia

Industrial policy		
Overarching objectives	**Specific objectives**	**Reference documents**
Promotion of goods and services with higher added value	Accessibility of labour and education corresponding to the needs of national economy; Development of industrial areas (high quality infrastructure, roads); Promote technological development towards production of goods with higher added value; Promotion of export; Reduction of costs for energy sources (supporting programmes to increase energy efficiency and reduction of emissions)	"The Guidelines for the Development of Industry Sector for 2014-2020"

Table 78 Policy instruments in the industry sector in Latvia

Industrial policy		
General instrument or instrument category	**Specific policy instruments**	**Reference documents**
Reduction of electricity payment	Criteria for enterprises to obtain reduction of electricity payment	MK Nr.395, adopted in 14.07.2015
Subsidies to promote export	Subsidies to promote export of products and services with high added value	MK Nr.678, adopted in 01.12.2015
Permits, limits	Permits for polluting activities from stationary sources; limits and restrictions to activities involving ozone depleting substances and fluorinated GHGs.	Law On Pollution (adopted in 2001) MK Nr. 182, adopted in 02.04.2013 MK Nr. 1082, adopted in 30.11.2010 MK Nr. 563, adopted in 12.07.2011
Natural resource tax	Tax for GHG emissions from stationary installations	Natural Resources Tax law, (adopted in 2005)
Subsidy to promote production	Subsidy to promote production of products of high added value in agriculture and forestry sectors	MK Nr.293 adopted in 10.05.2016

The Netherlands

Water

Table 79 Policy objectives in the water sector in The Netherlands

Overarching objectives	Code	Specific objectives
Flood protection/water supply	Wa1	Cost reduction of water management/ Increase cost-efficiency in relation to water quality, flood protection, water supply and (re)use of waste water. Currently (2013) Dutch water management costs 7 billion year-1. It is an objective to reduce the costs with 0.75 billion year -1
	Wa2	Ensure long-term flood risk reduction and water supply in view of climate change
	Wa3	In order to reduce the vulnerability of built-up areas to extreme weather conditions and the impact of a potential flood, climate-proof and water-resilient planning must become a self-evident element in spatial (re)development. The Spatial Adaptation Incentive Programme (SRA) aims to realise this goal by 2020, so that the Netherlands will indeed by climate-proof by 2050.

	Wa4	Increase awareness, maintain Climate Adaptation Knowledge, Operationalisation of Climate Adaptation into Practice, Adress urgent Climate Risks, implement climate adaptation into policy and law, monitoring and evaluation of climate adaptation policies
	Wa5	Maintenance of infrastructure for transport and water accessibility & maintenance of infrastructure are the main policy objectives. However, since 2016 also infrastructural project in relation to water management, spatial planning, climate adaptation and climate compatible energy supply can be co-financed by MIRT
Good water quality of surface and ground waters	Wa6	Clean and ecological healthy water for ecosystems and sustainable socio-economic use

Table 80 Policy instruments in the water sector in The Netherlands

Objective	Specific objective	Instrument category	Specific policy instrument
Optimal utilization of resources: circular economy	Cost reduction of water management/ Increase cost-efficiency water quality/supply and (re)use of waste water.	Governmental Achievement Agreements	Cost allocation agreements, strategy to increase cost-efficiency of water management
		Frameworks	Delta Fund, Delta Commissioner, Delta Programme (Water Safety, Spatial Adaptation, Water Supply)
	water management, spatial planning, climate adaptation and climate compatible energy supply	Frameworks	Meerjarenprogramma Infrastructuur en Transport (MIRT) Multi-year program for (co)-financing and subsidies for water management
	Maintenance of Infrastructure for transport and water (incl spatial planning)	Governmental Achievement Agreements	decision support for assessing cost-effectiveness and sustainable alternatives
	Clean and ecological healthy water for ecosystems and sustainable socio-economic use	Governmental Achievement Agreements	Measures in the River Basin Management Plans

Land use

Table 81 Policy objectives in the land use sector in The Netherlands

Overarching objectives	Code	Specific objectives

Increase the competitiveness of The Netherlands by enforcing the spatial-economic structure of The Netherlands	L1	Space for the main network of (sustainable) energy supply and energy transition
	L2	Sustainable, safe and efficient use of the subsoil
	L3	Space for preservation and enforcement of (inter)national unique cultural historic and natural qualities
	L4	Space for water safety
	L5	A framework for climate resilient urban (re)development
		Space for the main network for transport of (dangerous) substances via pipelines
		Better usage of the capacity of the current mobility system
		Maintaining the main network of roads, rails and water ways to preserve the functionality of the mobility system
		An excellent spatial economic structure of the Netherlands through an attractive business climate and good international accessibility of urban regions with a concentration of top sectors
		Improving the environmental quality (air, soil, water) and protection against noise disturbance and external safety risks
		Space for a sustainable freshwater supply
		Conservation of fauna and flora species

Table 82 Policy instruments in the water sector in The Netherlands

Overarching objective	Specific objective	Instrument category	Specific policy instrument
Increasing the competitiveness of the NL	An excellent spatial economic structure	Frameworks	Strategy document (Structuurvisies (regio's en gebieden)) to increase the competitiveness of The Netherlands by enforcing the spatial-economic structure of The Netherlands
		Financial	The urban regions around the mainports, brainports and greenports and their 'backland' connections get priority in the prolonged Infrastrucure fund after 2020
		Financial	Contribution to regional initiatives for integral development of the Westflank Haarlemmermeer and restructuring of the Stadshavens
		Knowledge	Using The College of Governmental Advisors for synergies between spatial development and infrastructure between the area agendas of Noordwest, Utrecht, Zuidvleugel and Brabant
		Knowledge	Developing the knowledge program 'Space and Economy' (with PBL and CPB) and monitoring the competitiveness

	Space for the main network of (sustainable) energy supply and energy transition	Frameworks	Governmental coordination arrangement for big energy infrastructure projects
		Frameworks	Agreements about making the electricity infrastructure suitable for decentralized power generation
		Frameworks	Rijksstructuurvisie 'Windenergie op land' for installations with a capacity of 100 MW and higher
		Frameworks	Governmental procedure from the national strategy Rijksstructuurvisie Windenergie op land for the identification of locations (land based wind-energy plants) with a capacity of 100 MW and higher
		Governmental achievement agreements	Governmental agreements with provinces about pointing out locations for large scale wind energy with the purpose of realizing 6000 MW for wind energy on land in 2020
		Knowledge	Knowledge development on the relationship between energy transition and space (with local governments, PBL and CRA)
	Space for the main network for transport via pipelines	Frameworks	National strategy for pipelines (Rijksstructuurvisie Buisleidingen)
		Governmental achievement agreements	Agreements with Flanders and Germany about the need for cross border cooperation for pipelines of national interest
	Robust network	Frameworks	Regulation for reservation areas for new connections and expansions of the infrastructure
Improving and spatially securing the accessibility	Maintaining the main network	Governmental achievement agreements	Multi-year infrastructure (MIRT) agreements on prioritization of mutual investments (2012-2018) in urban regions around mainports and technological business 'brainports and greenports' and their backland connections, with a good spatial allocations and co-financing.
		Governmental achievement agreements	MIRT agreements on coordination between sea harbors, inland harbors and backland connections and increasing the societal value of sea harbor
		Governmental achievement agreements	MIRT-VAR agreements on developing an efficient multimodal logistic network (harbour Rotterdam)
		Financial	MIRT Infrastructure fund for investments in infrastructure
		Financial	Increasing the possibilities for alliances (public-private and public-public) for financing infrastructure
		Governmental achievement agreements	Vision national core network of goods transportation

		Governmental achievement agreements	Co-operation with local governments to achieve optimal coordination of goods transportation
		Governmental achievement agreements	Creating and executing international agreements (e.g. German inclusion of the Betuweroute)
		Governmental achievement agreements	Agreements about possible adaptation and renewing of main water ways and harbors
		Governmental achievement agreements	Enforcing co-operation with decentral governments regarding traffic management and spatial planning on and around water
		Financial	Using the Infrastructure fund and the Delta fund for management and maintenance of the main infrastructure of roads and water ways
		Knowledge	Developing River Information Services, whereby a link is established with information systems of other (decentralized) governments
Preserving a liveable and safe environment	Sustainable, safe and efficient use of the subsoil	Frameworks	Structuurvisie Nationaal Waterplan for the surge of mineral extraction in (coastal) waters
	Space for the main network of (sustainable) energy supply and energy transition	Frameworks	Mijnbouwwet (Mine construction law) for the main network of (sustainable) energy supply and energy transition
		Frameworks	Law on Expropriation of property (Ontgrondingenwet) for the space for the main network of (sustainable) energy supply and energy transition
		Frameworks	Adapt the Wet Bodembescherming (Law for soil protection)
	Improving the environmental quality (air, soil, water)	Governmental achievement agreements	Agreements with private parties and local governments on connecting mineral extraction with other developments like recreation, water, housing and nature
		Knowledge	Monitoring production/import/export of construction resources
		Knowledge	Developing methods for utilizing and limiting environmental impacts of subsoil use (Space for the main network of (sustainable) energy supply and energy transition)
		Knowledge	Creating a knowledge agenda soil and subsoil with local governments
		Frameworks	Soil protection with Wet milieubeheer (environment management law), decision Milieueffectrapportage and European guidelines for projects and programs

	Frameworks	Soil and groundwater: Decision on soil quality (Besluit bodemkwaliteit); related to European Water Framework
	Governmental achievement agreements	Improving the environmental quality (air, soil, water) by the continuation and realization of the agreements in 'convenant Bodemontwikkelingsbeleid en aanpak spoedlocaties'
	Financial	Perform emergency soil remediation
	Frameworks	Deltawet and Structure vision Ruimte voor de Rivier
	Frameworks	Structure vision Derde Nota Waddenzee preservation of nature values
	Governmental achievement agreements	National/regional governments: spatial protection and development of the reconstruction areas (agriculture/rural)
	Governmental Achievement Agreements	Trilateral meetings about the international Waddenzee (Netherlands, Denmark, Germany)
	Governmental Achievement Agreements	Decentralization of the Wadden fund
	Knowledge	Knowledge- and method development for nature, landscape and culture history in MKBA (Societal Costs-Benefit Analysis)

Energy

Table 83 Policy objectives in the energy (biomass) sector in The Netherlands

Overarching objectives	Code	Specific objectives
Sustainable increase in biomass supply	B1	Increasing productivity of agriculture (use of residues)
	B2	Increasing productivity of forestry (use of residues)
	B3	More efforts for efficiency of biomass processing, via bio-refinery and co-production
	B4	Improving generation of biomass from residues
	B5	Combatting waste during harvesting and processing
	B6	Stimulating development of alternative ways of producing resources without using soil and biomass (like artificial photosynthesis)
	B7	Optimizing and closing loops (Cascaded use of biomass)
	B8	Production of aquatic biomass
	B9	Use of degraded soils for biomass production
Emission reduction of		The Netherlands aims for a 49% reduction of Greenhouse gases in 2030 based on 1990 emissions; and 95% reductie broeikasgas 2050

Greenhouse gases	• Reduction aims per sector: Industry 22 Mega tonnes; Mobilitysector 7 Mega tonnes; building industry 7 mega tonnes; electricity 20 mega tonnes; agriculture and land use 3,5 mega tonnes). • End the electricity production from coal by 2030 • Install a minimum price for CO2 in the electricity production • Agriculture and land use: deliver (bio)resources for other sectors and contribute to negative emissions.	
	The Netherlands will take the lead in the EU to achieve a 55% emission reduction goal for Greenhouse gases and initiate collaboration with Northwestern EU MS for an agreement on the 55% emission reduction.	

Table 84 Policy instruments in the energy (biomass) sector in The Netherlands

Overarching objective	Specific objective	Instrument category	Specific policy instrument
Sustainable use of biomass supply	Resource efficiency	Framework	Eliminating barriers in regulations for the production of biomass. Started with the program Conflicting Interests (Botsende Belangen) Bio-based Economy' to remove barriers for closing loops and chains
			Transition Agenda: Collaboration on new ways of stimulating more biomass production and usage
			Identifying and pushing bio-based initiatives with an added value for the Dutch economy
		Financial	Investment subsidy SDE+: Mono manure fermentation tender (150 million euros available for building 200 mono manure digesters)
			Subsidy Renewable Energy (also biomass; annual 50mln)
		Knowledge	Innovation funds in Topconsortium for Knowledge and Innovation (TKI) Bio Based Economy (BBE)
			Innovation contract 2012-2016 Bio-based economy for (1) Bio-based materials, (2) Bio-energy and bio-based chemicals, (3) Integrated bio-refinery, (4) Optimization of production and biomass production, (5) Re-use: water, nutrients and soil, and (6) Economy, policy and sustainability
		Knowledge	Biobased Industries Joint Undertaking (BBI JU) Research & Innovation actions, demonstrations and Flagships, coordination and support actions (Horizon 2020)
		Knowledge	The transition house: a project organization to stimulate new interactions, integral cooperation, cross sectoral networks, consortia and platform projects. Most important products is viable business cases
		Knowledge	Green Deal Business with Biomass and Bio-based Gas
	Production	Framework	Action Plan Forest & Wood with (1) 100.000 hectares extra forest in The Netherlands, (2) 50% more productivity in existing forest management, (3) Ten regional biomass hubs, and (4) Toolbox for climate smart forestry

Agriculture and food

Table 85 Policy objectives in the agriculture sector in The Netherlands

Overarching objectives	Code	Specific objectives
Agricultural policy		
Improving competitiveness of the agricultural sector	A7	Creating conditions for the economic and social regeneration of rural areas (RDP)
	A7	Better food chain organization and risk management (RDP)
	A7	(Rural) Modernization and rejuvenation (RDP)
	A7	Good functioning of the market: Smarter co-operation and safety net for low prices
		Stabilizing farmers income by providing financial support (CAP)
		Extra support for young farmers (CAP)
Improving sustainability in the agricultural sector	A1	Compliance of farmers with environmental and sustainability criteria: crop diversification
	A2	Compliance of farmers with environmental and sustainability criteria: maintaining permanent grassland
	A3	Compliance of farmers with environmental and sustainability criteria: conserving 5% of areas of ecological interest
	A5	Compliance of farmers with environmental and sustainability criteria: investments in nature and landscape
	A6	Compliance of farmers with environmental and sustainability criteria: improvement of water quality
	A8	Compliance of farmers with environmental and sustainability criteria: restoring, preserving and enhancing ecosystems related to agriculture and forestry
	A9	Increasing sustainable agricultural production
Food policy		
Sustainable and healthy food consumption		Improvement of product composition
		Healthy and sustainable food choice
		Unambiguous and reliable provision of information
		Education in healthy and sustainable food at schools
Achieving worldwide food security	F1	Enforcing international food security
	F5	Developing alternative protein sources
Sustainable food chains	F2	Reducing food waste from consumer side
	F3	The Netherlands a front runner in high quality efficient food production
	F4	Being a front runner in the use of renewable energy and low emissions in food production

	F6	Reducing crop losses from production
	F7	Optimal re-use of rest streams
		Producing, processing and consuming food with the smallest impact possible on ecosystems and well-being of animals and humans
		All the food on the Dutch market is sustainably produced and distributed
		Transition from an agricultural policy towards a food policy
A robust food system		Less dependence on import of proteins

Table 86 Policy instruments in the agriculture sector in The Netherlands

Overarching objective	Specific objective	Instrument category	Specific policy instrument
Improving competitiveness	Income of farmers	Financial	Direct Payments
			Young farmer regulation focused on innovative investments (€5.2 million per year)
	Rural development	Financial	Technical assistance (€6,4 million per year)
		Financial (compensation)	Guaranteed support for market introduction for risky innovations (GMI) (€3,5 million)
		Financial (compensation)	Continuation of a broad weather insurance (€8 million euros per year)
		Knowledge	Investments in development and innovation roll out (€9,6 million per year)
		Financial	LEADER (Bottom up approach for local initiatives) (€11.6 million per year)
		Financial	Investments in agricultural structure (€15,8 million per year)
		Framework	Creation of operational groups European Innovation Partnership (EIP) (€2,4 million)
Sustainability	Improvement of ecosystems	Financial	Direct Payments: In 2020 260 euros basic subsidy per hectare
			Direct Payments for greening: in 2020 115 euros greening subsidy per hectare
			Agricultural nature management in accordance with nature pact (70 million euros/y)
			Hydrological measures in the Programme Approach Nitrogen in accordance with nature pact (10 million euros/y)
			Additional measures for construction, management and recovery of landscape elements (6,4 million euros/y)

	Improvement of water quality	Financial	Management subsidies for water services (blue services) (4,3 million euros/y)
		Research and Development	Non-productive investments for water quality (18,2 million euros/y)
		Research and Development	Improvement of water quality through innovation (2,7 million euros/y)
	Sustainability and resilience	Research and Development	Investing in satellite data for precision agriculture

Table 87 Policy instruments in the food sector in The Netherlands

Overarching objective	Specific objective	Instrument category	Specific policy instrument
Enforcing securing food safety: antibiotics	Combatting antibiotics resistance	Governmental Achievement Agreements	Integral One Health approach international measures regarding health care, livestock farming, communication and development of new antibiotics
		Frameworks	Pushing resistant antibiotics on the WHO, FAO and OIE agendas
		Governmental Achievement Agreements	Global Action Plan against resistant antibiotics
		Frameworks	Pushing reduction of antibiotics usage in livestock farming (-70% by 2015)
		Governmental Achievement Agreements	Giving official support to EU to combat resistant antibiotics
Sustainable and healthy food consumption	Improvement of product composition and Healthy and sustainable food choice	Frameworks	Improved product content:(Akkoord verbetering productsamenstelling) Agreement with branch organizations of producers and the catering industry that contains ambitious goals for reducing sugars, saturated fat and calories in nutrition
		Governmental Achievement Agreements	Stimulating innovations in product composition and healthy and sustainable food choice through Top sectors policy
		Knowledge	Awareness raising by Voedingscentrum and Milieu Centraal for unambiguous and reliable information and education on healthy and sustainable food at schools
		Governmental Achievement Agreements	Stimulating businesses to enforce the function of 'het Vinkje' and continue innovation that focuses on healthy alternatives
		Knowledge	Stimulating and supporting schools to give attention to healthy food in their own way

		Knowledge	Contributing to international programs, research and innovation regarding malnutrition
Achieving worldwide food security	Enforcing international food security & Developing alternative protein sources	Governmental Achievement Agreements	Supporting initiatives that are focused on farmer rights, eco-efficient production and chain development and sustainable area management
Sustainable food chain	Enforcing international food security & Developing alternative protein sources	Knowledge	Supporting international initiatives for knowledge- and capacity development of farmers regarding climate adaptation
	Optimal use of biomass	Governmental Achievement Agreements	Agenda Verduurzaming Voedsel: Make food consumption more sustainable in cooperation with Alliantie Verduurzaming Voedsel: voluntary collaboration on optimal usage of biomass
	All the food on the Dutch market is sustainably produced and distributed	Governmental Achievement Agreements	Focusing on a chain approach to achieve that all the food on the Dutch market is sustainably produced and distributed
		Governmental Achievement Agreements	Supporting initiatives from chain parties for more focus on a chain approach to achieve that all the food on the Dutch market is sustainably produced and distributed
		Knowledge	Investing in knowledge programs for sustainably produced and distributed food
		Governmental Achievement Agreements	Establishment of a voluntary scientific (Wageningen) 'Alliance for Climate Smart Agriculture'
A robust food system	All the food on the Dutch market is sustainably produced and distributed	Governmental Achievement Agreements	Establishment of 'Global Oceans Action Network for Blue Growth and Food Security' together with Grenada and Indonesia
	Transition from agricultural to food policy	Governmental Achievement Agreements	Investing via Top sectors policy in a transition from agricultural to food policy, less dependency on protein and protection of intellectual properties of plant varieties

	Frameworks	Putting a transition from agricultural to food policy, less dependency on protein and protection of intellectual properties of plant varieties on European agenda during EU presidency

Nature

Table 88 Policy objectives in the nature sector in The Netherlands

Overarching objectives	Code	Specific objectives
Sustainable chains	N1	More wood from sustainably managed forests on the Dutch market
	N2	Protection of nature on landscape level in production areas of agro resources
	N7	Production of biomass for electricity and warmth is sustainable
	N10	Increasing Dutch wood production
		Getting chain parties in the wood sector together
		Tackling the plastics in sea
		Restoring degraded ecosystems in the marine environment
Valuation of natural capital	N8	Working on closed loops and creating higher value for sustainable resources
	N9	Providing insight into the economic value of our ecosystem services
		Exploring whether companies want to compensate their impact on biodiversity voluntarily
		Creating a digital atlas of our ecosystem services
		Further upscaling of green entrepreneurship
		Agriculture: Climate-smart agriculture
Including nature in the development of areas	N3	Ecosystems: Balancing food production and biodiversity
	N4	Ecosystems: Restoring degraded ecosystems on land
	N5	Urban development: Stimulating green industrial areas via the Green Table where knowledge and awareness about biodiversity is the core area of attention
	N5	Urban development: Stimulating use of more green for more health
	N5	European level: More co-operation on the European nature network and biogeographical region where The Netherlands belongs to
	N6	Agriculture: Sustainable increase in agricultural productivity
		Ecosystems: Less negative impact on nature by crop protection means
		Agriculture: Worldwide practice of sustainable agricultural development with knowledge of Dutch companies
		Urban development: Stimulating that municipalities and provinces, companies and societal partners work on a green work- and living environment
Green entrepreneurship as the engine of the economy		Green entrepreneurship as the engine of the economy

Table 89 Policy instruments in the nature sector in The Netherlands

Objective	Specific objective	Instrument category	Specific policy instrument
Green economy: sustainability chains	More wood from sustainably managed forests Dutch market: More cooperation chain parties, sustainable production of biomass for electricity/heath	governmental achievement agreements	Green Deal Stimulate Sustainable Forestry (Bevorderen Duurzaam Bosbeheer)
		governmental achievement agreements	Creating sustainability criteria for solid biomass
	Protection of nature on landscape level in production areas of agro resources	frameworks	Nature Protection law (Wet natuurbescherming)
		Financial	(Agrarian) Nature Protection Subsidy (Subsidie Natuurbeheer) for farmers and private land owners
		governmental achievement agreements	Develop a regional cycle approach for making chains more sustainable
		governmental achievement agreements	Stimulating green innovation via a bottom up approach that brings science, innovative businesses and young people together
		governmental achievement agreements	Making efforts to make worldwide multilateral agreements for sustainable wood management
	Increasing Dutch wood production	governmental achievement agreements	Action Plan Forest & Wood (Bos & Hout): (1) Expansion of forest area; and (2) More productive management
Green economy: valuation of natural capital	Valuation of Natural Capital, True Pricing: Upscaling green entrepreneurship and closed loops	governmental achievement agreements	Stimulating that companies will take the value of natural capital into account for a higher value for sustainable resources
Nature Inclusive area development of agriculture	Climate-smart agriculture, global practices of sustainable agricultural	governmental achievement agreements	Stimulating area coalitions (with the provinces) to create synergy between water management, agriculture, sustainable energy and nature
		governmental achievement agreements	Supporting initiatives to make national and international resource chains more sustainable
Including nature in the development of	Other areas: A stronger focus on nature dynamics	governmental achievement agreements	Stimulating organizations to produce sustainable energy in combination with improving the quality of the environment, nature, and landscape

areas: other areas

Waste

Table 90 Policy objectives in the waste management sector in The Netherlands

Overarching objectives	Code	Specific objectives
Optimal utilization of resources	W1	Stimulating prevention of waste, in a way that the total waste supply cannot be higher than 68Mton in 2015 and 74Mton in 2021
	W2	Increase the useful application of the total waste, the residential waste and HDO sector, and maintain the high application rate of the construction sector
	W3	Optimal utilization of the energy content of waste that cannot be recycled
	W4	Improvement of waste separation and collection
		Focus on sustainability at the front part of the waste chain (prevention of waste)
		More sustainable consumption patterns (prevention)
		Addressing specific chains and waste streams
		Simplification of measurement methods, indicators and certifications
		Focusing the existing policy on circular economy
		Make space for innovation in laws and regulations
		Minimalizing the amount of rest waste in the waste processing ovens (efficient incineration)
		Developing financial and other market incentives
		Linking knowledge and education to the circular economy
		Optimal utilization of the rest heat of waste incineration
		Reducing the impact on the environment by 20% for each of the seven priority streams that are addressed in the chain approach of the waste policy

Table 91 Policy instruments in the waste management sector in The Netherlands

Overarching objective	Specific objective	Instrument category	Specific instrument
Optimal utilization of resources: sustainability	Focus on sustainability at the front part of the waste chain	Frameworks	VANG: From Waste to Resource (Van Afval naar Grondstof program
		governmental achievement agreements	Green Development Initiative global register for projects for sustainable landuse
		governmental achievement agreements	Supporting the Ecosystem Return Foundation

Optimal utilization of resources: sustainability	More sustainable consumption patterns	governmental achievement agreements	Green Deal second hand stores and reparation stores checking if the infrastructure for re-use and reparation of products can be enforced
			Green Deal retail for more sustainable consumption
			Green Deal Circular Purchasing and Circulairondernemen.nl is an online community of the program Nederland Circular!: stimulating a sustainable circular economy. Also biomass projects, national and international High value use of biotic rest streams.
	More sustainable consumption patterns	Framework	Law prohibiting free plastic bags in stores
Optimal utilization of resources: chains	Addressing specific chains and waste streams	governmental achievement agreements	Creating a Support Unit 'steunpunt' for a chain approach: information to private parties, inventory and analysis per chain of the bottlenecks and opportunities and tacking care of quick processing
		governmental achievement agreements	Green Deal GFT (organic waste)
			Partnership with Staatsbosbeheer in the sales of biomass
		Frameworks	Continued development of sustainability criteria for biomass
	Simplification of measurement methods, indicators and certifications	governmental achievement agreements	Cooperation for different measurement methods
		governmental achievement agreements	Providing information on certifications and what they imply
		governmental achievement agreements	Supporting Dutch True Price Platform
		governmental achievement agreements	Make the availability, quality and use of information about waste part of a structural policy evaluation
Optimal utilization of resources: circular economy	Focusing the existing policy on circular economy & Make space for innovation in laws and regulations	governmental achievement agreements	Program Space Within Rules (Ruimte in Regels): Track unnecessary barriers in laws and regulations and remove them

		Frameworks	Establishing national criteria for end-of-waste status: definitions of waste as resource under European law: E-tool which companies can use to get information about this concept
		Knowledge	Create space for innovation in laws and regulations
			Stimulating a European common level playing field for waste through 'Europese Verordening Overbrenging Afvalstoffen (EVOA)'
		governmental achievement agreements	Adapting National Waste Management Plan to stimulate innovation: forbidding disposal of waste materials that can be recycled as fuel or filling mines
		Frameworks	Using national and international norms to push sustainability, asking Europe for dynamic norms
	Improvement of waste separation and minimalizing amount of rest waste in waste processing ovens	governmental achievement agreements	Facilitating municipalities
		Frameworks	Green Deal soil ashes
			Inspiring and facilitating citizens to separate their waste via 'Duurzaam Doen' program (also schools)
			Action plan for waste separation in the public spaces (RWS together with sectors)
Optimal utilization of resources: circular economy	Developing financial and other market incentives	Knowledge	Stimulate the use of new business models: Stimulating research to business models that promote sustainability
	Developing financial and other market incentives	Financial	Examine possibilities for setting up a revolving fund for the circular economy to give a helping hand to companies experimenting with Circular Economy
			Adapt landfill tax rules to ensure they tie in with promoting the circular economy
	Linking knowledge and education to the circular economy	Knowledge	Setting up knowledge and education programmes for 'Waste to Resource'
		Knowledge	SME innovation stimulation scheme for top sectors
		Knowledge	Focusing European research programmes on the circular economy: Horizon2020 and Eco-Innovera

	governmental achievement agreements	Make the Netherlands a hotspot for the circular economy by Green Deals
	Knowledge	Communication to create knowledge and acceptance
	Financial	Financial instruments: Waste tax (processing by companies); Producer responsibility (internalizing waste costs in the product price); Diftar (differentiated tariffs) and municipality levies from citizens for costs of waste management
	Frameworks	New regulation for business waste and dangerous substances

Sweden

Water

Table 92 Policy objectives in the water sector in Sweden

Overarching Objectives	Specific Objectives	Reference Documents
Protect inland surface waters, transitional waters and coastal waters.	Maintain and improve the aquatic environment (essentially water quality) Prevent further deterioration of aquatic ecosystems and protect/enhance their status Promote sustainable water use based on long-term protection of available water resources Protect and improve the aquatic environment through specific measures for the progressive reduction of discharges, emissions and losses of priority hazardous substances Ensure the progressive reduction of pollution of groundwater and prevent its further pollution contribute to mitigating the effects of floods and droughts Provision of the sufficient supply of good quality surface water and groundwater as needed for sustainable, balanced and equitable water use Achieving the objectives of relevant international agreements, including those which aim to prevent and	Environmental Code, (1998:808) Chapter 5 Section 8 Swedish Ordinance (2004:660) on Management of the Quality of the Aquatic Environment Directive 2000/60/EC of 23 October 2000 establishing a framework for Community action in the field of water policy Environmental Quality Objectives – A Shared Responsibility (Gov. Bill 2004/05:150)

	eliminate pollution of the marine environment, by Community action under Article 16 Protect territorial and marine waters Ensure greater integration of qualitative and quantitative aspects of surface waters Establish common definitions of the status of water in terms of quality and, where relevant for the purpose of the environmental protection, quantity should be established; Achieve the objective of at least good water status for each river basin by defining and implementing the necessary measures within integrated programs of measures; Protect, enhance and restore all bodies of surface water with the aim of achieving good surface water status in 2015 Protect and enhance all artificial and heavily modified bodies of water with the aim of achieving good ecological potential and good surface water chemical status by 2015 Implement the necessary measures with the aim of progressively reducing pollution from priority substances	
Ensure the sustainable management of natural resources.	Restore, preserve and enhance ecosystems related to agriculture and forestry, with a focus on: ▪ restoring, preserving and enhancing biodiversity ▪ improving water management, including fertiliser and pesticide management	Ordinance (2015:406) on the Support for Rural Development Measures Ordinance (2015:407) of Locally Led Development
Lakes and watercourses must be ecologically sustainable, of good quality and their variety of	Development of environmental quality standards for water bodies and for fish/bivalve waters. Provide rules for the identification, control and classification of surface bathing waters. Reduce acidification.	Ordinance (SFS 2004:660) on management of the quality of the aquatic environment Ordinance (2008:218) on Bathing Waters

habitats must be preserved.	Support liming of lakes and rivers. Reduce pollution. Protect water areas with high natural value. Restoring disturbed fresh waters. Reinstate a sufficient number of ecologically sustainable and diverse habitats. Strengthen the financial and the legal frameworks for restoring rivers and streams.	Ordinance (SFS 2001:554) on Environmental Quality Standards for Fish and Bivalve Waters Ordinance (SFS 1982:840) on Government Funding for Liming of Lakes and Rivers A Swedish strategy for biodiversity and ecosystem services (Gov. Bill 2013/14:141) Ordinance (SFS 2007:845) on Species Protection
Groundwater must provide a safe and sustainable supply of drinking water and contribute to viable habitats for flora and fauna in lakes and watercourses.	Secure good water quality by establishing measures on water quantity Ensure greater integration of qualitative and quantitative aspects of groundwater. Reduce the extraction of gravel from Eskers (natural gravel deposits). Implement the measures necessary to prevent or limit the input of pollutants into groundwater and to prevent the deterioration of the status of all bodies of groundwater; Protect, enhance and restore all bodies of groundwater, ensure a balance between abstraction and recharge of groundwater Implement the measures necessary to reverse any significant and sustained upward trend in the concentration of any pollutant resulting from the impact of human activity in order progressively to reduce pollution of groundwater;	Environmental Code, (1998:808) Chapter 5 Section 8 Swedish Ordinance (2004:660) on Management of the Quality of the Aquatic Environment Directive 2000/60/EC of 23 October 2000 establishing a framework for Community action in the field of water policy Act (SFS 1975:424) on the Duty to Report on the Exploration for Groundwater and Drilling of Wells Act (1995:1667) on Natural Gravel Tax
Natural productive capacity, biological diversity, cultural heritage assets and the ecological and water-conserving function of the landscape must be preserved, at the	Support people's opportunities to spend time in nature and enjoy outdoor recreational activities, with the right of public access being a foundation of outdoor recreation.	Act (SFS 1993:787) on Fisheries Ordinance (SFS 1994:1716) on Fishing, Aquaculture and Fisheries Ordinance (SFS 1998:1343) on the Support of Fish Conservation Act (SFS 1998:812) Containing Special Provisions concerning Water Operations

same time as recreational assets are safeguarded.		Act (SFS 2006:412) on Public Water Services
Promote sustainable development to ensure a healthy and sound aquatic environment for present and future generations	The environment is protected against damage and detriment, whether caused by pollutants or other impacts. Valuable natural and cultural environments are protected and conserved. Biological biodiversity is preserved. The use of land, water and the physical environment in general is such as to secure a long-term good management in ecological, social, cultural and economic terms. Reuse and recycling, as well as other management of materials, raw materials and energy are encouraged with a view to establishing and maintaining natural cycles.	Environmental Code, (SFS 1998:808), Chapter 1

Table 93 Policy instruments in the water sector in Sweden

General Instrument or Instrument Category	Specific Policy Instruments	Reference Documents
Administrative (Regulation)	Provisions on flood risk assessments and management plans.	Ordinance (SFS 2009:956) on Flood Risk
	Provisions concerning the management of the quality of the aquatic environment.	Ordinance (SFS 2004:660) on management of the quality of the aquatic environment
	Site protection and nature conservation agreements, which affect forest activities	Environmental Code (SFS 1998:808), Chapters 7-8

	Ordinance (SFS 1998:1252) on Protection of Natural Areas According to Environ. Code
Definition of duties for municipal authorities to provide for coordinated water services. General directives for the planning and operation of water supply and discharge installations.	Act (SFS 2006:412) on Public Water Services
Regulations regarding fishing activities	Act (SFS 1993:787) on Fisheries Ordinance (SFS 1994:1716) on Fishing, Aquaculture, Fisheries
Water-related provisions governing the construction, viability, operation, safety, management and cancellation of public roads.	Act (SFS 1971:948) on Roads
Provisions on the planning of land and water areas.	Act (SFS 2010:900) on Planning and Building Ordinance (SFS 2011:338) on Planning and Building
Minimum requirements as to how to manage the forest, which can have substantial physical and hydrological impacts.	Act (SFS 1979:429) on Forest Maintenance Ordinance (SFS 1993:1096) on Forest Maintenance
Provisions on the protection and management of cultural heritage.	Act (SFS 1988:950) on Cultural Heritage Ordinance (SFS 1988:1188) on Cultural Heritage
Regulations on environmentally hazardous activities.	Environmental Code (SFS 1998:808) Ordinance (SFS 1998:899) on Environmentally Hazardous Activities and the Protection of Public Health
Provisions on environmental impact statements and strategic environmental assessment reports.	Environmental Code (SFS 1998:808) Ordinance (SFS 1998:905) on Environmental Impact Statements
Provisions on the continuous examination, assessment and minimization of risks associated with the use of chemicals.	Environmental Code (SFS 1998:808) Ordinance (SFS 1998:901) on Operator's Control
Regulations concerning measures on waste and waste management.	Environmental Code (SFS 1998:808) Ordinance (SFS 2001:512) on the Landfill of Waste Ordinance (SFS 2011:927) on Waste
Provisions on the identification, control and classification of surface bathing waters.	Ordinance (2008:218) on Bathing Waters
Provisions regarding environmental quality standards for fish and bivalve waters.	Ordinance (SFS 2001:554) on Environmental Quality Standards for Fish and Bivalve Waters
Provisions on the handling of plant nutrients.	Environmental Code (SFS 1998:808) Ordinance (SFS 1998:915) on Environmental Considerations in Agriculture
Provisions on drinking water quality.	Act (SFS 2006:804) on Food
Regulations regarding the reporting on drilling, digging or any other operation for the exploration of groundwater.	Act (SFSS 1975:424) on the Duty to Report on the Exploration for Groundwater and Drilling of Wells

	Provisions on the responsibilities and tasks of the County Administrative Boards, which are coordinating national authorities with supervisory responsibilities that work amongst others on issues concerning the environment and nature.	Ordinance (SFS 2007:825) with Instructions for the County Administrative Board
Economic (Fee)	Annual fees to be paid by water operators as determined by the Land and Environment Court.	Act (SFS 1998:812) Containing Special Provisions concerning Water Operations
	Fees to be paid by property owners for the supply of drinking water and the removal of waste water.	Act (SFS 2006:412) on Public Water Services
	Water operators have to pay compensations to property owners in case of property damage.	Environmental Code (SFS 1998:808)
	Fees to be paid in case of water pollution caused by emissions from ships.	Act (SFS 1993:787) on Fishing
	Environmental sanction charges can be charged directly by a supervisory authority when a violation against the Environmental Code (SFS 1998:808) is ascertained.	Environmental Code (SFS 1998:808), Chapters 29-30
Economic (Subsidy)	Financial compensation for water operators in connection with the establishment of nature reserves.	Environmental Code (SFS 1998:808)
	Government Funding for municipalities to support liming of lakes and rivers to reduce acidification	Ordinance (SFS 1982:840) on Government Funding for Liming of Lakes and Rivers
	Financial support for fish conservation activities.	Ordinance (SFS 1998:1343) on the Support of Fish Conservation
	Financial support for forestry actions resulting in the protection of natural environments and cultural heritage.	Ordinance (SFS 2010:1879) on Support for Certain Measures in Forestry
	Financial support for investing in the improvement of the environment (e.g. reductions in leaching from farms or establishment/restoration of wetlands)	Ordinance (2015:406) on the Support for Rural Development Measures Ordinance (2015:407) of Locally Led Development
Economic (Tax)	Natural gravel tax, which indirectly reduces hydrological impacts.	Act (1995:1667) on Natural Gravel Tax
	Tax on pesticides to reduce the impact on water quality.	Act (SFS 1984:410) on Taxation of Pesticides
	Tax on NOx emissions, with the intent of reducing acidification and eutrophication.	Act (SFS 1990:613) on an Environmental Charge on Emissions of Nitrogen Oxides in Energy Production
Information	Project “Focus on Nutrients” (‘Greppa näringen’), which is the largest single undertaking in Sweden to reduce losses of nutrients to air and water from livestock and crop production. It offers free-of-charge advice to farmers.	http://www.greppa.nu/om-greppa/om-projektet/in-english.html
	Provide consultation, education and information material, e.g.	A Swedish strategy for biodiversity and ecosystem services (Gov. Bill 2013/14:141)

	▪ Handbook for water planning ▪ Handbook on water protection areas ▪ General advice on nitrogen fertilization of forest land provided by the Swedish Forest Agency	
Voluntary Action (Agreement)	Voluntary nature conservation agreements ("Naturvårdsavtal") between the government and a landowner to formally support long-term development and protection of areas with high natural values	Proposal for Consequential Legislation to the Environmental Code (Gov. Bill 1997/98:90)

Land use and forestry

Table 94 Policy objectives in the land use and forestry sector in Sweden

Overarching Objectives	Specific Objectives	Reference Documents
Production goal: Ensure a reliable yield of timber	Reforest unproductive or idle forest land within three years. Use only reforestation methods that were found to produce satisfactory results within an acceptable time frame. Apply necessary rejuvenation measures to ensure regrowth of a forest of adequate density. Plowing may not be used as a soil/land preparation method.	Act (SFS 1979:429) on Forest Maintenance Ordinance (SFS 1993:1096) on Forest Maintenance
Environmental goal: Sustainable development and management of forest resources	The environment is protected against damage and detriment, whether caused by pollutants or other impacts. Valuable natural and cultural environments are protected and conserved. Biological biodiversity is preserved. The use of land, water and the physical environment in general is such as to secure a long-term good management in ecological, social, cultural and economic terms. Reuse and recycling, as well as other management of materials, raw materials and energy are encouraged with a view to establishing and maintaining natural cycles.	Environmental Code, (SFS 1998:808), Chapter 1 Environmental Quality Objectives – A Shared Responsibility (Gov. Bill 2004/05:150), Chapter 16 Ordinance (SFS 2010:1879) on Support for Certain Measures in Forestry A Swedish strategy for biodiversity and ecosystem services (Gov. Bill 2013/14:141)

	Knowledge transfer and innovation in forestry and rural areas is fostered. Resource efficiency is promoted and the shift towards a low carbon and climate resilient economy in the forestry sector is supported.	Ordinance (SFS 2007:845) on Species Protection Act (SFS 1988:950) on Cultural Heritage Ordinance (SFS 1988:1188) on Cultural Heritage Ordinance (SFS 2015:406) on the Support for Rural Development Measures Ordinance (SFS 2015:407) of Locally Led Development
Achieve the forest policy goals decided on by the government	The Swedish Forest Agency shall be responsible for: ▪ supervising regulatory compliance ▪ creating inventories, following-up and evaluating how the forests are managed ▪ providing advice and information on how the forests should be managed ▪ working towards the achievement of the Environmental Objectives and the Generation Goal, and, if necessary, proposing measures for the development of environmental work ▪ coordinating follow-up, evaluation and reporting of the Environmental Objective “Living Forest” ▪ assisting in issues related to community planning for sustainable development and use of natural resources ▪ coordinating the implementation, development, follow-up and reporting of the goals of the Outdoor Recreation Policy	Ordinance (SFS 2009:1393) with Instructions for the Swedish Forest Agency

Table 95 Policy instruments in the land use and forestry sector in Sweden

General Instrument or Instrument Category	Specific Policy Instruments	Reference Documents
Administrative (Regulation)	Define minimum requirements as to how to manage the forest	Act (SFS 1979:429) on Forest Maintenance Ordinance (SFS 1993:1096) on Forest Maintenance

	Provisions concerning forestry activities that can potentially have a significant impact on the natural environment (including an obligation to make a notice of consultation)	Environmental Code, (SFS 1998:808), Chapter 12, Section 6
	Site protection and nature conservation agreements, which affect forest activities	Environmental Code (SFS 1998:808), Chapters 7-8 Ordinance (SFS 1998:1252) on the Protection of Natural Areas According to the Environmental Code
	Provisions concerning the management of the quality of the aquatic environment, which affects the management of forests	Ordinance (SFS 2004:660) on management of the quality of the aquatic environment
	Provisions on the protection and management of cultural heritage.	Act (SFS 1988:950) on Cultural Heritage Ordinance (SFS 1988:1188) on Cultural Heritage
	Provisions on the trading, storage, and display of threatened species without special permission.	Ordinance (SFS 2007:845) on Species Protection
Economic (Fee)	Environmental sanction charges can be charged directly by a supervisory authority when a violation against the Environmental Code (SFS 1998:808) is ascertained.	Environmental Code (SFS 1998:808), Chapters 29-30
Economic (Subsidy)	Financial support for environmental measures in forests	Ordinance (SFS 2015:406) on the Support for Rural Development Measures Ordinance (SFS 2015:407) of Locally Led Development
	Financial support for forestry actions resulting in ▪ the protection of natural environments and cultural heritage, and ▪ for establishing or protecting broad-leaved deciduous forest	Ordinance (SFS 2010:1879) on Support for Certain Measures in Forestry
Information	Provide advice and information on how the forests of the country should be managed	Ordinance (SFS 2009:1393) with Instructions for the Swedish Forest Agency A Swedish strategy for biodiversity and ecosystem services (Gov. Bill 2013/14:141)
Research & Development	Extensive research and innovation efforts into biodiversity and ecosystem services.	A Swedish strategy for biodiversity and ecosystem services (Gov. Bill 2013/14:141)
Voluntary Action (Certification)	Forest Certification through the Forest Stewardship Council (FSC) and the Programme for the Endorsement of Forest Certification (PEFC)	Environmental Quality Objectives – A Shared Responsibility (Gov. Bill 2004/05:150)
Voluntary Action (Agreements)	Voluntary nature conservation agreements ('Naturvårdsavtal') between the government and a	Proposal for Consequential Legislation to the

	landowner to formally support long-term development and protection of areas with high natural values	Environmental Code (Gov. Bill 1997/98:90)

Energy

Table 96 Policy objectives in the energy sector in Sweden

Overarching Objectives	Specific Objectives	Reference Documents
Sustainable and environmentally friendly energy supply	Promotion of the production of renewable energy and thereby increase their share The target by 2040 is 100 per cent renewable electricity production. By 2045, Sweden is to have no net emissions of greenhouse gases into the atmosphere and should thereafter achieve negative emissions. Impose modern environmental requirements on hydropower Continue to protect the protected 'national rivers' in the north of Sweden and other waterways specified by law from development Reduce property tax on hydropower plants Extend the electricity certificate system and expand by 18 TWh of new electricity certificates until 2030.	Act (SFS 2010:601) on Guarantees of Origin for Electricity Ordinance (SFS 2010:853) on Guarantees of Origin for Electricity Act (SFS 2010:598) on Sustainability Criteria for Biofuels and Bioliquids Ordinance (SFS 2011:1088) on Sustainability Criteria for Biofuels and Bioliquids Act (SFS 2011:1200) Regarding Electricity Certificates Ordinance (SFS 2011:1480) on Electricity Certificates Agreement by The Government, the Moderate Party, the Centre Party and the Christian Democrats on Swedish energy policy
Efficient energy use with minimal impact on the environment	An energy-efficiency target for the period 2020 to 2030 will be produced and adopted no later than 2017. Adapt existing regulatory frameworks to new products and services in the areas of energy efficiency, energy storage and electricity sales Introduce a special energy efficiency program Investigate broadly the potential obstacles to enable services to develop with respect to active customers and energy efficiency	Act (1994:1776) on Tax on Energy Ordinance (2010:178) on Tax on Energy Agreement by The Government, the Moderate Party, the Centre Party and the Christian Democrats on Swedish energy policy

Competitive energy provision: Offer electricity at competitive prices and build a robust electricity network with high security.	Strengthen Nordic cooperation on network investments, develop the cooperation on NordPool, and contribute to completing the move towards a harmonized Nordic electricity retail market Nuclear power needs major investment if it is to meet upcoming safety requirements. Continue high production of hydropower Increase transmission capacity within Sweden	Agreement by The Government, the Moderate Party, the Centre Party and the Christian Democrats on Swedish energy policy

Table 97 Policy instruments in the energy sector in Sweden

General Instrument or Instrument Category	Specific Policy Instruments	Reference Documents
Administrative (Regulation)	Provisions concerning power installations, trade in electrical power in certain cases and electrical safety.	Act (SFS 1997:857) on Electricity
	Provisions on the use of biofuels (in transport) and bioliquids (for electricity and heating)	Act (SFS 2010:598) on Sustainability Criteria for Biofuels and Bioliquids Ordinance (SFS 2011:1088) on Sustainability Criteria for Biofuels and Bioliquids
	Provisions concerning guarantees of origins to reduce greenhouse gas emissions and improve sustainability rating.	Act (SFS 2010:601) on Guarantees of Origin for Electricity Ordinance (SFS 2010:853) on Guarantees of Origin for Electricity
	Provisions of the Environmental Code, which indirectly affect the use of land and water areas for energy production.	Environmental Code, (SFS 1998:808)
	Provisions of the Planning and Building Policy, which affect the use of land and water areas for energy production.	Act (SFS 2010:900) on Planning and Building Ordinance (SFS 2011:338) on Planning and Building
Economic (Flexible Mechanisms)	EU Emission Trading System (EU ETS)	Ordinance (SFS 2004:1205) on Emissions Trading
Economic (Subsidy)	Carbon tax relief for industry Energy tax exemption for fuels used in industrial activities in the manufacturing process.	Act (1994:1776) on Tax on Energy
	Financial support to promote the development of new technology and the use of more energy-efficient products and systems (technology procurement)	Ordinance (SFS 2003:564) on Grants for Measures Promoting Effective and Environmentally Sustainable Energy Supply

Economic (Tax)	▪ Energy tax ▪ Carbon tax ▪ Electricity consumption tax	Act (1994:1776) on Tax on Energy Ordinance (2010:178) on Tax on Energy
Information	Information initiatives, including ▪ Energy advice ▪ Energy labeling ▪ Energy declarations for buildings ▪ campaigns on energy use	'Policy Instruments for Reduced Environmental Impacts' (Swedish Energy Agency, 2007)
Research & Development	Extensive research and innovation efforts in the energy field.	Research and New Technology for the Future Energy System (Gov. Bill 2005/06:127)
Voluntary Action (Certification)	Electricity Certification	Act (SFS 2011:1200) Regarding Electricity Certificates Ordinance (SFS 2011:1480) on Electricity Certificates
	Energy Mapping (provides municipalities and utilities with a way to evaluate existing energy use in a community and plan to improve energy efficiency through the use of better building standards and alternative energy sources)	'Policy Instruments for Reduced Environmental Impacts' (Swedish Energy Agency, 2007)

Agriculture, food and environment (horizontal)

Table 98 Policy objectives in the horizontal sectors in Sweden

Overarching Objectives	Specific Objectives	Reference Documents
Environmental goal: A varied agricultural landscape	Protect the value of the farmed landscape and agricultural land for biological production and food production. Preserve and strengthen biological diversity and cultural heritage assets.	A Swedish strategy for biodiversity and ecosystem services (Gov. Bill 2013/14:141) Environmental Quality Objectives – A Shared Responsibility (Gov. Bill 2004/05:150)
A market-oriented agricultural sector and a competitive food supply chain	Increase overall food production while achieving the relevant national environmental objectives. The increase in production – of both conventional and organic food – should correspond to consumer demands. Generate growth and employment Increase the level of self-sufficiency. Reduce vulnerability in the food supply chain.	A National Food Strategy for Sweden – more jobs and sustainable growth throughout the country (Gov. Bill 2016/17:104)

Environmental goal: Rich Diversity of Plant and Animal Life	Preserve biological diversity for the benefit of present and future generations. Safeguard species habitats and ecosystems and their functions and processes. Provide people with access to a good natural and cultural environment rich in biological diversity, as a basis for health, quality of life and well-being.	A Swedish strategy for biodiversity and ecosystem services (Gov. Bill 2013/14:141) Environmental Quality Objectives – A Shared Responsibility (Gov. Bill 2004/05:150)
Environmental goal: Zero Eutrophication	Nutrient levels in soil and water must not be such that they adversely affect human health, the conditions for biological diversity or the possibility of varied use of land and water.	Environmental Quality Objectives – A Shared Responsibility (Gov. Bill 2004/05:150)
Environmental goal: A Magnificent Mountain Landscape	Preserve the pristine character of the mountain environment in terms of biological diversity, recreational value, and natural and cultural assets. Activities in mountain areas must respect these values and assets, with a view to promoting sustainable development. Protect particularly valuable areas from encroachment and other disturbance.	Environmental Quality Objectives – A Shared Responsibility (Gov. Bill 2004/05:150)
Environmental goal: Natural Acidification Only	Limit the acidifying effects of deposition and land to values that can be tolerated by soil and water.	Environmental Quality Objectives – A Shared Responsibility (Gov. Bill 2004/05:150)

Climate

Table 99 Policy objectives in the climate sector in Sweden

Overarching Objectives	Specific Objectives	Reference Documents
Ambitious, long-term and stable climate policy	Government's climate policy is to be based on the climate goals. The new climate act specifies how the work is to be carried out. The Government is to present a climate report every year in its Budget Bill.	A Climate Policy Framework for Sweden (Gov. Bill 2016/17:146

	Every fourth year, the Government is to draw up a climate policy action plan which is to provide information on how the climate goals are to be achieved.	
Reduce Climate Impacts	Limit the rise in the global average temperature well below 2°C above pre-industrial levels. Pursue efforts to limit the rise to 1.5°C above pre-industrial levels.	A Climate Policy Framework for Sweden (Gov. Bill 2016/17:146
Emission reduction	By 2045, no net emissions of greenhouse gases into the atmosphere, thereafter negative emissions. By 2045, emissions from activities in Swedish territory at least 85% lower than in 1990 Increased uptake of carbon dioxide in forests and land, and investments in other countries. By 2030: emissions in Sweden outside of the EU ETS at least 63 per cent lower than emissions in 1990, and by 2040 at least 75 per cent lower. No more than 8 and 2 percentage points, respectively, of the emissions reductions may be realized through supplementary measures. By 2030: Emissions from domestic transport in the area of domestic aviation reduced by at least 70 per cent compared with 2010.	A Climate Policy Framework for Sweden (Gov. Bill 2016/17:146 Environmental Quality Objectives – A Shared Responsibility (Gov. Bill 2004/05:150) , Chapter 5
Ensure climate action	Foster knowledge transfer and innovation. Promote resource efficiency and support the shift towards a low carbon and climate resilient economy in agriculture, food and forestry.	Ordinance (2015:406) on the Support for Rural Development Measures Ordinance (2015:407) of Locally Led Development

Table 100 Policy instruments in the climate sector in Sweden

General Instrument or Instrument Category	Specific Policy Instruments	Reference Documents
Administrative (Regulation)	Land drainage provisions of the Environmental Code, which indirectly affect trends in carbon dioxide removal	Environmental Code, (SFS 1998:808), Chapter 11

	Site protection and nature conservation agreements, which indirectly affect trends in carbon dioxide removal	Environmental Code, (SFS 1998:808), Chapter 7-8
	Provisions on forest management in the Forestry Act, which indirectly affect trends in carbon dioxide removal	The Swedish Forestry Act (SFS 1993:1096)
	Provisions on the use of biofuels (in transport) and bioliquids (for electricity and heating)	Act (SFS 2010:598) on sustainability criteria for biofuels and bioliquids Ordinance (SFS 2011:1088) on sustainability criteria for biofuels and bioliquids
	Provisions concerning guarantees of origins to reduce greenhouse gas emissions and improve sustainability rating.	Act (SFS 2010:601) on Guarantees of Origin for Electricity Ordinance (SFS 2010:853) on Guarantees of Origin for Electricity
Economic (Flexible Mechanisms)	EU Emission Trading System (EU ETS) Joint Implementation (JI) Clean Development Mechanism (CDM)	Ordinance (SFS 2004:1205) on Emissions Trading
Economic (Subsidy)	Financial support to local climate investments with the goal to provide greatest possible climate benefit and reduce greenhouse gas emissions.	Ordinance (SFS 2015:517) on Aid to Local Climate Investments
	Financial support to municipalities for energy and climate consulting	Ordinance (SFS 2016:385) on Financial Support for Municipal Energy and Climate Advisors
Economic (Tax)	Energy tax Carbon tax Electricity consumption tax	The Swedish Energy Tax Act (1994:1776)
Information	Information campaigns at local, regional and national levels	Sweden's Sixth National Communication on Climate Change (Swedish Ministry of the Environment, 2015)
Research & Development	Extensive research and innovation efforts.	A Climate Policy Framework for Sweden (Gov. Bill 2016/17:146
	Technology procurement: Support the development for more energy-efficient products/systems and an increased use of renewable energy.	Sweden's Sixth National Communication on Climate Change (Swedish Ministry of the Environment, 2015)
Voluntary Action (Certification)	Electricity Certification	Act (SFS 2011:1200) Regarding Electricity Certificates Ordinance (SFS 2011:1480) on Electricity Certificates

Andalusia

Water

Table 101 Policy objectives in the water sector in Andalusia

Water		
Overarching objectives	**Specific objectives**	**Reference documents**
Integrated water management	Prevents further deterioration, protects and enhances the status of water resources	Spanish water law Andalusian water law National hydrological plan Andalusian Water Agreement in the Guadalquivir RBD
	Promotes sustainable water use based on long-term protection of water resources	
	Ensures the progressive reduction of water pollution	
	Meet the demand for water as effectively as possible while harmonizing regional and sector development	Spanish water law Andalusian water law National hydrological plan Andalusian Water Agreement in the Guadalquivir RBD
Policy integration in water management	Integrate public water domain protection within sectoral policies and land planning	Andalusian water law
Water management planning	River basin management plans	Spanish water law River basin management plans
Conserve water resources through the increase of water use efficiency in agriculture	Transformation and improvement of irrigation systems	National irrigation plan Horizon 2008
Enhance competitiveness of the Andalusian irrigation sector	Improvement of irrigation systems Ensure water supply (regulation mechanisms, reclaimed water, desalinisation) Improve knowledge transfer Promote research and innovation in the sector Sustainable water use (reduce water use, adequate water allocation to crops..) Contribute to achieve objectives under the WFD Improve energy use efficiency in irrigation Promote the introduction of renewable energies	Agenda for Andalusian Irrigation Horizon 2015
Irrigation planning in Doñana Natural Park	Make agriculture and tourism activities compatible with the protection of the environment of Doñana and the rational use of water.	Special Management Plan of the Irrigation Zones Located to the North of the Forest Crown of Doñana

Table 102 Policy instruments in the water sector in in Andalusia

Water

General instrument or instrument category	Specific policy instruments	Reference documents
Taxes	Fee for using the public water resources Fee for using water to produce electric energy Fee for using hydraulic works and water rate	Spanish water law Andalusian water law
Penalties	Sanctions for infringing the law (overexploitation, illegal wells, etc.)	Spanish water law Andalusian water law
Permits	Water volume transfer between basins	National hydrological plan
Taxes	Fee for water transfer (water use rate + environmental fee)	
Regulations	Definition of common technical and methodological criteria for RBMP Implement measure for efficiency water supply Research and innovation in the field of water Monitoring of the implementation of RBMP	
Programs	Program of public investment in water works	
Measures	Reduce point-source and diffuse pollution Reduce pressures on water extraction Conservation and improvement of aquatic ecosystems Face water governance problems Increase resource availability Prevent floods	River basin management plans

Land use

Table 103 Policy objectives in the land use sector in Andalusia

Land		
Overarching objectives	**Specific objectives**	**Reference documents**
Urban development planning	Develop instruments to coordinate land and urban development planning Regulation of soil prices	Law 7/2002, Urban Planning of Andalusia

Land planning	Reinforce economic competitiveness and social and territorial cohesion Strategy for sustainable spatial development	Andalusian Land Planning Scheme
Sustainable development of coastal areas	Control urbanization process in coastal areas Limit certain economic activities in the Andalusian coast Rationalize the use of inland waters and reduce the rate of growth of water demand Protection and conservation of natural processes and resources Formulate an institutional policy for integrated coastline management Improve coordination and institutional cooperation in matters related to the coast of Andalusia. Encourage public participation in policy decision making	Andalusian Integrated Coastline Management Strategy
Protection of coastal areas	Control urbanization process in coastal areas Protection and conservation of natural processes and resources Promote the maintenance of the coast as a basic tourist resource	Andalusian Coastline Protection Plan

Table 104 Policy instruments in the land use sector in Andalusia

Land		
General instrument or instrument category	**Specific policy instruments**	**Reference documents**
Plans	General plans (urban planning…) Development plans (partial planning, especial plans)	Law 7/2002, Urban Planning of Andalusia
Regulations	Land planning normative Municipal regulations	
Penalties	Land use change actions without licence Infringement of this law Urbanization in undeveloped land	
Plan	Land planning at sub regional level plans Coastal area planning programmes Industrial development plans Tourism planning Energy sustainability plans Water-land programmes	Andalusian Land Planning Scheme
Action lines	Formulate integrated policies for coastlines management Obtain economic resources to support the integrated management of coastline Education and raise awareness	Andalusian Integrated Coastline Management Strategy
Protected areas	Coastlines areas of environmental protection (already under protection – Red Natura 2000, natural protected areas) Coastlines areas of territorial protection (natural or agricultural values)	Andalusian Coastline Protection Plan

Energy

Table 105 Policy objectives in the energy sector in Andalusia

Energy		
Overarching objectives	**Specific objectives**	**Reference documents**
Ensure the economic sustainability of the energy system		Law 15/2012, Fiscal Measures for Energy Sustainability Law 24/2013 Electric Sector Royal Decree 900/2015 that regulates the administrative, technical and economic conditions of the modalities of electric energy supply and production with self-consumption
Reduce energy consumption	Establishes specific reduction to achieve in 2020	Saving and energy efficiency action plan 2014-2020 Saving and energy efficiency action plan 2017-2020
Moving towards a low carbon economy in Spain	20% final energy consumption from renewable sources	Renewable Energy Plan 2014-2020
Moving towards a low carbon economy in Andalusia	Reduce primary energy consumption in 25% 25% final energy consumption from renewable sources	Andalusian Energy Strategy 2020 Andalusian Energy Action Plan 2016-2017

Table 106 Policy instruments in the energy sector in Andalusia

Energy		
General instrument or instrument category	**Specific policy instruments**	**Reference documents**
Taxes	Tax on the nuclear fuel used Tax on hydroelectric generation Tax on fossil fuels Tax on electric generation over all type of sources	Law 15/2012, Fiscal Measures for Energy Sustainability

Regulations	Limitation or suspension on the rights of producers of electric energy from renewable sources Electric markets limitations or modifications Limitation or modification on the rights of third-party access to energy networks Regulation of electric energy prices	Law 24/2013 Electric Sector
Taxes	Rate to access to transport and distribution networks	Law 24/2013 Electric Sector
Subsidies	Building renovation (residential and hotel) Renewal of agricultural Renewal of transport vehicles	Saving and energy efficiency action plan 2014-2020 Saving and energy efficiency action plan 2017-2020
Loans	Industrial investment to increase energy efficiency	
Subsidies to projects and initiatives	Research and innovation in new prototypes Technological demonstration with electric generation Investment thermic renewable energies biogas production Investment in agro-industrial biogas production	Renewable Energy Plan 2011-2020
Funding programmes	Demonstration projects of innovative technological development in renewable energies Electric energy generation installations (P<10Kw) for self-consumption Thermic renewable energies projects	
Actions on energy infrastructures	Introduction of biogas in natural gas transmission networks Increase presence of biofuels in hydrocarbons logistic	
Dissemination and formation	Promotion, information and formation	
Action lines	Sustainable building Efficient transport Innovation in the energy sector Improvement of energy infrastructures Dissemination and formation Energy management in the regional public administration	Andalusian Energy Strategy 2020 Andalusian Energy Action Plan 2016-2017

Agriculture and food

Table 107 Policy objectives in the food and agriculture sector in Andalusia

Food and agriculture		
Overarching objectives	**Specific objectives**	**Reference documents**

Support EU agriculture	Viable food production Agricultural nature management and climate adaptation Territorial balance	Royal Decree 1075/2014 implementation of direct payments and rural development in Spain Royal Decree 1072/2015 modification of RD 1075/2014 of implementation of direct payment and rural development in Spain Royal Decree 1076/2014 allocation of payment entitlement
Enhance rural development	Improve resource use efficiency Improve the coordination of research and technology transfer Modernisation of farms	National Rural Development Programme 2014-2020 Andalusian Rural Development Programme 2014-2020
Improve competitiveness and promote sustainability of agricultural sector in Andalusia	Improve sector competitiveness Promote research and innovation Encourage sustainable agricultural practices Articulate the food chain Integration of the agricultural activity within the environment Sustainable use of natural resources through the promotion of organic and highly environmental value agriculture	Andalusian agricultural law proposal

Table 108 Policy instruments in the food and agriculture sector in Andalusia

Food and agriculture		
General instrument or instrument category	**Specific policy instruments**	**Reference documents**
Direct payments	Basic payment Green payment Payment for young farmer Coupled support Payment for small farmers Total: 1275 million euros (28% of Spanish direct payments)	Royal Decree 1075/2014 implementation of direct payments and rural development in Spain Royal Decree 1072/2015 modification of RD 1075/2014 of implementation of direct payment and rural development in Spain Royal Decree 1076/2014 allocation of payment entitlement
Rural development aids	Agrienvironmental measures: 328 M€ - 13%* Soil erosion: 201 M€ – 8% Water management: 166 M€ – 7% Improving holdings competitiveness: 524 M€ Promoting the efficiency of resources and support for the transition to a low-carbon economy: 344.9 M€ - 14% Promoting social inclusion, reducing poverty and developing rural economies: 331 M€-14%	Andalusian Rural Development Programme 2014-2020

	Promoting the organisation of the food supply chain: 254.8 M€ -10.4% Investment in improving competitiveness: 203 M€.

*Values in millions euros and % of the RDP total

Climate

Table 109 Policy objectives in the climate sector in Andalusia

Climate change		
Overarching objectives	**Specific objectives**	**Reference documents**
Achieve objectives under the Kyoto Protocol	Actions to fight against climate change and to achieve cleaner energy	Spanish Climate Change and clean energy strategy Horizon 2007-2012-2020
Mitigation of climate change in Andalusia	Establishment of mitigation measures for the sector land use, transport, waste, tourism, agriculture, industry, energy efficiency, renewable energy, carbon sinks, research, communication and dissemination and governance	Andalusian Climate Action Plan: Mitigation programme 2007-2012
Adaptation to climate change in Andalusia	Establishment of adaptation measures for the sectors water, soil, energy, forest, biodiversity, health, floods, agriculture, tourism, transport, and land use.	Andalusian Climate Action Plan: Adaptation programme 2007-2012

Table 110 Policy instruments in the climate sector in in Andalusia

Climate change		
General instrument or instrument category	**Specific policy instruments**	**Reference documents**
Action lines	Participate in new multilateral Funds, promote the creation of private Funds Increase forest surface, restore the soil cover Increase carbon absorbed in agricultural systems Encourage the small photovoltaic facilities of less than 5 Kw., by improving the premiums related to grid-access conditions and the administrative proceedings to obtain subventions and request connection permission Define biomass national Strategies and the use of organic matter Rationalization of manure management and reduce nitrogen fertilizers Improve energy efficiency in irrigation Improve the use of renewable energies in desalination processes Discourage excessive consumption by means of modifications to the fare structure Support research and innovation projects	Spanish Climate Change and clean energy strategy Horizon 2007-2012-2020

Measures	Include climate change issues in land and urban planning Promotion the production and use of biofuels Improve waste management Enhance sustainable tourism Increase carbon absorbed in agricultural systems Reduce GEI in agriculture Promote renewable energies Define action plan to use of organic matter as biomass Increase carbon absorbed in natural systems Research in energy and agriculture Raise awareness	Andalusian Climate Action Plan: Mitigation programme 2007-2012
Measures	Introduction of crop varieties adapted to drought Control of soil erosion Control of diseases and pests Adapt tourist infrastructures to new climate conditions Land planning adapted to climate change Research and innovation in the field of adaptation to climate change	Andalusian Climate Action Plan: Adaptation programme 2007-2012

Tourism

Table 111 Policy objectives in the tourism sector in Andalusia

Tourism		
Overarching objectives	**Specific objectives**	**Reference documents**
Sustainable tourism promotion	Distribution of powers in the area of tourism the different public regional Administrations Promotion of sustainable tourism as a strategic sector of the Andalusian economy Protection of tourism resources in accordance with the principle of sustainability	Law 13/2011 of Tourism of Andalusia
Promote sustainable tourism	Define strategies and policies to implement a sustainable tourism development model Strengthen the tourism sector and generate employment Dissemination of products promoting and valorising natural, cultural, territorial and landscape resources Establish effective participation mechanisms among the actors involved in the tourism development model	General Plan for Sustainable Tourism in Andalusia – Horizon 2020
Enhance quality tourism	Promote economic development while preserving natural resources Promotion of good tourist practices in protected natural areas Support emerging and innovative tourism initiatives to deal with seasonality	Andalusia Quality Tourism Plan 2014-2020
Promote interior tourism	Tourist attraction poles under the premise of integral sustainability	Sustainable Integral Strategy for the

	Foster the creation of forums for public-private cooperation Contribute to the integration of the local population through the creation of income and employment	Development of Interior Tourism in Andalusia

Table 112 Policy instruments in the tourism sector in Andalusia

Tourism		
General instrument or instrument category	**Specific policy instruments**	**Reference documents**
Action lines	Develop infrastructures that facilitate sector development Diversification of tourist products Sustainable land use Preservation of natural areas	Law 13/2011 of Tourism of Andalusia
Regulations	Regulation regarding tourist accommodation establishments	
Penalties	Infringement of this law	
Action lines	Tourist products and resources inventory Promotion of tourist product out of high season Support to sustainable tourist entrepreneurship	General Plan for Sustainable Tourism in Andalusia – Horizon 2020
Programmes	Excellence tourism Innovation and formation Coordination	Andalusia Quality Tourism Plan 2014-2020
Programmes	Support and formation to tourist sector Sustainability of tourist areas Promotion and communication	Sustainable Integral Strategy for the Development of Interior Tourism in Andalusia

Horizontal

Table 113 Horizontal policy objectives in Andalusia

Horizontal policies		
Overarching objectives	**Specific objectives**	**Reference documents**

Powers allocation to Andalusia		Ley 2/2007 on Reform of the Statute of Autonomy of Andalusia.
Environmental protection	Surveillance and inspection regime and constitutes a set of sanctions aimed at ensuring the restoration of environmental damages	Law 7/2007 de Environmental Quality Integrated Management of Andalusia
Integration of the environmental policy with other policies	Improvement of environmental information Promotion environemental R&D Environmental integrated management Water sustainable management Urban sustainability Environmental integration in economic activities.	Environmental Plan Andalusia - Horizon 2017
Sustainable development in Spain	Protection of the atmosphere, air quality, water, land, nature and health in Spain.	Spanish Strategy for Sustainable Development
Sustainable development in Andalusia	Policies and public and private initiatives towards a sustainable development model based on the transition to a green economy	Andalusian Strategy for Sustainable Development 2020
Sustainable urban development	Political framework to promote sustainable urban development (mobility, building, natural spaces…)	Urban Sustainability Strategy for Andalusia
Promote bio-economy	Agreement to formulate a bioeconomy strategy in Andalusia	Formulation agreement for the Bioeconomy Strategy of Andalusia
Sustainable Rural Development	National political framework on rural development complementing European regulation	Law 45/2007 Sustainable Rural Development
Biodiversity conservation		Andalusian Strategy for Biodiversity Integrated Management
Promotion and development of research and innovation activities in Spain		Spanish Strategy for Science, Technology and Innovation 2013-2020
Promotion and development of research and innovation activities in Andalusia	Promote a new productive model based on innovation that will generate employments and increase productivity in the region	Innovation Strategy 2020 - RIS3 Andalusia

Sardinia

Water

Table 114 Policy objectives in the water sector in Sardinia

Water		
Overarching objectives	**Specific objectives**	**Reference documents**
Preserve water resources	- Increase irrigation efficiency in agriculture using more efficient irrigation systems and water pricing - Reduce leakages in the water distribution systems - Review and updating the Sardinia river basin management plan - Establishment of water authority for riverbeds below great dams	- Regional Rural Development programme - Irrigation regulations of Irrigation Consortia - Sardinian Hydrologic district management plan - Regional Decree N. 1 of 15.03.2016 - Regional Decree N. 33/31 of 10.6.2016
Increase water quality	- Reduction of fertilizers and pesticides in agriculture - Reclaiming of land polluted from mine activities - Reduction of industrial wastes	- Regional Rural Development programme - Sardinian Hydrologic district management plan
Integrated water management	- Implementing the integrated monitoring system - Meeting the demands of different sectors while guaranteeing minimum environmental flows	- Sardinian Hydrologic district management plan - Regional water district management plan 2016-2020

Table 115 Policy instruments in the water sector in Sardinia

Water		
General instrument	**Specific policy instrument**	**Reference documents**
Governance	Coordination of public bodies for monitoring water resources	LR N4 2 febbraio 2015
Management	Optimized water management with monitoring system	PAEER 2013-2020
Normative	Norms for use of treated waste water	Regional directive for reuse of treated waste water
Measures	Technical measures to increase water efficiency for irrigation, industry and domestic use Water pricing Adaptation to climate change Managing runoff and Min Env Flows	Regional water district management plan 2016-2020
Raising awareness	consultancies for farmers	Regional water district management plan 2016-2020 POR FESR Sardegna 2014/2020 Sardinian rural development plans 2014-2020
Funds	Technical measures to increase water efficiency for irrigation, industry and domestic use	POR FESR Sardegna 2014/2020

		Sardinian rural development plans 2014-2020
Norms	irrigation rules (max amounts, managing water scarcity	Irrigation rules of Irrigation consortia

Energy

Table 116 Policy objectives in the energy sector in Sardinia

Energy		
Overarching objectives	**Specific objectives**	**Reference documents**
- Definition of governance and implementation strategy for Plan monitoring - Increase energy security	- Increase the flexibility of the energy system. - Developing an energy system as a tool for economic and social growth and compatible with policies of environmental protection. - Promotion of distributed energy production for auto-consumption - Methanization of the island Use of regional energy resources	Energy Environmental Plan for Sardinia 2015 – 2030 POR FESR Sardegna 2014/2020 priority axis 4 "sustainable energy"
Increase energy saving and Energy efficiency	- Increase Energy efficiency of buildings and transport systems - Development of smartgrids	Energy Environmental Plan for Sardinia 2015 – 2030 POR FESR Sardegna 2014/2020 priority axis 4 "sustainable energy"
Promotion of research	- Enhancing the "governance" of the regional energy system; - Promotion of energy awareness by ensuring active participation in the implementation of plan choices; - Monitoring the energy sector	Energy Environmental Plan for Sardinia 2015 – 2030 POR FESR Sardegna 2014/2020 priority axis 4 "sustainable energy"
Transform the Sardinian Energy System towards an integrated and Smart grid	- Use of ICT to integrate electric, thermal and transport systems - Development and implementation of energy accumulation technologies - Increase the economic competitiveness in the energy market and a full integration in the European market.	Energy Environmental Plan for Sardinia 2015 – 2030 POR FESR Sardegna 2014/2020 priority axis 4 "sustainable energy"

Table 117 Policy instruments in the energy sector in Sardinia

Energy		
General instrument	**Specific policy instrument**	**Reference documents**

Subsidies	energy efficiency for public buildings energy efficiency of private buildings and production of energy with renewables for self-consumption	POR FESR Sardegna 2014/2020 priority axis 4 “sustainable energy” LEGGE 11 dicembre 2016, n. 232 DM 28/12/12, il c.d. decreto “Conto Termico”
Monitoring	monitoring methodology for burden sharing regional objectives	DM 11 maggio 2015 “Metodologia da applicare per rilevare i dati necessari a misurare il raggiungimento degli obiettivi regionali in materia di fonti rinnovabili di energia - Burdensharing”
Trade	Energy saving for gas and electricity distribution companies	DM 20 luglio 2004 “certificati bianchi”
Subsidies	subsidies for renewable energy power plants other than domestic	DM_6_luglio_2012
Regulation	electric energy market rules	DM 21_settembre_2016
Regulation	Norms for simple systems of production and consumption	DEL 12 DICEMBRE 2013 578_2013_R_EEL
Funds for projects/infrastructures	regional and European funds for methane distribution network regional and European funds for smart grid regional funds for self-energy sufficiency of water authority (ENAS) Energy efficiency of water authority	Regional Energy Plan Del. 26_37 30/5/2017 DM 19 October 2016-state aids for infrastructures PON 2014-2020 IV axis POR FESR Sardegna 2014/2020 priority axis 4 “sustainable energy” PAEER 2013-2020
Action lines	Analysis and orientation of policies to meet H2020 targets	Regional Energy Plan

Agriculture and food

Table 118 Policy objectives in the food and agriculture sector in Sardinia

Food and agriculture

Overarching objectives	Specific objectives	Reference documents
Programming rural development in accordance with the strategy Europe 2020, the National Partnership Agreement, National Programs as well as with Regional Programs 2014/2020	- Promoting knowledge transfer and innovation in the agriculture and forestry sectors and in rural areas (horizontal priority). - Improving the competitiveness and profitability of the agricultural sector and agricultural firms. - Promoting the organization of the agri-food production and risk management in the agricultural sector. - Preserving, restoring and enhancing ecosystems dependent on agriculture and forests. - Encouraging the efficient use of resources and the transition to a low-carbon and climate-friendly economy in the agri-food and forestry sectors. - To work for social inclusion, poverty reduction and economic development in rural areas.	- Rural Development Programme for Sardinia 2014-2020. - European Commission implementing Decision C(2015)5893 and amendment approval C(2016)8506/

Table 119 Policy instruments in the food and agriculture sector in Sardinia

Food and agriculture		
General instrument	**Specific policy instrument**	**Reference documents**
Rural development aids	Improve competitiveness 158 M Promote Generational turnover 100 M Improving holdings competitiveness 312 M Risk management 16 M Biodiversity conservation, water management, soil erosion 485 M Increase irrigation efficiency 16 M Increase the use of renewable energies 16 M Carbon sequestration and Conservation of C pools 34 M	Sardinian Rural Development plan 2014-2020
Water pricing	Regional aids to reduce price of water	POR FESR Sardegna 2014/2020 priority axis 4 “sustainable energy” PAEER 2013-2020
Subsidies	Increase efficiency of irrigation systems Increase efficiency of conveyance water distribution systems	National rural development programme
Loans and insurance	Insurance against atmospheric events Instrument to stabilize annual income	National rural development programme
Funds for projects	Increase efficiency of water management (quantitative and qualitative)	POR FESR Sardegna 2014/2020

Land use

Table 120 Policy objectives in the land use and forestry sector in Sardinia

Land use (forestry)

Overarching objectives	Specific objectives	Reference documents
Preventing risks deriving from improper land use.	- identification of risk areas. - enclosure of risk areas and definition of protection criteria - Programming mitigation measures and protection from hydrogeological risk	- Hydrogeological Risk Plan - Action plan for Protected areas (Natura 2000 and SIC) - Regional Landscape Plan
a) To protect the complexity and multi-functionality of the forestry system b) Forecasting, preventing and fighting wildfires	a) The protection and care of woods as an indispensable asset; - Sustainable forest management to meet the needs of the present and future generations - The protection of forest heritage from the threat of fires; b) Updating the regional plan for the prevention of wildfires. Authorizing the Commander of the Forest Corp and the Dept. of Civil Protection to use available funds for the control of fires and firefighting activities.	a) Forestry Law of Sardinia 27 April 2016, n.8 b) Deliberation for Regional Plan for the forecasting, prevention and active fight against wildfires 2014 – 2016. Updated 2016. 2016 Updated General Plan

Table 121 Policy instruments in the land use and forestry sector in Sardinia

LAND USE (FORESTRY)		
General instrument	**Specific policy instrument**	**Reference documents**
Plans	Development plans	Regional Urban Plan Regional Landscape plan
Regulations	Land planning normative Municipal regulations	
Penalties	Land use change actions without licence	
Subsidies	Reduce hydrological risk 27 M	POR FESR Sardegna 2014/2020
Rural development aids	Biodiversity conservation, water management, soil erosion 7 M	Sardinian Rural Development plans 2014-2020
Subsidies	Reduce fire risk 27 M	POR FESR Sardegna 2014/2020

Climate

Table 122 Policy objectives in the climate sector in Sardinia

CLIMATE

Overarching objectives	Specific objectives	Reference documents
Drafting a regional strategy for adaptation to climate change that is in accordance to the National Strategy for Adaptation to Climate Change (SNAC)	Establishment of inter-departmental coordination for a regional climate change adaptation strategy	- Regional Decree 1/9 – 13.1.2015 – National Strategy for Adaptation to Climate Change (SNAC) Establishment of an interdepartmental Committee for the preparation of the regional strategy.
Support the choices of activities for adaptation to climate change at National, regional and urban level	Reduce the vulnerability of natural, social and economic systems Increase their adaptive capacity Find possible synergies between adaptation and sustainable development Favor the coordination of the activities	National Adaptation Plan to climate change (PNACC)
Subnational commitment for the reduction of emissions from 80 to 95% with respect to values of 1990.	Endorsement of "Subnational Global Climate Leadership Memorandum of Understanding" in cooperation with the State of California and the Region of Baden-Württemberg.	Adaptation Strategy to Climate Change. Signing of the protocol "UNDER 2 MOU" ("Sub-national Global Climate Leadership Memorandum of Understanding").

Table 123 Policy instruments in the climate sector in Sardinia

CLIMATE		
General instrument	**Specific policy instrument**	**Reference documents**
Action lines	NA	National Adaptation Plan to climate change (PNACC)
Subsidies	Increase the use of renewable energies 16 M Carbon sequestration and Conservation of C pools 34 M	Sardinian Rural development plan (2014-2020)
Subsidies	energy efficiency for public buildings energy efficiency of private buildings and production of energy with renewables for self-consumption	POR FESR Sardegna 2014/2020 priority axis 4 "sustainable energy" LEGGE 11 dicembre 2016, n. 232 l DM 28/12/12, il c.d. decreto "Conto Termico"
Awareness raising	Education, demonstration	POR FESR Sardegna 2014/2020
Governance	Establishment of inter-departmental coordination for a regional climate change adaptation strategy	- Regional Decree 1/9 – 13.1.2015

Tourism

Table 124 Policy objectives in the tourism sector in Sardinia

TOURISM

Overarching objectives	Specific objectives	Reference documents
Implement the Tourist sector	1) promote tourism by creating a stronger relationship with natural and cultural heritage 2) De-seasonal tourism 3) Coordination activities 4) Qualification and requalification of tourist infrastructures and offers	LR N°16, 28-07-2017: Normatives for the Tourist sector Regional Development Programme 2014 - 2019

Table 125 Policy instruments in the tourism sector in Sardinia

TOURISM		
General instrument	**Specific policy instrument**	**Reference documents**
Subsidies	Conserve and promote natural and cultural heritage	POR FESR Sardegna 2014/2020
Regulations	Allowable expansion of buildings up to 20% along the coastline	Regional Urban Plan
Subsidies	Improve the regional foot and bike path network	POR FESR Sardegna 2014/2020
Action lines	Increase tourist flows in low season months (transport to the island, offer of natural and cultural heritage sites)	Regional tourist strategic plan
Governance	Establishment of a permanent conference for the tourist sector	LR 28 LUGLIO 2017, N. 16
Subsidies	Agri-tourism facilities in rural areas	Regional rural development plan

South West England

Water

Table 126 Policy objectives in the water sector in South-West England

Water		
Overarching objectives	**Specific objectives**	**Reference documents**
The main aims of the Water Act 2014 are to increase competition and liberalise the water regime	Specifically the act aimed to introduce more competition in the sector by encouraging new entrants to offer alternative water sources and innovative ways of treating sewerage. As of April 2017 it is possible for	UK Water Act 2014
To maintain water infrastructure and manage water resources effectively. To develop a resilient and customer focused water industry.	To encourage more efficient use of water, promoting the use and benefits of Sustainable Drainage Systems and ensuring that the regulatory process provides for a longer term view.	Water for life. Defra Dec 2011
To meet the challenges for water and waste water services in 2020.	Promoting discussion on future regulatory framework	Towards Water 2020 – meeting the challenges for water and wastewater services in England and Wales. Ofwat 2015
To set out a framework for planning decisions on large-scale waste water infrastructure.	• Sustainable development, • Public health and environmental improvement, • To improve water quality in the natural environment • To reduce water consumption • To reduce demand for waste water infrastructure capacity • Climate change mitigation and adaptation	National Policy Statement for Waste Water. Defra 2012
To increase the UK's capacity to respond to civil emergencies	To manage responses to the issues of severe flooding arising from river, ground water and coastal regions.	Preparation and planning for emergencies: the National Resilience Capabilities Programme. Cabinet office 2013
To ensure that the Water Act makes a strong contribution to building greater resilience into water resources	Sets out proposal to amend 'general duties' of both Ofwat and Defra. Clarifying the role of the regulatory framework in securing long-term resilience.	Updating the general duties with respect to the water industry to reflect the UK Government's resilience priorities. Defra 2013
To highlight the value of an integrated approach to water resource management that enhances the quality of the aquatic environment.	• Delivering a better quality water environment, • encouraging collaborative work and transparent decision-making, • encouraging sustainable fund management,	Catchment Based Approach: Improving the quality of our water environment. Defra 2013

To highlight the legal obligation of water companies to develop and maintain long term water resource plans	Sets out framework: • Ensure early engagement with regulators customers and interested parties, • full public consultation of proposed plans, • regular revision and review • suitable timescales	Final Water Resources Planning Guidelines. EA 2016
To streamline and integrate Environmental Permitting Regulations.	• Conversion of water abstraction licences into permits, under the EPR • modification to permit volumes based on environmental risk • different permitting levels applicable to water companies and other commercial organisations.	Water abstraction management reform in England: What would reform mean for abstractors? Defra 2016
To enhance existing policy framework to secure long-term resilience of water and wastewater services	• Increased collaboration with water companies, • required the water industry to develop a national water resources long-term planning framework with a 50 year time horizon, • support regional trading of water • increased use of probabilistic analytics and resource modelling to inform the determination of service level, • expectation that water companies will consider time horizons greater than the 25 year mandatory requirement, • enhanced collaboration between neighboring water companies, • collaboration between other sectors, • enhancing natural resilience of the catchment, • minimising leakage and maximising water efficiency • development of wastewater plans similar to the 25 year water resource plan obligation	Creating a great place for living; Enabling resilience in the water sector. Defra 2016
To manage freshwater resources more appropriately to the increasing challenges of climate change and population growth.	• Links permitted rate of abstraction to available raw water resource, • twin track approach managing supply and demand, • increased stakeholder collaboration and integration with land management.	Reform of Freshwater Abstraction. Houses of parliament 2017
To add to Ofwat's remit	added to OFWATs remit: "Primary duty to secure resilience" and "to further the resilience objective." Clause 22 and 22,2(e).	Water Act 2014

	• to ensure that water companies secure long term resilience in their ability to supply primary services with regards environmental pressures, population growth and changes in consumer behavior; • to promote appropriate long term planning, investment, and sustainable management of water resources, with a view to increased efficiency and demand reduction	

Table 127 Policy instruments in the water sector in South-West England

Water Policy		
General instrument or instrument category	**Specific policy instruments**	**Reference documents**
Removal of barriers to competition	The non-household sector is free to switch supplier from April 2017. The combined license is set to be unbundled (in 2019) so that it will be possible for a licensee to hold a wholesale authorisation without having to provide retail services (such as billing and customer services). For new entrants, access rights will be extended to the water companies' treatment and storage systems rather than just mains and pipes, allowing new entrants to input water into any part of the network.	UK Water Act 2014
Proposals to deregulate and simplify legislation, reduce burdens on business and stimulate growth	A draft water bill; a new strategic policy statement for Ofwat; catchment pilots working with the EA; the design of a new abstraction regime; Social tariff guidance.	Water for Life 2014. HMSO
Actions to enhance resilience to climate change.	covers: • Built environment, • Infrastructure, • Healthy and resilient communities, • Agriculture and forestry, • Natural environment, Business and local government.	The National Adaptation Programme: Making the country resilient to a changing climate. Defra 2013
Ofwat Framework	• Defines resilience, • sets key actions to enhance resilience, • proposes mechanisms to measure resilience	Towards resilience: how we will embed resilience in our work. Ofwat 2015
Recommendations to Defra for assessing future needs associated with the resilience of	In line with Water for life 2014.	Water supply and resilience and infrastructure: Environment Agency advice to Defra. October 2015

strategic water infrastructure		
Proposed use of the Outcome Delivery Incentive mechanism to encourage adaptation to climate change.	Establishes a market-based approach to incentivising resilience to climate change.	Enabling, incentivising and encouraging climate adaptation in the water sector. Ofwat 2016

Energy

Table 128 Policy objectives in the energy sector in South-West England

Energy policy		
Overarching objectives	**Specific objectives**	**Reference documents**
To ensure that the net UK carbon account for the year 2050 is at least 80% lower than the 1990 baseline.	It is the duty of the Secretary of State to set for each succeeding period of five years beginning with the period 2008-2012 ("budgetary periods") an amount for the net UK carbon account (the "carbon budget"), and to ensure that the net UK carbon account for a budgetary period does not exceed the carbon budget.	Climate Change Act 2008
To ensure that the net UK carbon account for the year 2050 is at least 80% lower than the 1990 baseline.	Committee on Climate Change's ninth annual assessment of UK progress in reducing emissions and meeting carbon budgets.	Report to Parliament Meeting Carbon Budgets: Closing the policy gap 2017[8]
To set energy policy on 'smart and flexible path'.	Issues that energy systems are facing, and plans for dealing with them and delivering a smart and flexible energy system.	Clean Growth Strategy 2017; GB Industrial Strategy 2017; Ofgem's Strategy for Future Energy Systems 2017; and Ofgem's Strategy for Future Energy Systems 2017[9]
To increase use of renewable sources	The UK is legally bound to provide for 15% of its energy needs—including 30% of its electricity, 12% of its heat, and 10% of its transport fuel—from renewable sources by 2020.	2020 Renewable heat and transport targets[10]
To reduce support for various renewable energy schemes	To reduce costs falling within the Levy Control Framework but curbing costs for schemes	Solar farms: funding, planning and impacts

[8]https://www.theccc.org.uk/publication/2017-report-to-parliament-meeting-carbon-budgets-closing-the-policy-gap/ (accessed 5 March 2018)
[9]https://www.ofgem.gov.uk/system/files/docs/2017/08/our_strategy_for_regulating_the_future_energy_system.pdf (accessed 5 March 2018)
[10] https://publications.parliament.uk/pa/cm201617/cmselect/cmenergy/173/173.pdf (accessed 30 October 2017)

	such as the renewables obligation and the feed-in tariff	
The Renewable Transport Fuel Obligation (RTFO) supports the government's policy on reducing greenhouse gas emissions from vehicles by encouraging the production of biofuels that don't damage the environment.	Under the RTFO suppliers of transport and non-road mobile machinery (NRMM) fuel in the UK must be able to show that a percentage of the fuel they supply comes from renewable and sustainable sources. Fuel suppliers who supply at least 450,000 litres of fuel a year are affected. This includes suppliers of biofuels as well as suppliers of fossil fuel.	RTFO Guidance Part One – Process guidance RTFO Year 10 15th April 2017 to 14th April 2018.
The 2009 Renewable Energy Directive set a target for the UK to achieve 15% of its energy consumption from renewable sources by 2020	The UK renewables policy framework was then made up of three key components: -financial support for renewables -unblocking barriers to delivery -developing emerging technologies.	Renewable Energy Directive 2009
Renewable Heat Incentive - The RHI was designed to help the UK meet its renewable energy targets	More specifically, the RHI was designed to drive a step change in the uptake of renewable heat technologies in order to help deliver an increase in renewable heat (from the 1.5% level of total heat technologies in 2008 to a level of 12% by 2020).	Domestic RHI – April 2014 Non-domestic RHI – November 2011
Electricity market reform – The EMR was designed to attract the £110 billion of investment needed to replace and upgrade the UK's electricity infrastructure	To incentivise investment in secure, low-carbon electricity, improve the security of GB's electricity supply and improve affordability for consumers	Energy Act 2013

Table 129 Policy instruments in the energy sector in South-West England

Energy Policy		
General instrument or instrument category	**Specific policy instruments**	**Reference documents**

Subsidy reduction	Declining tariff rates for solar – currently standing as 4.14 p/kwh for solar PV under 10 kW and 4.36p/kWh for solar between 10-50kW, with an export tariff of 5.03 p/kWh for all installations with an eligibility date on or before 31 March 2018. The UK Government has also limited the Common Agricultural Policy (CAP) funding to solar farms on agricultural land to bring down spending and to reduce energy bills for consumers, as well as freeing up agricultural land for farming.	Solar farms: funding, planning and impacts
Obligation	Obligated suppliers may meet their obligation by redeeming Renewable Transport Fuel Certificates (RTFCs) or by paying a fixed sum for each litre of fuel for which they wish to 'buy-out' of their obligation. RTFCs are gained by supplying sustainable renewable fuels.	RTFO Guidance Part One – Process guidance RTFO Year 10 15th April 2017 to 14th April 2018.
Carbon budgeting	The Committee on Climate Change and the Adaption Sub-Committee were set up to advise on targets and scrutinise the programme for adapting. Legally-binding 'carbon budgets' set a cap on the amount of greenhouse gases emitted in the UK over a five-year period. BEIS and Defra lead on policies for mitigation and adaption respectively.	Climate Change Act 2008
Financial support for renewables	The feed-in tariff, Renewable Obligation certificates and the RTFO all support greater levels of renewable energy. The Green Investment Bank A smarter grid	
Financial support for renewables	The RHI consists of tariffs paid to companies who choose to add to the generation of renewable heat. The policy differentiates support levels by technology, size and consumer groups to better target support levels.	Renewable heat incentive impact assessment
Two main mechanisms were introduced, a capacity market (CM) and Contracts for difference (CfD)	The CM is designed to ensure sufficient reliable capacity is available by providing payments to encourage investment in new capacity or for existing capacity to remain open. CfDs are private contracts that allow low carbon generators to be paid the difference between the 'strike price' – a price for electricity reflecting the cost of investing in a particular low carbon technology – and the 'reference price'– a measure of the average market price for electricity in the GB market. It gives greater certainty and stability of revenues to electricity generators by reducing their exposure to volatile wholesale prices, whilst protecting consumers from paying for higher support costs when electricity prices are high.	BEIS -Electricity Market Reform: Contracts for Difference, updated 8th Feb 2017 DECC Electricity Market Reform: Capacity Market Consultation on Capacity Market supplementary design proposals and changes to the Rules. March 2015

Agriculture and food

Table 130 Policy objectives in the food and agriculture sector in South-West England

Agricultural/ land use policy

Overarching objectives	Specific objectives	Reference documents
Improved management of natural resources and the increased adoption of farming practices that are climate friendly.	Protecting farmland through environmental land management, targeted to specific biodiversity and water objectives.	Rural Development programme for England 2014 -2020.
To address potential implications for the natural environment post-Brexit	This includes the withdrawal from the CAP	House of Commons Environmental Audit Committee on the Future of the natural environment after the EU referendum (UK Parliament, 2016). Health and Harmony: The Future, for food, farming and the environment in a Green Brexit[11] A Green Future: our 25 year plan to improve the environment[12]
To promote an integrated approach to the agri-environment	To create resilient landscapes and seas, put people at the heart of the environment, and grow natural capital.	Natural England 2016. Conservation 21: Natural England's conservation strategy for the 21st century. NE642.
Agri-technology strategy	In partnership with industry, to improve the flow of ideas and solutions from the laboratory to the farm,	UK Strategy for Agricultural Technologies. HMSO 2013. And Feeding the Future: Innovation requirements for Primary Food Production in the UK to 2030. Joint Commissioning Group, 2017.
Policy change post-Brexit must align to enable sustainable and more strategic use of land.	Connect to broader issues - like public health, technology, migration and the shape of our future economy. Policy is important, but not only driver of change. Need to recognize not simply about changing regulations or government subsidies.	Food and Farming Commission: Growing a mandate for change. 2017.
To ensure that food safety is given priority when pesticides are authorised.	the use of pesticides in the production of food as long as: • regulatory bodies follow a precautionary approach when approving the use of pesticides • independent scientific advice says that the safety of pesticides is within acceptable limits • acceptable levels can be set for residues in food	Food Standards Agency website: https://www.food.gov.uk/business-industry/farmingfood/pesticides

[11] https://www.gov.uk/government/consultations/the-future-for-food-farming-and-the-environment (accessed 5 March 2018).
[12] https://www.gov.uk/government/publications/25-year-environment-plan (accessed 5 March 2018).

• enough good-quality information is available to the regulatory bodies on which to base these decisions	

Table 131 Policy instruments in the food and agriculture sector in South-West England

Agricultural /land use Policy		
General instrument or instrument category	**Specific policy instruments**	**Reference documents**
Sustainable Development goals	UK Government has committed itself to implementing the Sustainable Development Goals (17 concern food)	Adoption of Agenda 2030.
Regulate agricultural land sales	EU Member States have the right to restrict sales of farmland to preserve agricultural communities and promote sustainable agriculture. But in doing so they must comply with EU law, in particular rules on free movement of capital.	Guidance to help Member States protect agricultural land from threats such as excessive price speculation and ownership concentration. https://ec.europa.eu/info/business-economy-euro/banking-and-finance/financial-markets/capital-movements_en#legalframework
To undertake land management practices, beyond minimal regulatory compliance, to protect and enhance the environment and wildlife	Countryside Stewardship, Environmental Stewardship and other schemes offer payments to farmers and other land managers in England.	European Agricultural Fund for Rural Development funding.
Local Enterprise Partnerships (LEPs)	Established as locally derived business-led partnerships between the private and public sector to drive local economic growth.	Review of Local Enterprise Partnership Governance and Transparency. DCLG Board. October 2017
EU LEADER programme	Supports the growth of the rural economy, for example through measures such as farm diversification, rural tourism, and cultural and heritage activities.	The Leader Approach. Fact Sheet 2006

Transboundary DE-CZ-SK: Germany

Water

Table 132 Policy objectives and instruments in the water sector in Germany

Key policy objective	Key policy instruments	Relevant for sector	Reference documents (selection)
Improvement of water quality	Pollution limits Monitoring Fees Standards Regulations	Water, Food and agriculture, Land use, Energy	Die Europäische Wasserrahmenrichtlinie (EU-WRRL) (EU Water Framework Directive) Abwasserabgabengesetz - AbwAG Abwasserverordnung - AbwV
Sustainable usage of water	Regulations for usage	Water, Food and agriculture, Land use, Energy	Die Europäische Wasserrahmenrichtlinie (EU-WRRL) Wasserhaushaltsgesetz - WHG
Flood control	Dikes and other flood control measures	Water, Land use, Food and agriculture	Die Europäische Wasserrahmenrichtlinie (EU-WRRL) (EU Water Framework Directive) **Brandenburgisches Wassergesetz (BbgWG)** Floods Directive

Land use

Table 133 Policy objectives and instruments in the land use sector in Germany

Key policy objective	Key policy instruments	Relevant for sector	Reference documents (selection)
Ensuring food quality and production	Controlling ingredients Regulations, Standards Fees	Land use, Food and agriculture, Water	Ernährungssicherstellungs- und vorsorgegesetz – ESVG Gesetz zur Förderung der Einstellung der landwirtschaftlichen Erwerbstätigkeit Flurbereinigungsgesetz (FlurbG) Tierzuchtgesetz (TierZG)
Promotion of ecological cultivation	Subsidies	Land use, Food and agriculture	Direktzahlungen-Durchführungsgesetz - DirektZahlDurchfG Verordnung zur Durchführung des Öko-Landbaugesetzes (Öko-LandbauGDVO M-V
Protection of animals and biodiversity	Regulations	Land use, Food and agriculture	Verordnung über die Jagdzeiten (JagdzeitV 1977) Tierschutzgesetz (TierSchG)
Preservation of forests and their biodiversity	Regulations	Land use, Climate, Food and agriculture	Bundesnaturschutzgesetz BNatSchG Flurbereinigungsgesetz (FlurbG) Verordnung über die Jagdzeiten (JagdzeitV 1977)

Energy

Table 134 Policy objectives and instruments in the energy sector in Germany

Key policy objective	Key policy instruments	Relevant for sector	Reference documents (selection)
End of nuclear energy usage in Germany	Shutdown of atomic power plants	Energy, Climate, Land use	Atomgesetz - AtG
Promotion of renewable energy	Subsidies Biddings for e.g. solar plants	Energy, Water, Food and agriculture, Land use, Climate	Erneuerbare-Energien-Gesetz - EEG 2017 Erneuerbare-Energien-Verordnung – EEV
Improvement of the power network	Subsidies	Energy, Land use	Erneuerbare-Energien-Gesetz - EEG 2017 Erneuerbare-Energien-Verordnung – EEV Energieleitungsausbaugesetz – EnLAG Netzausbaubeschleu-nigungsgesetz Übertragungsnetz (NABEG)
Reduction of energy usage	Regulations for energy usage (taxation) Subsidies Fees	Energy, Climate	Energieeinsparungsgesetz – EnEG Energieeinsparverordnung – EnEV Berliner Energiewendegesetz (EWG Bln)
Sustainable and environmental friendly use of land	Regulations Subsidies Fees	Energy, Water, Food and agriculture, Land use, Climate	Baugesetzbuch BauGB Bundes-Bodenschutzgesetz - BBodSchG
Reduction of emissions	Regulations Subsidies Standards	Energy, Climate	Klimaschutzplan 2050: Klimaschutzpolitische Grundsätze und Ziele der Bundesregierung Erneuerbare-Energien-Gesetz - EEG 2017

Agriculture and food

Table 135 Policy objectives and instruments in the agriculture and food sector in Germany

Key policy objective	Key policy instruments	Relevant for sector	Reference documents (selection)
Prevention of animal diseases and diseases in general	Regulations Standards	Food and agriculture	Tiergesundheitsgesetz - TierGesG Fischseuchenverordnung (FischSeuchV 2008)

Climate

Table 136 Policy objectives and instruments in the climate sector in Germany

Key policy objective	Key policy instruments	Relevant for sector	Reference documents (selection)
Promotion of awareness about the environment	Establishment and support of organizations	Climate	Umweltauditgesetz - UAG UAG-Erweiterungsverordnung - UAG-ErwV

Transboundary DE-CZ-SK: Czech Republic

Water

Table 137 Policy objectives in the water sector in Czech Republic

Overarching objectives	Specific objectives	Reference documents
Water conditions in the landscape	The evidence of decreasing retention ability of the landscape because of urbanization and suggestion how to compensate this; flood protection issue	Act no. 254/2001 Coll. on water
	Flood risk management plans may also include support for sustainable land use, soil water retention and controlled flooding of certain areas in the event of floods.	
Water management in catchment	define spatial pollution, high nutrient and matter losses, high need for water retention in the landscape as big issue – impact of agriculture	National plan of Labe catchment
	create a concept for implementation of anti-erosion measures and measures to increase water retention in the landscape and prepare legislative and financial instruments to implement the proposed measures.	
	reduce spatial and concentrated runoff of surface water by spatial water retention or by slowing the runoff by optimizing landscape structure and using both natural and technical measures to slow down the runoff.	

	Note: Water retention targets are mainly proposed in the upper and middle parts of the river basin, where there is a lower representation of forest stands, in areas with meliorations, on large agricultural field blocks, on the upper sections of tubed streams.	
	apply "good agricultural and environmental condition" requirements and "cross compliance" requirements to increase water infiltration - restore and enhance the retention capacity of the landscape (grassing of spring areas and river meadows, planting forests and trees, opening of major drains, renaturation of channels and fortified streams, setting up of pools in sites with increased groundwater levels, etc.)	
	define discrepancy of CAP and EU energy policy (support of crops supporting erosion for energetic use)	
	suggest different measures to achieve the goals of the catchment plan, i.e. to improve and restore the retention ability of the landscape	
	define the land property as a major barrier for the optimalization and restoration of water regime (the measures should be realized on state property land); as well as missing legislation and financial support for large changes of landscape structure, construction and maintenance landscape features and measures for increasing water retention	
Drought mitigation	To set landscape planning as a tool for water retention	Preparation of measures to mitigate the negative impacts of drought and water scarcity; preparation actions approved by the Government decision no. 620/2015 on Preparation of measures to mitigate the negative impacts of drought and water scarcity
	Specific objectives that occur in connection with retention of water in the landscape. To minimize drought, flood, climate change mitigation are (selection of the targets): . Protection and restoration of the natural water regime in forests · Improving the effectiveness of landscape consolidation with respect to climate change · Stop soil degradation, sealing, excessive erosion, loss of nutrients, loss of organic matter · Ensuring the sustainability and production function of agriculture in order to reduce the negative impacts of climate change · Limiting the emergence and impacts of agricultural drought · Improvement of the management of stormwater in urban areas · Improving the natural retention capacity of watercourses and floodplains	
	· Effective protection and use of water resources · Enhance environmental stability and reduce the risks associated with temperature and air quality in urban areas · Improvement of ecological stabilization functions and landscape permeability	GD no. 34/2017, National adaptation plan

	- To develop a comprehensive system of sustainable land management in the agriculture landscape and in the forests to enhance the soil and landscape retention capacity	
Flood protection	to increase the retention of water in the landscape, construct water reservoirs, revitalization of floodplains, watercourses, improve soil characteristics	Concept of the solution of flood protection in the Czech Republic using both technical and nature measures approved by government decision no. 799/2010 Coll.

Table 138 Policy instruments in the water sector in Czech Republic

Water policy		
General instrument or instrument category	**Specific policy instruments**	**Reference documents**
Protection and restoration of natural water regime in forests	Revision of measures for forestry meliorations, streams and forest roads with a focus on protection and restoration of natural water regime in forests	National Forest Program until 2013 (NLP) State Environmental policy (SPŽP) Strategy of the Ministry of Agriculture of the Czech Republic with a view to 2030 (SrMze) The Concept of Research, Development and Innovation of Ministry of Agriculture of the Czech Republic 2016-2022 (KVVIMZe) Biodiversity Conservation Strategy (SOBR) Plans for flood risk management (PpZPR) National river basin plans (NPP) State Nature Conservation Program (SPOPK) State Forest Policy Principles (ZSLP)
	Minimizing technical drainage of forest land using natural and seminatural procedures	
	Implementation of measures for water retention in forests	
	Applying procedures and measures for harvesting and restoring forests to avoid or slow down surface drainage and soil erosion	
	Stabilizing the forest types affected by water and protection of wetlands in forests	
To process and ensure compliance with the principles of good agricultural practice in terms of protection of water reservoirs and streams		Biodiversity Conservation Strategy (SOBR) State Environmental policy (SPŽP) Strategy of the Ministry of Agriculture of the Czech Republic with a view to 2030 (SrMZe) The Concept of Research, Development and Innovation of

		Ministry of Agriculture of the Czech Republic 2016-2022 (KVVIMZe) State Nature Conservation Program (SPOPK) National river basin plans (NPP)
Minimizing the impact of inappropriately drainage systems on the accelerated outflow of water from the landscape		State Environmental policy (SPŽP) The Concept of Research, Development and Innovation of Ministry of Agriculture of the Czech Republic 2016-2022 (KVVIMZe) National river basin plans (NPP)
Improving the natural retention capacity of watercourses and floodplains	Complex revitalization of watercourses and floodplains and support of spontaneous renaturation	Biodiversity Conservation Strategy (SOBR) Water Policy Concept of the Ministry of Agriculture by 2015 (KVHP Mze) Action Plan Regional Development Strategy (APSRR) State Environmental policy (SPŽP) The Concept of Research, Development and Innovation of Ministry of Agriculture of the Czech Republic 2016-2022 (KVVIMZe) The concept of flood protection in the Czech Republic using technical and nature-friendly measures (KPPO) National river basin plans (NPP) State Nature Conservation Program (SPOPK) Plans for flood risk management (PpZPR)
Effective protection and use of water resources	Ensure a forest management in the protection zones of water resources so that it cannot occur threatening the abundance of water resources	State Environmental policy (SPŽP) Strategy of the Ministry of Agriculture of the Czech Republic with a view to 2030 (SrMZe) The Concept of Research, Development and Innovation of Ministry of Agriculture of the Czech Republic 2016-2022 (KVVIMZe) National river basin plans (NPP)
	Create more detailed plans of water resources protection, including the concept of wetland restoration and revitalization of watercourses, renewal of species and spatial forests composition, land - use optimization, etc.	
	Develop a comprehensive concept for drought and water scarcity and to prevent emergencies caused by long-term water scarcity	Strategy of the Ministry of Agriculture of the Czech Republic with a view to 2030 (SrMZe) Environmental Security Concept (KEB) The Concept of Research, Development and Innovation of Ministry of Agriculture of the Czech Republic 2016-2022 (KVVIMZe)

	Recovery of water management function of small water reservoirs in poor technical condition	Multiannual National Strategic Plan of the Czech Republic for Aquaculture (VNSPA)
	Support for surface water infiltration into ground waters	Strategy of the Ministry of Agriculture of the Czech Republic with a view to 2030 (SrMZe) The Concept of Research, Development and Innovation of Ministry of Agriculture of the Czech Republic 2016-2022 (KVVIMZe)
Incorporate the concept of ecosystem services into the design of new river basin plans		Biodiversity Conservation Strategy (SOBR) The Concept of Research, Development and Innovation of Ministry of Agriculture of the Czech Republic 2016-2022 (KVVIMZe)
Water management in catchment	suggest different measures to achieve the goals of the catchment plan – one of the measures is to improve and restore the retention ability of the landscape by: 1. Implementation of comprehensive measures (type A - according to catchment area management plans) on the agricultural land 2. Maintenance and management of technical and nature measures for the retention, accumulation and improvement of water quality on agricultural land 3. Support for the purchase of land for the implementation of these measures 4. Reimbursement of economic damage from loss of production from the areas designated for the implementation of these measures Needs for changing agriculture policy, legislation, question of land owners, funding etc.	National plan of Labe catchment
Drought mitigation	In the areas of long-term water scarcity, the water supply should be targeted to increase the water supply by restoring the natural accumulation of water (floodplain forests, wetlands), increasing the capacity (reconstruction) of existing artificial accumulations (reconstruction of old water reservoirs) and implementing measures to restore or enhance natural retention of water in the landscape	Preparation of measures to mitigate the negative impacts of drought and water scarcity; preparation actions approved by the Government decision no. 620/2015 on Preparation of measures to mitigate the negative impacts of drought and water scarcity GD no. 34/2017, National adaptation plan
	implementing the measures contained in the River Basin Plans and the measures proposed in the framework of the land consolidation, thereby contributing to the restoration and	

	increase of the retention capacity of the landscape	
Drought mitigation	Increase wetlands area and retention dams on agriculture land by private investments and specific financial support	Strategy of the Ministry of Agriculture of the Czech Republic with a view to 2030 (SrMZe)
	Increase the area of state land property in areas with identified drought problems	
	Start preparation for the realization of technical and nature-friendly measures in the drought endangered areas	
	To prepare a new financial and subsidies programm to support water retention in the landscape by strengthening the retention capacity of the soil, construction of new ponds and small water reservoirs, support for the restoration of extinct ponds and the restoration of wetlands.	
	Wider application and control of compliance with GAEC standards	
	Inclusion of a section to support drought protection measures in legislation.	

Land use

Table 139 Policy objectives in the land/soil sector in Czech Republic

Overarching objectives	Specific objectives	Reference documents
Land consolidation as a tool for minimizing soil erosion, slowdown of water runoff, floods protection	In the plan of common facilities, the whole land consolidation will also be assessed in terms of soil erosion and flood risks, as well as the possibility of water retention in relation to the slowdown of surface runoff. The use of the individual protection measures depends mainly on their efficiency; requires reduction in soil washout, the reduction of maximum flows and the protection of water resources, watercourses, water reservoirs and built-up parts of the municipality. The plan of the common facilities must be completed by a proposal of agro-technical and organizational measures, with which landowners will be demonstrably acquainted; Furthermore, the plan of the common facilities includes an evaluation of the change of the runoff parameters as a basis for the solution of the runoff in the catchment area.	Government decree no. 13/2014 Coll. On the procedure for the implementation of land consolidation and the requirements of land consolidation proposal
	Landscape consolidation provides conditions for improving the quality of life in rural areas, including diversification of economic activities and improving agricultural competitiveness, improving the environment, protecting and regeneration the soil fund, improving forestry and water	Act no. 139/2002 Coll. On landscape consolidation and land offices

	management, especially in the field of minimizing the adverse effects of floods and drought and increase the ecological stability of the landscape. The land reform results serve for the renewal of the cadastral project and as a basis for spatial planning.	
Agriculture soil protection	Define water features (reservoirs, flood protection measures, etc.) as agriculture land fund	Act of the Czech National Council no. 334/1992 Coll., on agriculture soil protection
	Define changes in agriculture land fund are possible in case of water quality deterioration, erosion risks, soil characteristics deterioration	Government decree no. 13/1994 Coll., which amends some details on the protection of the agricultural land fund
Protecting and enhancing the ecological stability of the landscape and sustainable farming in the landscape	- increase ecological stability of the landscape - restoration of landscape water regime - mitigation of landscape fragmentation - Conservation and strengthening of non-production functions of agricultural landscapes and forests	State environmental policy
Better environment in urban areas	- support greening in urban areas - Improvement of rainwater management in residential areas	State environmental policy
Protection and sustainable use of land	Limits for land occupation	State environmental policy
Land consolidation, land property support	- land consolidation solution in areas threatened by climate change impacts, complex land consolidation should be directed primarily to areas of vulnerable water erosion and non-forested areas with a high risk of accelerated runoff; - arranging ownership relationships to land so as to allow the construction of flood protection structures and the implementation of plans for common facilities, including water and anti-erosion measures; - projects focusing on enhancing water retention in the landscape, such as proposals for the rehabilitation and construction of water reservoirs and anti-erosion measures; -with the help of simple and complex lands consolidation, to contribute to the enhancement of landscape retention capacity through water management and anti-erosion adjustments;	Strategy of the Ministry of Agriculture of the Czech Republic with a view to 2030

Table 140 Policy instruments in the land/soil sector in Czech Republic

Land policy

General instrument or instrument category	Specific policy instruments	Reference documents
Improving the efficiency of land consolidation	Financial and material support for land consolidation	Biodiversity Conservation Strategy (SOBR) Strategy of the Ministry of Agriculture of the Czech Republic with a view to 2030 (SrMZe) The concept of flood protection in the Czech Republic using technical and nature-friendly measures (KPPO) State Nature Conservation Program (SPOPK) The Concept of Research, Development and Innovation of Ministry of Agriculture of the Czech Republic 2016-2022 (KVVIMZe) State Environmental policy (SPŽP) The Concept of Research, Development and Innovation of Ministry of Agriculture of the Czech Republic 2016-2022 (KVVIMZe) Plans for flood risk management (PpZPR)
	Implement the necessary legislative arrangements to secure a state land reserve	
	Legislatively modify the instruments for financial support of purchase of land for implementation of common facilities, anti-erosion and water management measures incl. revitalization within land consolidation	
	Organizational support for the implementation of land consolidation	
	Implementation of complex land consolidation in terms of increasing the retention capacity of the landscape	
	Within the common facilities, combining technical and seminatural measures to increase the retention capacity of the landscape	
	Reduce the share of leased land to 70% by incentives to realize the investments in land purchase and continue support of the implementation of land consolidation. At the same time, an improvement in the relationship to the land is achieved.	
Stopping soil degradation by excessive erosion, depletion of nutrients, loss of organic matter and soil sealing	Measures to reduce water and wind erosion of agricultural land by 50 % by direct payments for greening, strict application of AECM, GAEC	Biodiversity Conservation Strategy (SOBR) State Environmental policy (SPŽP) Strategy of the Ministry of Agriculture of the Czech Republic with a view to 2030 (SrMZe) The Concept of Research, Development and Innovation of Ministry of Agriculture of the Czech Republic 2016-2022 (KVVIMZe) State Nature Conservation Program (SPOPK) National river basin plans (NPP)
	Maintaining and increasing the ability of the soil to bind water – instruments are not still specified; application of GAEC, AECM	Biodiversity Conservation Strategy (SOBR) State Environmental policy (SPŽP) Strategy of the Ministry of Agriculture of the Czech Republic with a view to 2030 (SrMZe) The Concept of Research, Development and Innovation of Ministry of Agriculture of the Czech Republic 2016-2022 (KVVIMZe)
	Strict application of the Act of the Czech National Council no. 334/1992 Coll., on agriculture soil protection - reduce soil sealing, improve soil structure, increase the organic matter content of soil	

		Plans for flood risk management (PpZPR)State Nature Conservation Program (SPOPK)
	In terms of greening implementation: -the obligation to apply the diversification of crops to improve the environment and, in particular, to improve soil quality -the obligation to respect the ratio of permanent grassland (PG) to the total number of arable land and the prohibition of ploughing PG and to change the type of agricultural crop within environmentally sensitive areas -set up ecological focus areas, whose main objective is to preserve and improve biodiversity (eg through fallow land, landscape features, catch crops, nitrogen-binding crops, etc.).	Strategy of the Ministry of Agriculture of the Czech Republic with a view to 2030 (SrMZe)
Stopping soil degradation by excessive erosion, depletion of nutrients, loss of organic matter and soil sealing	Strengthening and effective application of Cross Compliance / GAEC rules in relation to the use, protection and improvement of agricultural land - in particular: -projection of real erosion risk into the respective LPIS layer and interconnection with the prescribed mode of landuse while providing sufficient soil protection technologies -major strengthening of the GAEC standards for improving the quality of soil and water - in particular under GAEC 1 and 3 (water protection by delimitation of non-fertilized streams along water courses and protection of groundwater against pollution), GAEC 4 (ensuring minimum land cover), GAEC 5 measures for erosion by introducing and requiring protection of soil from wind erosion), GAEC 6 (preservation of the content of organic matter) and GAEC 7 (in 2016 extension of landscape elements by a new one - wetland, in the following years efforts to further enlargement of landscape elements e.g leakage, or other anti-erosion measures, in particular technical ones).	Strategy of the Ministry of Agriculture of the Czech Republic with a view to 2030 (SrMZe)
Rural development program	Strengthen the prevention of soil degradation, strengthen the soil and landscape retention capacity	Strategy of the Ministry of Agriculture of the Czech Republic with a view to 2030 (SrMZe)
Increase of ecological stabilization functions and	Protection, conservation and restoration of natural elements and ecosystems in the landscape	Biodiversity Conservation Strategy (SOBR) State Environmental policy (SPŽP)
	To analyze the performance of state administration in nature and landscape conservation and to	

landscape permeability	analyze the methodological support of nature protection organizations activities in relation to climate change and landscape planning (based on spatial planning, land consolidation, water planning, forest planning, etc.)	Strategy of the Ministry of Agriculture of the Czech Republic with a view to 2030 (SrMZe) State Nature Conservation Program (SPOPK) Plans for flood risk management (PpZPR)
Increase of ecological stabilization functions and landscape permeability	Set conditions for keeping natural and seminatural ecosystems to protect soil in agricultural landscape without the need to their removal from agriculture fund	
	Inventarize peat bogs and other small wetlands and identify other areas suitable for restoration. To elaborate a timetable for the recovery of priority peat bogs and other selected wetlands and to evaluate the financial costs of the recovery.	
	Revise legislation and, if necessary, propose amendments to ensure better protection and restoration of wetlands.	
	Review and modify a set of land-analytical phenomena in order to capture historical landscape structures whose regeneration can contribute to increasing landscape retention and erosion threats.	Decree No. 500/2006 Coll., On Territorial Analytical Documents, on Territorial Planning Documents and on the Evidence on Territorial Planning Activity
Ensure national evaluation of ecosystem services		Biodiversity Conservation Strategy (SOBR) The Concept of Research, Development and Innovation of Ministry of Agriculture of the Czech Republic 2016-2022 (KVVIMZe)

Energy

Table 141 Policy objectives in the energy sector in Czech Republic

Overarching objectives	Specific objectives	Reference documents
Increase support of renewable energy resources	To set national target for the share of energy from renewable sources by 2020 in electricity, heating and cooling and transport. 13,5 % energy from renewable resources	National action plan of the Czech Republic for the renewable resources energy
	To support of ripe and corn planting for biomass production	

Table 142 Policy instruments in the energy sector in Czech Republic

Energy policy		
General instrument or instrument category	Specific policy instruments	Reference documents
Renewable energy sources resisting the effects of climate change	Ensuring that biomass is available as an energy source and supporting energy sources that produce environmentally friendly and cost-effective production	National Action Plan of the Czech Republic for Renewable Energy 2010-2020 (NAPOZE) National Forest Program until 2013 (NLP) Biomass Action Plan 2012-2020 (APB) Action Plan Regional Development Strategy (APSRR) State Environmental policy (SPŽP) The Concept of Research, Development and Innovation of Ministry of Agriculture of the Czech Republic 2016-2022 (KVVIMZe)
	Define energy crops that will be able to adapt to climate change while not contributing to a worsening of the soil and water regime and requiring high inputs of additional energy, industrial fertilizers or biocides; to encourage the cultivation of these crops on less fertile soils in less favored areas	
Using renewable energy sources and increasing energy efficiency	Promote the use of renewable energy sources, with a focus on biomass production in accordance with the Biomass Action Plan.	Government decision no. 207/2017 Coll., Policy of climate protection in the Czech Republic
Support for biogas stations	Encourage the use of methane and prevent its spontaneous occurrence by processing residues of agricultural production in biogas stations, including support for prolonging the life of existing biogas stations.	Government decision no. 207/2017 Coll., Policy of climate protection in the Czech Republic
CAP	Enable the cultivation of multi-annual herbs for energy purposes and forage crops within "eco-friendly areas"	Biomass Action Plan.
	Set up the conditions for the providing subsidies for permanent grassland and less-favored areas to motivate the use of harvested material for further purposes	

Agriculture and food

Table 143 Policy objectives in the agriculture sector in Czech Republic

Overarching objectives	Specific objectives	Reference documents
Support of non-production functions of agriculture - protection of soil, water, air, maintenance of cultural landscape	evidence of the features of ecological importance (e.g. wetlands)	Act No.252/1997 Coll. on agriculture
Land use specification	definition of all features with ecological importance	Government order no. 307/2014 Coll. On determination the evidence details of land use according to user relations
	Define wetlands as protected agriculture feature and feature for water retention in the landscape	
	Establish soil blocks evidence: drainage systems, adjacency to water reservoirs, if suitable for greening because of concentrated drainage	
Improve agriculture land quality	Set up conditions of agri-environmental and climate measures implementation	Government order No.75/2015 on conditions for the implementation of agro-environmental measures
	support of greening areas along water courses	
	good agriculture ecological conditions specification (GAEC)	
	control of buffer zones and vegetated strips along water courses	Government order no. 48/2017 Coll. On the establishment of requirements under the acts and standards of good agricultural and environmental condition for the areas of cross compliance rules and the consequences of their breach for the provision of certain agricultural subsidies
	control of harmful agriculture interference in floodplains and water courses	
	Notes: nothing about water retention in soil, about climate – so why agri-environmental-climate measures?	
	keep agriculture procedures favourable to climate - without specification	
Land management - Incentives for farmers	Define fallow land as an agriculture measure favourable for climate	Government order No.61/2016 on laying down certain conditions for granting direct payments to farmers
	payments for wetland as ecological feature	
	information compilation on The principles of good agricultural practice in land management	
	cross compliance as a good tool for solution of the problems of water, soil and landscape	Guidance for farmers: The principles of good agricultural practice in land management – GAEC Cross compliance 2017 - guidance for farmers
	monitoring of soil erosion and crops planting – no sanctions for breach	
	increase soil water capacity and erosion minimization in coming time horizon – how???	

	Notes: only protection against nitrate pollution, carbon storage in soil, food security, animal evidence and welfare, soil does not fulfil the basic productive and non-productive functions why are the cross compliance mentioned in GAEC as a good tool for solution of the problems of water, soil and landscape ???nothing about improving soil retention	
Sustainable management of natural resources and climate actions	- Increasing soil protection at a time of climate change with a view to sustainable farming and to comprehensive development and landscape creation -support of agriculture biomass as a renewable resource -Stopping the degradation of agricultural land in particular through excessive erosion, compacting, loss of organic matter -Promoting natural retention and water uptake into the soil -Reducing the rate of decline of the agricultural land fund, in particular of the best soils -Motivating users to increase their own land property (not agriculture land leasing) -Support for the implementation of land consolidation	Strategy of the Ministry of Agriculture of the Czech Republic with a view to 2030

Table 144 Policy instruments in the food and agriculture sector in Czech Republic

Food /agriculture policy		
General instrument or instrument category	**Specific policy instruments**	**Reference documents**
Stopping soil degradation by excessive erosion, depletion of nutrients, loss of organic matter and soil sealing	Revise good agricultural and environmental standards (GAEC) in order to better protect and increase biodiversity of land and soil; ensuring that more organic matter is added to the soil, motivation to greater use of soil protection technologies.	Biodiversity Conservation Strategy (SOBR) State Environmental policy (SPŽP) Strategy of the Ministry of Agriculture of the Czech Republic with a view to 2030 (SrMZe) The Concept of Research, Development and Innovation of Ministry of Agriculture of the Czech Republic 2016-2022 (KVVIMZe) State Nature Conservation Program (SPOPK) National river basin plans (NPP)
Restrictions on the occurrence and impact of agricultural drought	Construction of new and modernization of existing irrigation systems	State Environmental policy (SPŽP) Strategy of the Ministry of Agriculture of the Czech Republic with a view to 2030 (SrMZe)
	Support maintenance, restoration and construction of small water reservoirs for irrigation and retention in agricultural landscape	
Strengthening the stability and biodiversity of agroecosystems	Supporting farming systems and restructuring landscape to mitigate the decline biodiversity linked to agricultural land	
	Greening in the EU Common Agricultural Policy - introducing a new mandatory eco-funded direct payments component	
Ensuring the sustainability and production function of agricultural farming in the landscape	To prioritize small farms in the framework of agricultural subsidies	Strategy of the Ministry of Agriculture of the Czech Republic with a view to 2030 (SrMZe)
	Define the areas of arable land in floodplains where flooding occurs at increased flow rates (Q5 - Q20), determine appropriate farming practices and motivate agricultural subjects to apply appropriate farming practices	
Supporting program - soil protection against erosion, degradation and excessive drying	In the context of evaluating the current tools in the area of protection of the agricultural land fund ("Preparing for the implementation of measures to mitigate the negative impacts of drought and water scarcity"), prepare a multiannual training	Government decision no. 207/2017 Coll., Policy of climate protection in the Czech Republic

	program and free consultations for farmers, with the aim of putting forward desirable practices in practice.	
Comprehensive monitoring of compliance with Good Agricultural and Environmental Conditions (GAEC) standards and compliance with Statutory management requirements (SMR)		Government decision no. 207/2017 Coll., Policy of climate protection in the Czech Republic
Rural development program	Advantages for agricultural projects that accept specific commitments of AECM supporting the structural changes of czech agriculture	Strategy of the Ministry of Agriculture of the Czech Republic with a view to 2030 (SrMZe)
	Targeting of AECM payments to ensure support and contribution of AECM to the structural change of Czech agriculture landscape with an emphasis on enhancing the ecological stability and biodiversity (through the appropriate setting of eligibility criteria, in particular the correct targeting of environmental measures on agriculture land (appropriate seed treatment, PG management)	

Climate

Table 145 Policy objectives in the climate sector in Czech Republic

Overarching objectives	Specific objectives	Reference documents
Adaptation to climate change	increase efficiency of landscape measures(adjustments) with respect to climate change and water retention (ensure financial support, increase state land property for technical water retention measures, etc.) 2017-2022	Government decision no. 34/2017, National adaptation plan
	decrease /stop soil degradation, nutrient and organics losses (only improve monitoring, revise GAEC till 2020 – no particular measures how to achieve it)	
	decrease the impact of agricultural droughts by irrigation systems and small water reservoirs (2020, 2023)	
	increase natural retention ability of water courses and floodplains (natural and technical revitalization of water courses) – 2017 - 2020	

	Note: not complex and spatial measures in landscape	
	sustainable use of soil, increase its retention ability = factor for climate change adaptation	Government decision No.861/2015 Coll.,The Adaptation Strategy of the Czech Republic on climate changes
	support of water retention (e.g. construction of small water reservoirs and irrigation systems) = drought mitigation	
	adaptation measures of water management: One of the most important tools for implementing adaptation measures to ensure the stability of the water regime in the catchment area is complex land-use modifications, which create an opportunity to increase the retention capacity of the landscape through a plan of common facilities[13], proposals for good agricultural practice and spatial and functional arrangement of land. (In practice = revitalization of water courses, no measures on soil blocks)	
Climate protection	Climate change mitigation through emissions trading; CO_2 and anthropogenic emissions as only factors responsible for climate change	Government decision no. 207/2017 Coll., Policy of climate protection in the Czech Republic
Climate protection and air quality improvement	To reduce greenhouse gas emissions within the EU ETS by 21% and to reduce emissions of non-EU ETS to 9% by 2020 compared to 2005	State environmental policy
	Reducing the level of air pollution	
	Efficient and friendly use of renewable energy sources and increased energy efficiency	

Table 146 Policy instruments in the climate sector in Czech Republic

Climate policy		
General instrument or instrument category	**Specific policy instruments**	**Reference documents**
Policies and measures to reduce emissions across sectors	Emissions Trading and carbon capture and storage	Act No. 383/2012 Coll. on the conditions for trading in greenhouse gas emission allowances.
reduction of greenhouse gasses emission; so-called	introduction of carbon tax outside EU ETS	government decision no. 207/2017 Climate protection policy

[13] One part of the land consolidation proposal is a plan of common facilities, which forms the future framework for the restructuring of agricultural landscape and is therefore a form of landscape plan within land consolidation. These include, in particular, measures to make land accessible, i.e. by field or forest roads, anti-erosion and water management measures and measures to create and protect the environment. The proposed measures shall be supplemented, where necessary, with calculations or with the technical solutions necessary to determine the land area for common facilities.

mitigation (ie reduction measures) in different sectors		
	Efficient EU ETS implementation after 2020	
	Investment priorities related to EU ETS beyond 2020	
	EU ETS Indirect Cost Compensation Scheme	
	Law on the Reduction of Fossil Fuel Dependence	
	Smart cities and villages	
Adaptation to climate changes	Adaptation strategies in different sectors to climate change	government decision no.861/2015 Adaptation strategy to climate change in the Czech Republic Government decision no..34/2017, National adaptation plan
	Sustainable land use (eg erosion and soil degradation, soil retention, soil fertility) is a key condition for adaptation to climate change. The solution should be based on the principles of sustainable farming and good agricultural practice (*conditions e.g. CAP, GAEC, agri-environmental-climate measures, have been already adopted, implemented, however without any significant effect)*	6th national communication of the Czech Republic
	Ensuring flood protection based primarily on increasing the retention capacity of the landscape and slowing water drainage, including in the agriculture and aquaculture sector, as the main factor in the floods, as well as the implementation of other flood protection measures including technical ones.	
Adaptation to climate changes	Due to the great importance of soil, its sustainable use (e.g. erosion and degradation protection, soil retention, soil fertility) is a key condition for adaptation to climate change. The solution should be based in particular on the following principles of sustainable management: - a suitable spatial arrangement of agricultural land, - soil protection and anti-erosion measures, - improving the soil structure, - increasing the proportion of organic matter in the soil.	
	Agri-environmental – climate measures in agriculture are mainly based on carbon sequestration and N retention	

Transboundary DE-CZ-SK: Slovakia

Water

Table 147 Policy objectives in the water sector in Slovakia

Overarching objectives	Specific objectives	Reference documents
Law on comprehensive water protection, including aquatic ecosystems, and from waters of directly dependent ecosystems	Reducing the adverse effects of floods and drought Efficient, economical and sustainable use of water Preservation or improvement of water status Cooperation in the elaboration of the program of anti-erosion measures, measures for increasing the retention capacity of sub-basins and coordination in their implementation Defining conditions for owners, administrators or tenants of agricultural land and forest land is required to manage them in a way that not only maintains appropriate conditions for the occurrence of water but also helps to improve water conditions; it is particularly required to prevent harmful changes in drainage, soil drainage and to ensure the maintenance of soil water and to improve the retention capacity of the area. (lack of conditions for urban and municipalities)	Act no. 364/2004
Flood Protection Act and Obligations to Evaluate and Manage Flood Risks to Reduce the Adverse Effects of Floods	Development of flood risk management plans	Act no 7/2010
Protection against floods, drought and climate change	The Program's content is to create, activate and create in the long term conditions for a socially useful and macroeconomically efficient operation of a comprehensive and integrated system of measures to ensure flood prevention, to reduce their risks, the risks of landscape drying and other risks of sudden natural disasters.	Resolution of the Government of the SR no. 744 from October 2010
Implementation of the close nature measures in the damaged landscape to protect against floods and droughts with climate prevention	Developing the nature of close water-based measures to prevent floods, drought and climate change, with a capacity of about 6 mil. m3 in the territory of 190 municipalities of the Slovak Republic and creation jobs for unemployment people (4.200 jobs) It was implemented around 58 000 close nature water retention measures. It was implemented around 45 000 close nature water retention measures in 348 communities with creation 3.800 jobs for poor people	Resolution of the Government of the SR no. 183/2011 and . 590/ 2011

	Need to obtained knowledges of impact of water measures on floods, drought and climate.	
Water conditions in the landscape	Land managers are not responsible for increasing the water drainage from their land. We need to strengthen the responsibility of land managers for the state of water in the area the legislative principle is not anchored by the principle of the impact of the use of the landscape on the changes of the water regime of the landscape. We need legislative instruments to apply the land-use impact principle to the permanent restoration of water resources in the river basins There is no protection of groundwater, replenishment of groundwater reserves. We need to define both methodological and legislative how users can participate in the restoration of water resources in the landscape	Act no. 364/2004 (Water Act)
	Flood protection is still focused on creek and river regulation, widening of troughs and ditching. We need to orient the flood protection to the principle of slowing runoff of rainwater from the landscape into watercourses	
	In the flood risk strategy, water rainwater systems are recommended. Impacts of applied measures to mitigate floods and prevent droughts need to be assessed	
Water management in catchment	The principles of water protection against pollution are defined, we need to quantify the principle of maintaining a sustainable water balance in the river basin and the permanent restoration of water sources in the catchment areas The scope of use and protection of water resources is defined, it is necessary to define the impact of human activities on the change of water sources in the territory and it is necessary to define the principles of permanent water restoration in the territory. The need to be based on the principle that water is not a disposable wealth, but is part of a permanent restoration in small water cycles. We need to implement model examples (best practices) of integrated protection and rehabilitation of water resources for different uses of the landscape. It is necessary to carry out research for implementation needs for practice	River basins plans
	We need to define the principles and tools of the implementation of erosion protection in the river basins. We need to develop a methodology for the implementation of integrated river basin protection from drought, floods and climate change	
	It is necessary to project methodological procedures into the quantification of the moderated, respectively. reducing the rainwater runoff from the landscape used. We need to quantify regulations for users and landowners to participate in the conservation of water resources in the land.	

Drought mitigation	In Central Europe, drought is often underestimated, because its impacts are not so obvious, they are developing slowly and are spread over much of the geographic area than the damage that results from other natural disasters. In contrast to most of the European states, almost all the water that comes from the Slovak Republic comes from the rainfall.	The Ministry of the Environment is preparing a strategy to combat drought The plan is to be approved by the Government in February 2018
	Solving drought as a natural disaster has not yet been legally grounded in the Slovak Republic. The drought assessment is based on various model scenarios, the common denominator is the water saving and construction of reservoirs. Evapotranspiration is taken as a loss of water, not as a tool for climate change mitigation and important factor in hydrological cycle. Higher temperatures result in higher vapor and thus loss of water. But for cities, where the change in hydrological balance is attributed to the predominance of impermeable surfaces (the same is sealed agriculture land) leads to reduction of available water to evapotranspiration, while at the same time reduce latent heat flux and increasing turbulent flow (sensible heat). In cities, evapotranspiration is taken as a mean of cooling the urban environment, so why is it considered so harmful for the landscape?	
	We need to integrate integrated flood risk plans with drought plans and plans to combat climate change	
	Reject the principle "zero rainwater runoff from land" from all types of landscape. Specific objectives that occur in connection with retention of water in the landscape. To minimize drought, flood, climate change mitigation are (selection of the targets): Protection and restoration of the natural water regime in forests Improving the effectiveness of landscape consolidation with respect to climate change Stop soil degradation, sealing, excessive erosion, loss of nutrients, loss of organic matter Ensuring the sustainability and production function of agriculture in order to reduce the negative impacts of climate change Limiting the emergence and impacts of agricultural drought Improvement of the management of stormwater in urban areas Improving the natural retention capacity of watercourses and floodplains Effective protection and use of water resource Enhance environmental stability and reduce the risks associated with temperature and air quality in urban areas Improvement of ecological stabilization functions and landscape permeability	
Drought mitigation	Main principles (selection):	

	To develop a comprehensive system of sustainable land management in the agriculture landscape and in the forests to enhance the soil and landscape rainwater retention capacity In the areas of long-term water scarcity, the water supply should be targeted to increase the water supply by restoring the natural accumulation of water (floodplain forests, wetlands), increasing the capacity (reconstruction) of existing artificial accumulations (reconstruction of old water reservoirs) and implementing measures to restore or enhance natural retention of water in the landscape to implement the measures contained in the River Basin Plans and the measures proposed in the framework of the land consolidation, thereby contributing to the restoration and increase of the retention capacity of the landscape

Land use

Table 148 Policy objectives in the land sector in Slovakia

Overarching objectives	Specific objectives	Reference documents
Land use specification and conditions	The Act defines agri-environmental conditions nothing about water retention in soil nothing about carbon sequestration and related to the climate	Act no. 543/2002 Coll. on Nature and Landscape Protection
Land consolidation	water management measures that protect the landscape from floodwaters and waterlogging and provide a source of water to cover the deficit of water (tanks, polders, drains and irrigations), The law does not specify the conditions necessary for climate change	Act no. 145/2013 Coll., no. 330/1991
Support for agro-environment	The Regulation defines the principles of support for direct payments for agricultural activity on land Payment for agricultural practices beneficial to the climate and the environment shall be granted to an applicant who adheres to farming practices that are beneficial to the climate and the environment	Government Regulation no. 342/2014
Support for agriculture, rural development and fisheries	The law defines the payment method for granting aid for processed agricultural products in agriculture, rural development and fisheries	Act no. 543/2007
Landscape protection	anti-erosion measures to protect soil from erosion and water erosion and related structures (check dams, afforestation, breakwind, wetlands, water retention measures, terraces, precincts and galleries);	Act no. 145/2013 Coll., no. 330/1991

Reducing the risk of groundwater degradation in the and reducing erosion and increasing water supplies in specific re	Agroenvironmental Climate Action: • Protection of water resources - Protected landscape area of Žitný ostrov Aid for first afforestation of agricultural land	Government Regulation no. 75/2015

Climate

Table 149 Policy objectives in the climate sector in Slovakia

Overarching objectives	Specific objectives	Reference documents
Adaptation to the climate change	The need to reflect the legislative frameworks in the planning of the municipality, region, river basin and territorial units with the enhancement of the use of rising rainwater in the intensive water in order to thermoregulate of the landscape Promoting the principles of climate change in regional development plans, building green infrastructure and job creation	Resolution of the Government of the SR no. č. 148/ 2014
	The need to develop a methodology and quantification of rainwater use tools for its evaporation from the country through the green infrastructure and vegetation	

Transboundary DE-FR

Water

Table 150 Policy objectives in the water sector in the transboundary case DE-FR

Water policies		
Overarching goals	**Specific goals**	**Reference documents**
Reach the good water status objectives as defined by the EU Water Framework Directive in the Rhin-Meuse basin	Status of water bodies, to reach by 2021: - 44% of the rivers in the basin in good ecological status - 80% of groundwater in good chemical status Polluting substances: Reduction or suppression objectives have been set for the Rhine-Meuse basin for more than 50 substances or families of substances according to their dangerousness. Protected areas:	Rhine-Meuse River basin Management Plan Strategy for the IRBD Rhine for adapting to climate change

	On protected areas (catchments used for drinking water, remarkable areas for fauna and flora, etc.), it was reaffirmed to respect the effective standards.	
Integrate and ensure consistency between different approaches to flood risk management in the Rhin-Meuse basin	→ Not aggravate flood risks in the various states / regions of the International Commission for the Meuse river through relevant coordination of cross-border impact measures ; foster cooperation between actors → Improve forecasting and warning systems through multilateral exchange of hydrological data ; improve knowledge and develop risk culture ; prepare for a crises and facilitate a return to a normal situation → Improve flood prevention through knowledge exchange on past floods and their occurrence in the future → Promote sustainable development of the territories (e.g. preserve areas of flood expansion in non-urban areas) → Prevent risk through balanced and sustainable management of water resources (in coherence with the River basin management plan, e.g.: limit the discharge of rainwater into watercourses, encourage infiltration ; limit the acceleration and increase of runoff in rural and peri-urban river basins by preserving wetlands and developing agro-ecological infrastructure)	Management Plan for Flood Risk Management Internationally coordinated flood risk management plan for the Rhine basin Strategy for the IRBD Rhine for adapting to climate change
Reduce flood risks to a socially acceptable level and prevent unacceptable risks so as to secure living areas and economic areas for the future	(1) Avoid new, unacceptable risks (2) Reduction of existing risks to an acceptable level (3) Reduction of adverse consequences during a flood event (4) Reduction of adverse consequences after a flood event	Internationally coordinated flood risk management plan for the Rhine basin

Table 151 Policy instruments in the water sector in the transboundary case DE-FR

Water policies		
General instrument or instrument category	**Specific policy instruments**	**Reference documents**
Strategic document Dialogue and consultation	The Management Plan for Flood Risk Management is the planning document for flood control measures at the river basin level. As such, it aims to provide a strategic vision of the actions to be undertaken and must orchestrate the various components of flood risk management.	Rhin-Meuse Management Plan for Flood Risk Management
Regulatory	The Management Plan for Flood Risk Management is mandatory for local administrative structures and planning and programming documents. In turn, it must be compatible with the River Basin Management Plan and the national	Rhin-Meuse Management Plan for Flood Risk Management

	strategy for flood risk management. It must take into account, and be taken into account by, the Regional scheme for ecological coherence (SRCE).	
	The fundamental orientations and provisions of the RBMP are opposable to all the programs and administrative decisions in the field of water, as well as to other documents such as certain urban planning documents (in particular the territorial coherence schemes) or career plans. They are the administrative rules for a balanced and sustainable management of water resources and to preserve or improve the state of water and aquatic environments at the scale of the basin. The plan also provides deadlines for achieving the status of rivers, lakes and groundwater and for reducing emissions of hazardous substances.	Rhin-Meuse River Basin Management Plan
Strategic documents & Dialogue and consultation	The RBMP which is elaborated by the Basin Committee (Basin-wide Water Parliament) and the program of measures by the Basin Coordinator Prefect, are built in a coordinated way. The actors of water management (local authorities, economic actors, associative world, State services) contributed to the updating of the RBMP and programs of measures. The RBMP and the program of measures for each district are submitted to the public and institutional stakeholders for consultation.	Rhin-Meuse River Basin Management Plan
	The International Commission for the Protection of the Rhine (ICPR) is carrying out the coordination and exchange of information indicated in the Floods Directive for the Rhine river basin	Internationally coordinated flood risk management plan for the Rhine basin
	The ICPR working groups have analysed the possible specific impacts on the assets of protection as well as their sensitivity and the risks in the fields of water quantity, ecology and water quality.	Strategy for the IRBD Rhine for adapting to climate change

Energy

Table 152 Policy objectives in the energy sector in the transboundary case DE-FR

Energy policies		
Overarching goals	**Specific goals**	**Reference documents**
Support the development of renewable energies	Ensure energy supply (share of renewables in 2020 at 38 % [12% solar/ 10% wind/ 8% hydro/ 8% biomass of which half of this comes from waste incinerators] and 2050 at 86 %) for the transition period construction of gaz powered combined heat & power plants until 2020 and decrease the energy consumption by 16 % in 2020 and 49 % by 2050 (baseline 2010)	Climate Action Plan 2050 in Baden Württemberg

	Increase the production of renewable energies by 20% by 2020 by diversifying the production sectors.	Regional Scheme for Climate Air Energy Alsace
	- Increase the share of renewable energies to 23 % of gross final energy consumption in 2020 and 32 % of gross final energy consumption in 2030; - Reduce the share of nuclear power in electricity production to 50 % by 2025	Law on the energy transition for green growth
Fight against energy poverty	Enforce a right to access for all to energy without excessive cost in relation to household resources	Law on the energy transition for green growth

Table 153 Policy instruments in the energy sector in the transboundary case DE-FR

Energy policies		
General instrument or instrument category	**Specific policy instruments**	**Reference documents**
Strategic document	The Regional Scheme for Climate Air Energy (SRCAE) has a strategic scope. It is therefore not a regulatory tool, directly opposable to a request for an administrative authorization (urban planning, for example), but a framework that defines the regional objectives in terms of energy management, and guidance to achieve air quality standards and to prevent, reduce or mitigate air pollution.	Regional Scheme for Climate Air Energy Alsace
Economic incentive - tax expenditure	The energy transition tax credit (*Crédit d'impôt transition énergétique* – CITE) provides for a refund of 30% of the total cost of energy renovation work, up to a limit of €8,000 for a single person and €16,000 per couple.	Law on the energy transition for green growth (France)
Economic incentive - interest-free loan	The interest-free eco-loan is a loan of up to €30,000 available to property owners carrying out energy renovation work. It can be combined with the CITE, with no restrictions applying.	
Economic incentive - rebate on the purchase of an electric vehicle	The rebate for the purchase of an electric vehicle, provided it is accompanied by scrapping a polluting vehicle (diesel vehicle over 10 years old), has been extended and increased since 1 April 2015. The rebate is worth up to 10,000 euros. 7,000 electric vehicles have been purchased using the conversion rebate, worth 70 million euros for the electric vehicle market in the first year. This aid has helped double the French electric vehicle market, making it the largest in Europe, with over 12,000 electric vehicles registered since the beginning of 2016.	
Economic incentive - guarantee on a purchase tariff for electricity	In 2016, the purchase tariff for electricity cogenerated by existing methanisation plants was revised to improve the return on investment in biogas plants (mostly operated by farmers), and to lay sound foundations for the development of this technology. A 20-year guaranteed	

	purchase tariff exists to support development of biogas plants with output under 500 kW.	
Funding programme	The regions have been mobilised by the call for projects “Breathable cities in 5 years" (*Ville respirables en 5 ans*): 25 winners have been selected and will receive aid packages of up to a million euros.	
	The Environment Ministry and the Ademe provide technical and financial support to the regions, mainly through the Waste Fund. This fund provided 55 million euros for the regions in 2015, funding promotion of the Zero waste, zero wastage regions initiative.	
	Heat fund: this fund is used to support the production of heat from renewable sources (biomass, geothermal, solar thermal, etc.). In two years, 733 projects have received funding worth a total of 400 million euros.	
	The “positive energy territories for green growth” call for projects, launched in September 2014, has generated a lot of community interest. The laureates (nearly 400 territories labeled in November 2016) receive financial support of 500,000 euros which can be increased up to 2 million euros depending on the quality of the projects and their contribution to the objectives enshrined in the law.	
	To boost energy renovation work in the housing sector, the *Habiter Mieux* (Better housing) programme managed by France's National Housing Agency (ANAH) set a target of renovating 70,000 homes in 2016; this implies a 40% increase in the programme's targets	
Regulation	The regulation is part of the Renewable Energy act and states which material falls under biomass, which technical procedures are allowed and what environmental requirements have to be met by electricity generation from biomass.	Regulation of electricity generation of biomass
Legislation	The law was published in the Official Journal of 18 August 2015. It includes mid and long term objectives to prepare for the post-oil era and to establish a robust and sustainable energy model in the face of energy supply issues, price developments, resource depletion and the imperatives of environmental protection.	Law on the energy transition for green growth (France)
	The law, last altered in 2017, provides a feed-in tariff to encourage more generation of renewable electricity.	Renewable Energy Sources Act

Agriculture and food

Table 154 Policy objectives in the food and agriculture sector in the transboundary case DE-FR

Agricultural policies		
Overarching goals	**Specific goals**	**Reference documents**
Provide practical guidance and funds for agricultural practices preserving ecosystems, biodiversity and soils as well as promoting climate smart and organic agriculture in Alsace	- 52 % of the Alsace RDP resources are dedicated to the development of agricultural practices preserving ecosystems and biodiversity through agri-environmental and climate operations as well as support in the development of surfaces in organic farming (13% of the agricultural surface will be concerned). - 26 % of the Alsace RDP resources are dedicated to support farms in order to strengthen their competitiveness and sustain their activity, through modernization and development projects for about 1000 farms and 700 young farmers' installation projects in order to guarantee generational renewal. To this will be added the support of farmers through training actions.	Rural Development Programme (RDP) in Alsace Regional Plan for sustainable agriculture in Alsace
Define specific elements of common measures to the 21 regional French rural development programs (RDP)	Common objectives include : 1) Develop new production methods that improve the competitiveness of farms by reducing the cost of factors of production while preserving the natural resources from which farms derive their production. 2) Promote the generational renewal of farms by promoting the creation, transfer and adaptation of farms 3) Protect the natural environment by implementing measures to preserve, restore and manage natural resources	National Framework for the European Agricultural Fund for Rural Development (France)
Promote agroecology principles (linking environment, social and economic performance) at the national level (France)	Train and advise farmers; Develop and facilitate collective projects; Reduce the use of phytosanitary products; Support the transition; Promote organic farming; Engage and mobilize sectors and territories; Decrease the use of veterinary antibiotics; Select suitable seeds; Enrich the soil with the 4 per 1000 initiative[14]; Encourage beekeeping; Promote the use of trees to improve production.	Agro-ecologic Project for France
- Recover good water quality	→ The River Basin Management Plan for the Rhin-Meuse district identified 56 priority catchments in Alsace, where the good status must be achieved by 2015	Regional Plan for sustainable agriculture in Alsace

[14] The "4 per 1000" initiative aims at the annual growth rate of 0.4% of the stock of carbon in soils that would stop the current increase in CO2 in the air.

- Preserve and improve balance between agriculture and biodiversity - Take into account air quality and climate change issues - Support agricultural sectors	→ Beyond the strict preservation measures of the most sensitive areas, solutions must be sought to restore or maintain a balance between biodiversity and agriculture at the territorial level. The rate of contractualization of areas with biodiversity issues such as Natura 2000 areas is a good example. → Support energy recovery of agricultural biomass and co-products (methanisation, boilers), geothermal energy, photovoltaic projects **Viticulture**: strengthen the competitiveness of the sector to strengthen its economic contribution (trade balance, employment, etc.); support the adaptation of the sector to the structural changes linked to greater liberalization; pursue the development of organic viticulture; contribute to territorial development by reinforcing the role of viticulture in tourism, enhancing landscapes, etc. **Corn and field crops**: preserve the regional corn sector by strengthening its sustainability (impacts on water, biodiversity, societal image); promote the development of organic production of field crops especially in areas with environmental issues **Milk production**: increase the productivity of regional production systems; strengthen farms' resistance to economic and natural hazards (support to improve competitiveness); strengthen the economic power of producers (support approaches to better valorise milk as part of the mountain milk scheme); increase regional markets: support the modernization or development of new transformation tools	

Table 155 Policy instruments in the agriculture sector in the transboundary case DE-FR

Agricultural policies		
General instrument or instrument category	**Specific policy instruments**	**Reference documents**
Economic incentives - subsidies and market measures	EU's common agricultural policy (CAP), providing income support to farmers through direct payments (depending on compliance with certain requirements in the areas of public, animal and plant health, environment and animal welfare), financing agri-environmental and climate measures and intervening on agricultural markets and providing sector-specific support	Agro-ecologic Project for France
Funding programme	European Agricultural Fund for Rural Development, partly contributing to the 180,5 million € allocated to the Alsace Rural Development Programme.	Alsace Rural Development Programme National Framework for the European

		Agricultural Fund for Rural Development (France)
Public education and advertising	Training: "teach to produce differently" program Providing farmers (and their advisers) with an agroecological diagnostic tool Methodological guide for mobilizing rural development aid at regional level Launching of calls for projects to disseminate, in more than 30,000 farms, the lessons learned by the 3,000 Dephy farms, which innovate to reduce the use of pesticides (Ecophyto 2 plan).	Agro-ecologic Project for France
Strategic document	Setting the main orientations of the agricultural, agri-food and agro-industrial policy of the State in the economic, social and environmental regional context	Regional Plan for sustainable agriculture Alsace
Legislation	Federal law which puts agriculture and forestry into the overall political agenda through funding schemes (EU agricultural fund) and ensures the preservation of the cultural and recreational landscape for the general public.	Law of Agriculture and National Culture Baden-Württemberg

Climate

Table 156 Policy objectives in the climate sector in the transboundary case DE-FR

Climate policies		
Overarching goals	Specific goals	Reference documents
Reduce GHG emissions and control energy demand	→ climate protection through reducing GHG emission by 25% in 2020 and by 90% by 2050 (baseline: emissions in 1990) in the federal state of Baden-Württemberg → general electricity saving: reduction of 5,5% in 2020 (baseline 2010) and 14% in 2050 whereby 20% of electricity will be imported → make heating 100% climate-neutral until 2050	Climate Action Plan 2050 in Baden Württemberg
	→ 75% reduction in greenhouse gas emissions between 2003 and 2050 → Reduce final energy consumption by 20% between 2003 and 2020 and decrease by 50% by 2050	Regional Scheme for Climate Air Energy Alsace
	- Reduce greenhouse gas emissions by 40% between 1990 and 2030 and divide by four greenhouse gas emissions between 1990 and 2050 (factor 4); - Reduce the final energy consumption by 50% in 2050 compared to the 2012 reference by aiming at an intermediate target of 20% in 2030; - Reduce the primary energy consumption of fossil fuels by 30% in 2030 compared to the 2012 reference	French law on the energy transition for green growth

	- Reduce by 50% the amount of waste sent to landfill by 2025 and gradually decouple economic growth and consumption of raw materials.	
Reduce and prevent atmospheric pollution	→ Reduce emissions of particulates and nitrogen oxides as a priority. → Prevent exposure to air pollution due to ozone, heavy metals, pesticides, etc.	Regional Scheme for Climate Air Energy Alsace
Adapt to climate change	- improve knowledge on the effects of climate change, in order to inform public decisions on adaptation - integrate adaptation into existing public policies, in order to ensure overall coherence and to reflect the cross-cutting nature of adaptation - inform society about climate change and adaptation so that everyone can learn about the issues and act - consider interactions between activities - pinpoint responsibilities in terms of implementation and financing → Key specific objectives include, for the water sector: Develop water savings and ensure better water use efficiency - Save 20% of the water withdrawn, excluding winter water storage, by 2020 ; → for agriculture: improve water resource efficiency in agriculture; → for energy / industry: Promote the use of more efficient cooling (air conditioning) equipment or using renewable or renewable energy sources.	French National Plan for Climate Change Adaptation Regional Scheme for Climate Air Energy Alsace
	Measures relating to water quantity (flood risk management, low flow management), water quality (improvement of water quality, optimizing the use of fertilizers and plant protection agents and enhancing organic farming, use of Warning and Alarm Plan Rhine (WAP) if considerable amounts of pollutants flow into the Rhine), the ecosystem (protect and renature habitats, work on habitat network connectivity, develop ecological flood protection, improve water quality, keep additional anthropogenic increase of water temperature due to thermal discharges to a minimum, monitor biocoenosis). Additional measures may concern: Agriculture - Adapt existing practice (recovering of precipitation water, choice of suitable plant species requiring less water, use of irrigation techniques using less water, e.g. drip irrigation, etc.); Hydro power generation: Determine a biological minimum water flow for hydropower plants in bypass rivers, in order to secure life, migration and reproduction of the species living in the water bodies.	Strategy for the IRBD Rhine for adapting to climate change

Table 157 Policy instruments in the climate sector in the transboundary case DE-FR

Climate policies		
General instrument or instrument category	**Specific policy instruments**	**Reference documents**
Public education & awareness	Communication on climate scenarios for France and their consequences on resources and activities.	French National Plan for Climate Change Adaptation
Legislative and regulatory	The code of urbanism states that local authorities' "urban planning contributes to the fight against climate change and adaptation to this change"	Grenelle Laws of 2009 and 2010
Strategic document	Definition of measures to implement as well as designed organisations to lead the measures (estimated cost of 171 million € for the implementation of the new measures).	French National Plan for Climate Change Adaptation
	Adaptation strategies	Climate Change Adaptation Strategy Baden-Württemberg
	Sets quantified objectives in terms of GHG emissions reduction	Climate Action Plan 2050 in Baden-Württemberg

Nature

Table 158 Policy objectives in nature sector in the transboundary case DE-FR

Environmental policies		
Overarching goals	**Specific goals**	**Reference documents**
Reconcile the preservation of nature and the development of human activities, through the development or restoration of ecological continuities, to promote the movement of species and reduce habitat fragmentation and preserve the services rendered by	→ Maintaining the existing functionality of the green and blue belts: preservation and good management of the 145,100 ha of biodiversity reservoirs in the plain (25% of the surface area), the 69,000 ha of biodiversity reservoirs in the Vosges mountains (26% of the area) and rivers of the region in good ecological condition → Consolidation of the current network of ecological corridors: rehabilitation of a linear of 560 km of corridors, corresponding to 34% of identified corridors	Regional scheme for ecological coherence Alsace

biodiversity and prepare adaptation to climate change.	→ Restoration of ecological continuity on rivers: preservation and restoration of ecological continuity over the 1,415 km of rivers classified in list 2 of the environmental code → Removal of the most important discontinuities related to transport infrastructure (classes 4 and 5, and those that significantly disrupt amphibian migrations) → In mountain areas, maintaining of non-urbanised spaces between towns and neighboring villages in order to guarantee the continuity of wildlife exchanges between slopes of the same valley and control of the development of leisure facilities	
Mitigate the impacts of modified discharge and temperature patterns on the flora and fauna caused by climate change.	Protect and renature habitats Restore habitat network connectivity Promote ecological flood protection Improve water quality Additional anthropogenic increase of water temperature due to thermal discharges should be limited to a minimum and should not prevent achieving the good ecological status or the good ecological potential Monitoring of biocoenosis	Strategy for the IRBD Rhine for adapting to climate change

Table 159 Policy instruments in the nature sector in the transboundary case DE-FR

Environmental policies		
General instrument or instrument category	**Specific policy instruments**	**Reference documents**
Regulatory	Planning documents and projects of the State, local authorities and their groupings take into account the SRCE. The French code of urbanism states that urban planning documents take into account the SRCE.	Regional scheme for ecological coherence (SRCE)
Strategic document	The SRCE identifies the main ecological continuities in Alsace and is meant to support decision-making.	
Legislation	Federal law which regulates all aspects of nature conservation and land planning on a federal level based on the national version.	Law of Nature Conservation and Landscape Development Baden-Württemberg

Appendix 2 – Vertical policy coherence assessment in the case studies

Greece

Table 160 Integration of higher level policies into lower level policies in the Greek case study

Higher level policies fully integrated at lower scale	
CLIMATE	
Policy	*Description of reason and how NCOs are influenced*
Kyoto Protocol	Ratified and fully adopted in Greece (Law 3017/2002) for the protection of climate. It supports the attainment of national goals having to do with climate and atmosphere quality through the: reduction of emissions, advancement of sustainable development, limitation of GHG emissions not monitored by the Protocol of Montreal and energy efficiency.
Doha amendment of the Kyoto Protocol	Ratified and fully adopted in Greece (Law 4345/2015) for the protection of climate. It supports the undertaking of efforts aiming at the reduction of emissions in Greece (quantitative commitments).
Paris Convention	Ratified and fully adopted in Greece (Law 4426/2016) for the protection of climate. It supports goals aiming at combating climate change and increase of global temperature through the reduction of GHG emissions, the assessment of climate change impacts and the improvement of socioeconomic and ecological systems' resilience.
Directive 2003/87/EC	Ratified and fully adopted in Greece [Common Ministerial Decisions 54409/2632(2004) and 57495/2959/E103(2010)] for the protection of climate. It supports the establishment of a national GHG emissions trading system, the inclusion of the air transport in the GHG emissions trading system and the limitation of GHG emissions in a cost-effective and economic-efficient way.
WATER	
Directive 2000/60/EC	Ratified and fully adopted in Greece (Law 3199/2003 and Presidential Decree 51/2007) for the protection of water resources. It supports goals having to do with the sustainable management of surface water and groundwater, the quality of water resources, the establishment of analytical reports for the Greek river basins, the recovery of costs for water services, the development of a monitoring network for water resources, etc.
FOOD AND AGRICULTURE	
International Convention on plant genetic resources for food and agriculture	Ratified and adopted in Greece (Law 3165/2003) for the sustainable development of agriculture and food sector. It supports goals having to do with the preservation and sustainable use of plant genetic resources for food and agriculture as well as the equitable sharing of benefits derived from the use of plant genetic resources.
Higher level policies only partly integrated at lower scale	
Policy	*Description of reason and how NCOs are influenced*
None	None
Higher level policies poorly integrated at lower scale	
Policy	*Description of reason and how NCOs are influenced*
None	None

Table 161 Level of support to lower level policies from higher level policies in the Greek case study

Lower level policies fully supported by higher level policies	
Policy	*Description of reason and how NCOs are influenced*
CLIMATE	
National programme for the reduction of emissions	Adopted in 2003 and verified by the Council of Ministers for the protection of climate and atmosphere quality. Fully supported by higher (Global and European) level policies concerning the reduction of GHG emissions, the promotion of RES, energy saving in building, use of biofuels, etc. (Kyoto Protocol, 2002/358/EC Decision of the Council).
National strategic plan for climate change adaptation	Adopted in 2016 and aims at combating climate change in Greece. Fully supported by higher (European) level policies. It concerns the reinforcement of the country's adaptation ability and resilience against climate change impacts (adaptation of biodiversity, agricultural sector, forest ecosystems, etc.) (EC Green Paper COM2007, EC White Paper COM2009, Directive 2007/60/EC).
WATER	
Decision 39626/2208/E130 (2009)	Adopted in 2009 for the protection of groundwater. Fully supported by higher (European) level policies. It focuses on the establishment of proactive measures for monitoring pollution and deterioration of groundwater and the assessment of the chemical status of groundwater (Directive 2006/118/EC).
Common Ministerial Decision 31822/1542/E103(2010)	Adopted in 2010 for the assessment of flood risk. Fully supported by higher (European) level policies. It concerns the assessment of flood risk and the limitation of floods' effects on: human health, natural environment, cultural heritage and several economic activities (Directive 2007/60/EC).
Common Ministerial Decision 135275(2017)	Adopted in 2017 for the sustainable management of water resources. Fully supported by higher (European) level policies. It focuses on the establishment of a national water pricing system, the determination of water prices for water services and the determination of costs for water services (Directive 2000/60/EC).
FOOD AND AGRICULTURE	
Law 4036/2012	Adopted in 2012 for the sustainable development of agriculture. Fully supported by higher (European) level policies. It concerns the establishment of rules regulating pesticides' market and the rational / sustainable use of pesticides (Directive 2009/128/EC, Regulation 1107/2009/EC, Regulation 396/2005/EC).
Law 4235/2014	Adopted in 2014 for the sustainable development of food sector. It is supported by higher (European) level policies. It concerns the achievement of goals having to do with food and fodder security through the establishment of strict controls and penalties in food and fodder industry (Regulation 178/2002/EC, Regulation 882/2004/EC).
ENERGY	
Law 3734/2009	Adopted in 2009 for the sustainable development of energy sector. It is supported by higher (European) level policies. It focuses on the promotion of cogeneration from two or more types of energy in the internal energy market (Directive 2004/8/EC).
Law 3851/2010	Adopted in 2010 for the sustainable development of energy sector and the protection of climate. Fully supported by higher (European) level policies. It focuses on the attainment of the national energy goals for the year 2020 and the acceleration of RES

	development for combating climate change (Directive 2009/28/EC, European Energy Strategy for the year 2020).
Law 4001/2011	Adopted in 2011 for the sustainable development of energy sector. Fully supported by higher (European) level policies. It concerns the operation of electricity and natural gas markets as well as research, production and transmission networks for hydrocarbons (Directive 2009/72/EC, Directive 2009/73/EC).
Law 4414/2016	Adopted in 2016 for the sustainable development of energy sector. Fully supported by higher (European) level policies. It focuses on electricity production from RES and the adoption of cogeneration technologies (Directive 2004/8/EC).
Lower level policies only partly supported by higher level policies	
Policy	*Description of reason and how NCOs are influenced*
ENERGY	
Law 3468/2006	Adopted in 2006 for the sustainable development of energy sector. Partially supported by higher (European) level policies. It concerns electricity production from RES and cogeneration of high performance electricity and heat in the internal market (Directive 2001/77/EC).
LAND	
Decision 6876/481-2008	Adopted in 2008 for the sustainable spatial development, the protection of biodiversity and natural resources. It is partially supported by higher (Global and European) level policies as some provisions have to do with the protection of climate, the reduction of GHG emissions, the adoption of climate change adaptation strategies, the mitigation of climate change impacts and the confrontation of natural disasters (Kyoto Protocol).
Decision 31722-2011	Adopted in 2011 for the spatial organization and sustainable development of aquaculture sector. It is partially supported by higher (European) level policies as some provisions have to do with the sustainable management of water resources and rules regulating fishery (Directive 2000/60/EC, Common EU Policy Framework for Fishery).
Lower level policies hindered/disrupted by higher level policies	
Policy	*Description of reason and how NCOs are influenced*
None	None

Latvia

Table 162 Integration of higher level policies into lower level policies in the Latvian case study

Higher level policies fully integrated at lower scale	
Policy	*Description of reason and how NCOs are influenced*
CLIMATE	
Kyoto Protocol	Ratified and fully adopted in Latvia in 2002 for reaching the goals of the climate policy and reduction of greenhouse gas emissions for the period from 2008 – 2012 (quantitative commitments). Latvia is participating in the EU Emission trading scheme (EU ETS), International emission trading scheme, as well as joint implementation projects and clean development mechanisms.
Doha amendment of the Kyoto Protocol	Ratified and fully adopted in Latvia in 2017 (Law "On the Doha Amendment to the Kyoto Protocol of the United Nations Framework Convention on Climate Change" of 01.10.2015) for reaching the goals of the Climate policy i.e. reduction of GHG emissions for the period from 2013 – 2020. Ratification of Doha amendment of the Kyoto Protocol does not change the Latvia Climate Policy goals and targets related to reduction of GHG emission undertaken already by earlier commitments.
Paris Agreement	Ratified in Latvia in 2017 (Law "On United Nations Framework Convention on Climate Change Paris Agreement" of 02.02.2017) for reduction of GHG emissions and improve the ability for adaptation to climate change. Latvia is already following implementation of the Goals defined in the Paris Agreement thus ratification of the Agreement does not have a significant impact on the society.
GHG emission allowance trading Directive 2003/87/EC	Requirements are transposed in Latvia by the Law on Pollution (adopted in 2001) and by the Cabinet of Ministers Regulation No. 769 "Regulations Regarding Participation of Stationary Technological Installations in the Emission Allowance Trading Scheme of the European Union" (of 13.11.2012)
ENERGY	
Fuel Quality Directive 98/70/EC	Cabinet of Ministers Regulation No. 545 "Regulations Regarding the Sustainability Criteria for Biofuels and Bioliquids, the Mechanism for Introducing Thereof, and the Procedure by Which They Shall Be Supervised and Monitored (of 05.07.2011) and Cabinet of Ministers Regulation No.772 "Regulations Regarding Requirements for Biofuel Quality, Conformity Assessment, Market Supervision and Procedures for Consumer Information" (of 18.10.2005)
Energy efficiency Directive 2012/27/EU	Requirements are transposed in Latvia by the Energy Efficiency Law (adopted in 2016) and by the Law "On the Energy Performance of Buildings" (adopted in 2013).
WATER	
Water Framework Directive 2000/60/EC	Requirements are transposed in Latvia by Water Management Law (adopted in 2002).
The Drinking Water Directive 98/83/EC	Requirements are transposed in Latvia by the Cabinet of Ministers Regulation No. 671 (of 14.11.2017)
Groundwater Directive 2006/118/EC	Requirements are transposed in Latvia by the Cabinet of Ministers Regulation No. 118 "Regulations Regarding the Quality of Surface Waters and Groundwaters" (of 12.03.2002)
Nitrates Directive 91/676/EEC	Requirements are transposed in Latvia by the Law "On Pollution (adopted in 2001) and several Cabinet of Ministers Regulations.

Helsinki Convention	Ratified and adopted in Latvia by Law on Helsinki Conventions on the protection of marine environment of the Baltic Sea are (adopted in 1994)
Higher level policies only partly integrated at lower scale	
Policy	*Description of reason and how NCOs are influenced*
ENERGY	
Renewable Energy Directive 2009/28/EC	Requirements are transposed in Latvia by Energy Law (adopted in 1998), Electricity Market Law (adopted in 2005) and Biofuel Law (adopted in 15.04.2005). Development of regulation to achieve the 10% share of RES in transport is in the process.
Directive (EU) 2015/1513 on quality of petrol and diesel fuels	Transposition of the requirements is in the process.
Directive on alternative fuel infrastructure Directive 2014/94/EU	Requirements are transposed in Latvia by Cabinet of Ministers Order No 202 (adopted in 2017). Implementation of the requirements set by the Order is in process and will be done according to the prescribed deadlines up to the year 2030.
Higher level policies poorly integrated at lower scale	
Policy	*Description of reason and how NCOs are influenced*
None	None

Table 163 Level of support to lower level policies from higher level policies in the Latvian case study

Lower level policies fully supported by higher level policies	
Policy	*Description of reason and how NCOs are influenced*
ENERGY	
"Long-Term Energy Strategy of Latvia 2030 - Competitive Energy for the Society"	Adopted in 2013 for promotion of sustainable energy. It focusses on increasing energy efficiency and use of renewable energy sources, safety of energy supply for consumers. Fully supported by higher (European) level policies (Directive 2008/28/EC, Directive 2012/27/EU).
"The Guidelines for the Development of Energy Sector for 2016-2020"	Adopted in 2016 to increase the competitiveness of national economy. It focuses on sustainable energy development – increasing of energy efficiency, use of RES, reduction of GHG emissions. Fully supported by higher (European) level policies (Directive 2008/28/EC, Directive 2012/27/EU, (Directive 2008/28/EC, Directive 2012/27/EU).
"Long-term strategy for refurbishment of buildings 2014 - 2020"	Adopted in 2014 to increase the energy performance of buildings. Focuses on residential and non-residential buildings. Fully supported by higher (European) level policies (Directive 2009/28/EC).
Electricity Market Law	Adopted in 2005 to establish prerequisites for the operation of an efficiently functioning electricity market and to promote the production of electricity by using renewable energy resources (incentive measures are determined). It governs the types of activities to be performed in the electricity market - production, transmission, distribution, trade of electricity as a free circulation commodity and the provision of services necessary for the trade. Fully supported by higher (European) level policies (Directive 2009/28/EC).
Energy Efficiency Law	Adopted in 2016 for increasing the energy efficiency. It focuses on energy efficiency planning and monitoring requirements and on efficiency conditions for energy production,

	transmission, and distribution. Fully supported by higher (European) level policies (Directive 2009/28/EC).
Law On the Energy Performance of Buildings	Adopted in 2013 to increase energy performance of buildings. It sets minimum energy performance standards for existing, planned, refurbished, renovated. Fully supported by higher (European) level policies (Directive 2009/28/EC).
Cabinet of Ministers Order No 202 "Plan for development of alternative fuels 2017 – 2020"	Adopted in 2017 to reduce negative impact of transport on the environment (reduction of GHG emissions). It focuses on creation of the infrastructure for alternative fuels. Fully supported by higher (European) level policies (Directive 2014/94/EU).
FOOD AND AGRICULTURE	
"Latvia – Rural Development Programme (National) 2014 – 2020"	Adopted in 2015 (last time amended in 09.02.2018) to utilize the European Agricultural Fund for Rural Development (EAFRD) funding for agriculture and rural development. It focuses on management and control of the funds granted. Fully supported by higher (European) level policies (Regulation (EU) No 1303/2013, Regulation (EU) No 1305/2013, Regulation (EU) No 1306/2013, Regulation (EU) No 1310/2013, etc.).
Law On Agriculture and Rural Development	Adopted in 2004 to provide a legal basis for agricultural development and to specify sustainable agricultural and rural development policy. It focuses on State aid and the EU support to be granted to promote agricultural, rural and fisheries development. Fully supported by higher (European) level policies (the Common Agricultural Policy and the Common Fisheries Policy).
Cabinet of Ministers Order No 611 "The Guidelines for the development of forestry and related branches 2015.-2020"	Adopted in 2015 to support sustainable management of forests. It focuses on ensuring availability of wood-based resources and at the same time on possibilities for increasing CO2 sequestration potential. Fully supported by higher (European) level policies (EU Forest Strategy adopted in 2013).
WATER	
Water Management Law	Adopted in 2002 for the protection and management of surface water and groundwater. It focuses on the emission limitation from sources of point pollution and diffuse pollution, reduction of flood risk Fully supported by higher (European) level policies (Directive 2000/60/EC, Directive 2006/7/EC, Directive 2006/118/EC, Directive 2007/60/EC, Directive 2008/105/EC).
NATURE	
Law on Specially Protected Nature Territories	Adopted in 1993 for protection and preservation of natural diversity. It focuses on specially protected nature territories - strict nature reserves, national parks, biosphere reserves, nature parks, nature monuments, nature reserves, protected sea territories and protected landscape areas. Fully supported by higher (European) level policies (Directive 92/43/EEC, Directive 2009/147/EEC, Directive 2008/56/EC).
Lower level policies only <u>only partly</u> supported by higher level policies	
Policy	*Description of reason and how NCOs are influenced*
None	None
Lower level policies <u>hindered/disrupted</u> by higher level policies	
Policy	*Description of reason and how NCOs are influenced*
None	None

The Netherlands

Table 164 Integration of higher level policies into lower level policies in the Dutch case study

Higher level policies fully integrated at lower scale	
ALL	
Policy	*Description of reason and how NCOs are influenced*
SDG 2030 Agenda - Sustainable Development Goals (2015)	In terms of agenda setting and the first steps towards implementation, the Dutch government is on track with ambitious plans and approaches (transition agenda's and stakeholder dialogue)
CLIMATE	
Paris Agreement (2015)	Idem
ENERGY	
EU Renewable Energy Directive	New ambitious Cabinet plans for energy and climate and major efforts to engage many public and private stakeholders for further concretizations of the plans.
BIODIVERSITY	
Bird and Habitat Directive (legal framework for Natura 2000)	The legal framework is well developed and the designated areas are defined and allocated. Decentralization a boost for provinces to engage in management plans in the making
AGRICULTURE	
CAP Common Agriculture Policy	CAP is the leading policy for agriculture
WATER	
Water Framework Directive	Increased Cabinet efforts through the Delta plan, improved soil and water quality and extra budget (275 mil euro for water quality Natura 2000). Also through the Rural Development Plan (CAP); Deltaplan Agrarian Water Management (Agrarisch Waterbeheer)
Higher level policies only partly integrated at lower scale	
BIODIVERSITY	
Bird and Habitat Directive (Natura 2000 implementation)	Management plans still in development, with discussions on how to implement Natura 2000

Table 165 Level of support to lower level policies from higher level policies in the Dutch case study

Lower level policies fully supported by higher level policies	
NA	NA
Lower level policies only partly supported by higher level policies	
ALL	
Biomass 2030 plan	- Lack of clarity regarding the usage of biomass in the Natura2000 policy, the CAP, the Water Framework Directive; - Too many rules and regulations makes the EU policies hard to deal with in practice: applies for policies on nature (as Natura2000), agriculture (CAP) and water (Water Framework Directive); - no clear and binding sustainability criteria; -Natura 2000: Opportunities to combine the restoration of nature with the economy is argued to be limited. - Biomass is sometimes identified as waste and then strict policies apply for processing and transportation. For example, manure, covered by the EU Nitrate Directive.
Lower level policies hindered/disrupted by higher level policies	
Policy	*Description of reason and how NCOs are influenced*
None	None

Sweden

Table 166 Integration of higher level policies into lower level policies in the Swedish case study

Higher level policies fully integrated at lower scale	
ENERGY	
Directive on promotion and use of renewable energy (2009/28/EC)	The goal is fulfilled; Sweden has set higher goals than EU (50% versus 20% renewable energy).
Higher level policies only partly integrated at lower scale	
WATER	
Water Framework Directive (2000/60/EC)	Lack of coordination of activities in water sector. E.g., water authorities have no influence on forestry management.
Directive on flood protection (2007/60/EC)	Lack of coordination of water management in general and lack of coordination with water and groundwater directive.
BIODIVERSITY	
Directive on conservation of natural habitats wild fauna and flora (92/43/EEC)	There is a need for restoration of large areas of habitat to be able to fully implement this directive.
Higher level policies poorly integrated at lower scale	
BIODIVERSITY	
Directive on the conservation of wild birds (2009/147/EC)	Species protection is relevant for forestry, but there has not been much focus on working with this issue within this sector.

Table 167 Level of support to lower level policies from higher level policies in the Swedish case study

Lower level policies fully supported by higher level policies	
WATER	
Ordinance (SFS 2009:956) on Flood Risk	Fully supported by EU Directive on flood protection (2007/60/EC), essentially the same regulations.
BIODIVERSITY	
Environmental Code (SFS 1998:808), chapter 6, about environmental impact assessment	Fully supported by EU Directive on Environmental Impact Assessment (2011/92/EU), essentially the same regulations.
Lower level policies only partly supported by higher level policies	
CLIMATE	
Climate Policy Framework for Sweden (Gov. Bill 2016/17:146, passed in parliament 15 June, 2017)	Sweden has set higher goals than EU (50% vs. 20% renewable energy sources). Consequently, the EU Directive on promotion and use of renewable energy (2009/28/EC) is supporting the Swedish goals, but only up to the level of EU goals.
Lower level policies only partly supported by higher level policies	
LAND USE	
The Swedish Forestry Act (SFS 1993:1096)	Habitat and Birds Directives hamper forest production.
Lower level policies hindered/disrupted by higher level policies	
Policy	*Description of reason and how NCOs are influenced*
None	None

Andalusia

Table 168 Integration of higher level policies into lower level policies in the Andalusian case study

Higher level policies fully integrated at lower scale	
Policy	Description of reason and how NCOs are influenced
WATER	
Royal Decree 1/2001 Rewritten Text of the Water Act	Transposed to the regional level through the Law 9/2010 of Water of Andalusia and the River Basin Management Plans. These policies contribute to achieve the NCO of achieving good status of the water bodies and to the rational water use.
National Irrigation Plan Horizon 2008	This plan contributed to consolidate and modernise existing irrigation land and to develop new irrigation areas in Andalusia.
ENERGY	
Law 24/2013 Electric Sector and Royal Decree 900/2015	This legislation aims at the economic sustainability of the electric sector in Spain. However, it hampers the NCOs of obtaining 5% self-consumption of electricity from renewable sources and providing 25% of total energy consumption from renewable sources.

Saving and energy efficiency action plan 2014-2020	Transposed to the regional level in the Andalusian Energy Strategy 2020. It contributes to promote a low-carbon energy system.
Renewable Energy Plan 2011-2020	National 2020 target of 20% of renewable energy share is transposed to the regional level through the Andalusian Energy Strategy 2020 that sets a more ambitious target of 25%.
FOOD AND AGRICULTURE	
National Rural Development Programme 2014-2020	This programme guarantees the coherence between national and regional strategies.
CLIMATE	
Spanish Climate Change and clean energy strategy Horizon 2007-2012-2020	The national objectives of reducing GHG emissions and boosting resource efficiency and translated to Andalusia through the Andalusian Climate Action Plans and the Andalusian Energy Strategy 2020.
Higher level policies only partly integrated at lower scale	
Policy	Description of reason and how NCOs are influenced
N/A	
Higher level policies poorly integrated at lower scale	
Policy	Description of reason and how NCOs are influenced
N/A	

Table 169 Level of support to lower level policies from higher level policies in the Andalusian case study

Lower level policies fully supported by higher level policies	
Policy	Description of reason and how NCOs are influenced
Law 9/2010 of Water of Andalusia	In line with the Spanish Water Law, this regional law was ratified at the national level.
Andalusian Rural Development Programme 2014-2020	This programme is developed at the regional level and is validated at the national level. It contributes to preserve ecosystems related to agriculture, enhance resource efficiency and climate and improve social inclusion and local development in rural areas.
Andalusian Energy Strategy 2020	In line with national strategies, this strategy sets the targets on energy consumption and saving.
Law 7/2002, Urban Planning of Andalusia	This regional law was ratified at the national level.
Andalusian Climate Action Plans	These plans were considered when framing the Spanish Climate Change and clean energy strategy Horizon 2007-2012-2020.
Lower level policies only only partly supported by higher level policies	
Policy	Description of reason and how NCOs are influenced
N/A	
Lower level policies hindered/disrupted by higher level policies	
Policy	Description of reason and how NCOs are influenced
N/A	

South-west England

Table 170 Integration of higher level policies into lower level policies in the English case study

Higher level policies fully integrated at lower scale	
WATER	
• **Water supply regulations: The Water Supply (water quality) regulations 2016 govern public water supplies in England and Wales;** • **The Private Water Supplies (water quality) regulations (England) 2016 govern private water supplies.**	Drinking water quality meets regulatory standards in accordance with current EU guidelines. Quality in SWW region is consistently of a very high standard.
FOOD AND AGRICULTURE	
The Food Safety and Hygiene (England) Regulations 2013	Food safety regulations and inspections implemented by relevant statutory local authorities.
Higher level policies only partly integrated at lower scale	
WATER	
National Strategy for Water	SWW meets statutory and legal obligations determined by EU Directives in national policy or requirements set out by regulators like the Environment Agency and Drinking Water Inspectorate. But there is a lack of coordination between statutory bodies which leads to a lack of enforcement at regional level.
Water Act 2014	The Act sets out powers for the Secretary of State to publish the government's strategic priorities and objectives for Ofwat, the water regulator (2017). These focus on securing long-term resilience of water service delivery and infrastructure; protecting vulnerable customers who are struggling to pay their bills; and increasing market competition, including for environmental services. SWW has implemented a range of initiatives to meet the measures as laid out in the Act, including a Compliance Code with the aim of ensuring there is no restriction, distortion or prevention of competition. But their annual household bill for water and wastewater services remains the highest in England.
Water Abstraction Plan 2017	The Environment Agency is making full use of its existing powers to amend abstraction licences to protect the environment. The work aims for 90% of surface water bodies and 77% of groundwater bodies to meet the required standards by 2021. Obligations partially met by SWW: maintenance of dams including upgrading spillways; maintenance and upgrades of pumps and other assets (e.g. pipework); and generation of renewable energy using hydropower, solar panels and wind power. But required

	standards for sustainable abstraction not fully met at regional level.
ENERGY	
National UK Energy Strategy	Sets UK on smart and flexible path; Set out in Clean Growth Strategy (2017); Industrial Strategy (2017) and Ofgem's Upgrading our Energy Systems (2017). But conflicts occur at regional level between current centralised regulatory system and support for smaller scale, more active local participation.
Energy Act 2013	National legislative framework for delivering secure, affordable and low carbon energy implemented by regional energy providers. But conflicts occur at regional level between current centralised regulatory system and support for smaller scale, more active local participation.
CLIMATE	
Climate Change Act 2008	UK's approach to tackling and responding to climate change. Legally binding carbon budgets set cap on GHG emissions. But there has been no progress in reducing agricultural GHG emissions over the past six years (the major industry in the region), despite the requirement of a 36% reduction in UK emissions from 2016 to 2030.
FOOD AND AGRICULTURE	
Agri-environment schemes	Agri-environment schemes: provide funding to farmers and land managers to farm in a way that supports biodiversity, enhances the landscape, and improves the quality of water, air and soil. These payments and grants include: Basic Payment Scheme; Countryside Stewardship Schemes; and The Rural Development Programme for England (RDPE) 2014 -2020: The payments received from agri-environment schemes are highly variable because they depend on the particular environmental assets on each farm and on which elements of the available schemes have been adopted by the farmer. Plus the level of payments for agri-environment schemes is less than for the basic payment scheme. Also, there has been a drop off in the region from farmers and land-owners signing up because of uncertainty post 2022 when current schemes will be replaced.
Farming-related regulation and enforcement	Regulations and enforcement are difficult to implement because of lack of coordination and resources across the statutory bodies and lack of adequate funding of enforcement mechanisms.
Rules for farmers and land managers to prevent water pollution (2018)	It is mandatory for all farmers in England to maintain good practice to protect water quality and prevent water pollution incidents. But agriculture is a significant source of water pollution and there is a lack of coordination across relevant bodies to monitor pollution from farms.
WATER	
Flood and Water Management Act 2010	Implemented but lack of coordination across jurisdictional boundaries between local authorities.

Higher level policies poorly integrated at lower scale
None

Table 171 Interactions between policies across scales in the South-west England case study

Lower level policies fully supported by higher level policies	
WATER	
Flood Risk Management Plans	Implements Flood and Water Management Act 2010 to set out how Risk Management Authorities (RMAs) work together with communities to manage flood risk.
River Basin management (SW district)	Set out how organizations have made decision on how to act to improve the water environment in the SW river basin district; • supports UK government framework for 25 year environment plan (Defra 2017) • links with UK's implementation of Marine Strategy framework (Directive 2008/56/EC).
Local authority policy statements	Provide more specific and detailed view of central government policy.
FOOD AND AGRICULTURE	
Catchment Sensitive Farming (CSF)	CSF has been working in specific Priority Catchments where agriculture is having the most significant impact on rivers, lakes and estuaries in the SW River Basin.
Lower level policies only partly supported by higher level policies	
Planning: Local and neighbourhood plans	National Planning Policy Framework (2012 – currently under review) does not dictate how local and neighbourhood plans should be written or planning outcomes, but is a framework for producing distinctive local and neighbourhood plans and development orders which meet local needs.
Upstream Thinking partnerships	Upstream Thinking focuses on achieving improved raw water quality and water storage in the natural landscape to make the provision of drinking water more sustainable. SWW have recognized that it is cheaper to help farmers deliver cleaner raw water (water in rivers and streams) than it is to pay for the expensive filtration equipment required to treat polluted water after it is abstracted from the river for drinking.
Lower level policies hindered/disrupted by higher level policies	
Local Economic Partnerships (LEPs)	Funding variations centrally prescribed by government has affected role and can limit remit.
Local energy markets (LEMs)	Range of regulatory and policy barriers hinder development of smaller scale initiatives.

Transboundary DE-CZ-SK

Germany

Table 172 Integration of higher level policies into lower level policies in the transboundary German case study

Higher level policies fully integrated at lower scale	
Policy	***Description of reason and how NCOs are influenced***
NATURE	
Eco Management and Audit Scheme	The Eco Management and Audit Scheme is an EU-Program related to environment management and eco-audit of corporations, whose participation is voluntary. The implementation on national and federal state level was managed by a series of laws and regulations e.g. "Umweltauditgesetz ". The program is relevant for all objectives related to the environment; waste disposal, reduction of energy usage, emissions and polution, sustainability and raise of awareness about the environment.
ENERGY	
EU Emissions Trading System	The EU Emissions Trading System is implemented on national level. Objective is the reduction of emissions, but it also influences the NCOs reduction of energy usage and promotion of renewable energies. Emissions producer have the right to produce a certain amount of emissions. Additional rights can be bought if needed.
AGRICULTURE	
Common agricultural policy (CAP)	The CAP of the European Union is mostly relevant for the objectives; Securing food production, securing food quality, improvement of rural infrastructure and agriculture and sustainable use of land and its ressources. The subsidies for farmers are the most relevant part of the CAP. The allocation of subsidies is supported by the public authorities, especially by the ones of federal state level. Germany an it´s federal states support the receiver of subsidies with additional funds of their own. The CAP is considered in management plans regarding agriculture and land use. The frequent change of the allocation process is a problem, which often leads to problems regarding the errorless implementation.
Prevention of animal diseases	The prevention of animal diseases is regulated by the EU. The respective laws, regulations and standards are implemented on lower scale by the member states. Measures are taken in context to the situation and the disease in question. There exist systems regarding the tracking livestock and diseases to better contain outbreaks (Animal Disease Notification System). The monitoring is conducted in cooperation between the EU and the authorities of the respective state.

LAND USE	
Forest protection and hunting laws	This mainly affects Germany and the respective federal states. The laws on national level have equivalents on federal state level.
Waste disposal laws and regulations	Waste disposal is regulated by the EU and implemented across all lower scales (National State – Federal States – Municipalities) depending on the respective responsibilities. Waste disposal is important for the NCOs; reduction of water pollution, reduction of emissions and sustainable use of land.
Higher level policies only partly integrated at lower scale	
Policy	*Description of reason and how NCOs are influenced*
WATER	
EU Water Framework Directive	The EU Water Framework Directive is related to the achievement of the NCOs; reduction of water pollution and usage, protection of biodiversity, especially in water bodies, the improvement of waterway infrastructure and the sustainable use of land and its resources. The objectives should be reached by the implementation of pollution limits and standards, which must be enforced and controlled. Management plans regarding the protection and development of river basins were made. The policy is implemented in all scales of government (EU – National State – Federal States – Municipalities). Laws and regulations were implemented to provide the legal framework for the achievement of the policy objectives and adhere to the regulations. There are still problems regarding the implementation, mostly related to the low interest of policy makers and questions regarding financing (shared responsibility between Germany and it´s federal states). Several arrangements are still based on voluntary actions. The policy objectives collide with the interests of the agriculture industry e.g. the use of fertilizer, which results in water pollution. Reaching the objectives will take at least until 2027, longer than originally intended.
CLIMATE	
Klimaschutzplan 2050: Klimaschutzpolitische Grundsätze und Ziele der Bundesregierung	This policy is significant for basically all NCOs. Objective is the reduction of emissions by 80-95 percent until 2050. The document shows possible measures to reach this objective. The implementation of the policy differs from sector to sector, since it's a program that encompass´ basically all areas with relevance for the environment and emissions production. This policy is closely related to the Energy Roadmap 2050 of the European Union and is at least partly an implementation. (More see e.g. "Energy Revolution").
Energy Roadmap 2050	This EU-policy is significant for basically all NCOs. Objective is the reduction of emissions by 80-95 percent until 2050. The implementation in Germany is carried out by the "Klimaschutzplan 2050"(see above).
ENERGY	

Energy Revoultion	The "Energy Revolution" in Germany is implemented on national and federal state level and is relevant for the achievement of the NCOs; reduction of energy usage, promotion of renewable energies and biofuels, improvement of the power network, end of nuclear energy, reduction of emissions and sustainability. The implementation in lower scale is mostly successful, but the measures taken are not sufficient to reach the objectives, at least not in a timely manner. The improvement of the power network is to slow, and the interests of the industry are most of the time held in higher regard than the objectives of the "Energy Revolution", e.g. shown by the continued lignite mining and use of lignite power plants, as well as the exception of energy intensive corporations from the "eeg-apportionment", which should be paid by all power users equally. Related to the "Klimaschutzplan 2050".
Higher level policies poorly implemented at lower scale	
Policy	*Description of reason and how NCOs are influenced*
NA	NA

Table 173 Interactions between policies across scales in the German case study

Lower level policies fully supported by higher level policies	
Policy	*Description of reason and how NCOs are influenced*
WATER	
Management plans for e.g. Elbe river	The management plans were developed to implement the EU Water Framework Directive and are in line with the objectives of the directive.
Respective laws on the usage and protection of water	The respective laws of the federal states are in line with European and national laws and regulations and are accordingly supported. Laws and regulations exist on all scales (EU – National State – Federal States – Municipalities).
Lower level policies only partly supported by higher level policies	
Policy	*Description of reason and how NCOs are influenced*
LAND USE	
Forest protection	The protection of forests in Germany is regulated on national as well as federal state level, but there doesn't exist a "big" EU-Directive which defines the topic on the same magnitude the EU Water Framework Directive does in the water sector.
Lower level policies hindered/disrupted by higher level policies	
Policy	*Description of reason and how NCOs are influenced*
FOOD AND AGRICULTURE	
Animal protection	The protection of animals, especially of livestock, is hindered by the EU. National laws and regulations cannot be stricter than the EU laws, thus they dictate the maximum amount of protection possible. The laws and regulations of the European Union contradict each other in some cases and have to many exceptions.

Czech Republic

Table 174 Integration of higher level policies into lower level policies in the Czech transboundary case study

Higher level policies fully implemented at lower scale	
Policy	*Description of reason and how NCOs are influenced*
CLIMATE/ENERGY	
Directive 2009/28/ EC on the promotion of the use of energy from renewable sources	*Objectives: increase biofuels production, support agriculture biomass as renewable resource, partly supports non-productive functions of agriculture* The Support of Renewable Energy Sources Act no. 165/ 2012 Co. In accordance with the EU ambitious commitment to use 20 % of renewable energy by 2020 (the overall EU target). The National Renewable Energy Action Plan of the Czech Republic was developed on the basis of. The article 4 of this Directive mandates the Member States of the European Union to draw up and adopt a National Renewable Energy Action Plan (Renewable Energy Action Plan). Pursuant to the Directive, the national target for the Czech Republic of renewable energy in 2020 was set on 13,5 % (in 2005 this was 6.1%). To achieve the goal there is an abrupt increase of biofuel production, mainly maize and rape.
The United Nations Framework Convenction on Climate change Kyoto Protocol **Paris Agreement**	UNFCCC: ratification on 7. October 1993 (80/2005 Statement of the Ministry of Foreigner Affairs) Kyoto protocol: Government decision no. 669/1998 (reduction of greenhouse gasses emission by 8 % in 2008 – 2012 compared to the based year 1990 and by 20 % till 2020. Paris agreement signed on 4 November 2017 Reporting as: National communication of the Czech Republic *Objectives: Climate change mitigation and adaptation strategy with measures for different sectors are involved in:* Government decision no. 34/20017 Implementation of adaptation strategy Government decision no. 861/2015 Strategy for climate change adaptation in the Czech Republic Government decision no. 207/2017 Climate protection politics
Regulation (EU) No 525/2013 of the European Parliament and of the Council on a mechanism for monitoring and reporting greenhouse gas emissions and for reporting other information at national and Union level relevant to climate change	*Objectives: climate change mitigation, adaptation, reduction of greenhouse gasses* Government decision no. 34/20017 Implementation of adaptation strategy

	Government decision no. 861/2015 Strategy for climate change adaptation in the Czech Republic Government decision no. 207/2017 Climate protection politics
EU strategy on adaptation to climate change (COM(2013)216)	*Objectives: climate change mitigation, adaptation, reduction of greenhouse gasses* The development and implementation of adaptation plans and measures is an integral part of the UN Framework Convention on Climate Change commitments Government decision no. 34/20017 Implementation of adaptation strategy Government decision no. 861/2015 Strategy for climate change adaptation in the Czech Republic Government decision no. 207/2017 Climate protection policy
Energy efficiency and its contribution to energy security and the 2030 Framework for climate and energy policy	*Objectives: climate change mitigation, adaptation, reduction of greenhouse gasses* Energy Management Act. No 406 / 2000 Co., as amended Greenhouse gasses reduction by 40 % till 2030, compared to 1990
(EU ETS) directive 2009/29/ES on greenhouse gas emission allowance trading scheme of the Community	*Objectives: climate change mitigation, adaptation, reduction of greenhouse gasses* Act no. 383/2012 Coll. on the conditions for trading in greenhouse gas emission allowances; Climate change mitigation through emissions trading
FOOD/AGRICULTURE	
Common agriculture policy **Regulation No 1307/2013 of the European Parliament and of the Council, establishing rules for direct payments to farmers under support schemes within the framework of the common agricultural policy** **Regulation No 1305/2013 of the European Parliament and of the Council on support for rural development by the European Agricultural Fund for Rural Development (EAFRD)** **Regulation (EU) No 1306/2013 of the European Parliament and of the Council on the financing, management and monitoring of the common agricultural policy**	*Objectives: support of non-production functions of agriculture, AECM, favourable climate procedures, greening, size of soil blocks, arable land management* No.50/2015 and its Amendment No.61/2016 on laying down certain conditions for granting direct payments to farmers No.252/1997 Coll. on agriculture

Proposal for a Regulation of the EU Parliament and of the Council establishing rules for direct payments to farmers under support schemes within the framework of the common agricultural policy	Primarily promising greening as a condition for direct payments; Greening is mandatory for all farmers, but with exceptions the conditions are set so that the effect is close to zero. Successful implementation without effect.
GAEC 4 (ensuring minimum land cover) **GAEC 5 measures for erosion by introducing and requiring protection of soil from wind erosion)** **GAEC 6 (preservation of the content of organic matter)**	Mandatory for all farmers – successful implementation, however not particularly implemented in the Czech legislation
WATER	
2000/60/EC Water framework directive	The Water Act no. 254/2001 Co. The implementation of the Framework Directive also requires international cooperation in order to meet its requirements for a common approach to the protection of international river basin districts, such the Labe. International cooperation is ensured by international commission which coordinates inter-state cooperation on the protection of waters.
Directive 2007/60/EC on the assessment and management of flood risk	The water Act No 254/ 2001 Co. art. 63 – 87 (Flood Protection) *Objectives: water retention (technical measures)*
Higher level policies only partly implemented at lower scale	
Policy	*Description of reason and how NCOs are influenced*
Land/Soil	
Proposal for a Directive establishing a framework for the protection of soil and amending Directive 2004/35 / EC	Act of the Czech National Council no. 334/1992 Coll., on agriculture land fund protection Waiting for new soil directive *Objectives: agriculture soil protection, its quality improvement??*
European Landscape Protection Convention	*Objectives: sustainable landscape management* Good implementation in the Czech Forest Act (no. 289/1995 Coll.) or The Nature Protection Act No 114 / 1992 Co. as amended. The Agricultural Land Protection Act No.334/ 1992 Co. as amended is weak in implementation and did not stop the decrease of agricultural land in CR. About six thousand ha of agricultural land are taken off the land fund in CR each year. The retention of water in agricultural land is rapidly decreasing – now is only on 60 to 70 % of its potential. Big farmers (about 80 % farms area are above 2000 ha) and too big arable fields are threatening by erosion and suffer from insufficiency of organic content.
Higher level policies poorly implemented at lower scale	
Policy	*Description of reason and how NCOs are influenced*
NA	NA

Table 175 Interactions between policies across scales in the Czech case

Lower level policies fully supported by higher level policies	
Policy	*Description of reason and how NCOs are influenced*
CLIMATE/ENERGY	
Government decision no. 207/2017 Climate protection policy	Climate Protection Policy in the Czech Republic defines the main objectives and measures in the field of climate protection at the national level to ensure the achievement of the goals of reducing greenhouse gas emissions in relation to obligations arising from international agreements (The UN Framework Convention on Climate Change and its Kyoto Protocol, the Paris Agreement and the obligations arising from European Union legislation). This 2030 climate protection strategy, with a view to 2050, should contribute to a long-term transition to a sustainable low-carbon economy in the Czech Republic. Climate policy in the Czech Republic is focused on the period 2017-2030 with a view to 2050.
National biomass action plan 2012 – 2020	Directive 2009/28/ EC of the European Parliament and of the Council on the promotion of the use of energy from renewable sources *Objectives: Roadmaps how to achieve the goal of 13 % of energy from renewable resources* *Support of agriculture biomass as renewable resource – mainly rape and maize*
National action plan of the Czech Republic for the energy from renewable resources	
WATER	
River Labe basin management plan	2000/60/EC Water framework directive Agreement on the International Commission for the Protection of the Elbe (signed 1990, came into force in 1993) The Water Act no. 254/2001 Co. *Water quality objectives*
AGRICULTURE/FOOD	
Strategy of Ministry of Agriculture till 2030	Common agriculture policy (mainly 1. Pillar – direct payments) 2000/60/EC Water framework directive (water management) *Involve strategy of water management and related issues, in terms of agriculture is aimed at production, not soil quality management*
Government order no. 48/2017 Coll. On the establishment of requirements under	Regulations No 1307/2013, No. 1306/2013, no. 1305/2013 of the European Parliament and of the Council

the acts and standards of good agricultural and environmental condition for the areas of cross compliance rules and the consequences of their breach for the provision of certain agricultural subsidies	*Objectives: arable land management practices*
Government order no. 49/2017Coll. On Amending certain Government Orders in connection with the adoption of a Government Order laying down requirements under the acts and standards of good agricultural and environmental condition for the areas of cross compliance rules and the consequences of their violations for the provision of certain agricultural subsidies	The objectives: Buffer zones along water courses: GAEC 1 and 3(water protection by delimitation of non-fertilized streams along water courses and protection of groundwater against pollution) GAEC 4 (ensuring minimum land cover) GAEC 5 measures for erosion by introducing and requiring protection of soil from wind erosion) GAEC 6 (preservation of the content of organic matter) GAEC 7 – landscape features protection (in 2016 extension of landscape elements by a new one – wetland) – heterogeneous landscape structure
Government order No. 47/2017 on conditions for the implementation of agri-environmental measures	Act no. 252/1997 Coll. on Agriculture, CAP (II. pillar, Rural development programme) *Voluntary measures in landscape with support to:* *Sub-measure 10.1.4. management of permanent grassland* *Sub-measure 10.1.5. grassing of arable land* *Sub-measure 10.1.8. grassing of runoff corridors* *Objectives: support of non-production functions of agriculture, decrease soil erosion, heterogeneous landscape structure, support greening in catchment and along watercourses reduction of concentrated and spatial runoff*
Act No. 254/2001 Coll., On Water	GAEC 1 and 3(water protection by delimitation of non-fertilized streams along water courses and protection of groundwater against pollution)
National action plan of climate change adaptation **Strategy for climate change adaptation of the Czech Republic**	Are based on the implementation and ongoing control of reporting obligations under Article 15 of the European Parliament Regulation and Council 525/2013, which requires EU member states to report on National Adaptation Measures in the interval of 4 years starting on 15 March 2015, will enable the processing of the Czech Republic's Adaptation Report to change climate at a four-year interval starting in 2019.
Concept of flood protection in the Czech Republic using technical and nature-friendly measures	2000/60/EC Water framework directive The Water Act no. 254/2001 Co. Directive 2007/60/EC on the assessment and management of flood risk *Objectives: set up importance of GAEC standards, CAP, Cross compliance rules for flood protection*
Lower level policies only partly supported by higher level policies	
Policy	*Description of reason and how NCOs are influenced*

WATER	
River Labe basin management plan	Missing legislation for drought mitigation Missing legislation for support of spatial water retention in landscape – land ownership problems (insufficient state land reserves), financial support (new subsidies), need to establish water as public interest and consider water retention as set of complex measures (need of inter-resort communication)
LAND/SOIL	
Complex land consolidation Act no. 139/2002 Coll. on Land Consolidation and Land Offices	Missing legislation for soil erosion (in preparation; 2018 at the earliest, as regulation amending the Act no. 334/1992 Coll., on agriculture land fund protection) Through CLC can be realized Agri-environmental and climate measures, greening, GAEC; Promising support in new CAP after 2020 for gradual decrease of direct payments in favour of husbandry and improving of arable land quality and water sources Need to set up stricter condition for land management – it would incentive more and effective land consolidation actions leading to water retention
Lower level policies hindered / disrupted by higher level policies	
Policy	*Description of reason and how NCOs are influenced*
WATER	
River Labe basin management plan	Support of energy crops (wide-row crops) is against good water quality (Directive 2009/28/ EC on the promotion of the use of energy from renewable sources)

Appendix 3 – Horizontal policy coherence in the cases

European Union

Table 176 Scoring matrix of coherence among policy objectives in the WLEFC-nexus at EU scale

Clue to read the matrix: What happens to objective Y in the columns (affected) if we make progress on objective X in the rows (affecting)?

	W1	W2	W3	W4	W5	W6	E1	E2	E3	E4	E5	E6	E7	E8	E9	E10	L1	L2	L3	L4	F1	F2	F3	F4	F5	F6	F7	C1	C2	C3	C4	C5	C6
W1		+2	0	-1/0	+1	+1	-1/+1	0	0	0	-1/+1	0	0	0	0	0	+1	+1	+1	0	-1/+1	-1/+1	+2	-1/+2	0	0	0	0	0	0	0	0	0
W2	+2		-1	-1	0	+3	-1/+2	0	0	0	+3	0	0	-1/+1	0	+2	+1	+1	+1	-1	-1/+2	-1/+2	+2	-1/+2	-1/+1	0	0	0	0	0	0	0	+1
W3	0	0		+3	0	+2	+1	0	0	0	0	0	-1/+1	-1/+1	0	0	0	0	0	0	+1	+2	0	0	+3	0	0	0	0	0	0	0	+3
W4	+1	+3	+2		0	+2	-1/+1	0	0	0	-1/+1	0	-1/+1	+2	0	0	+1	+1	0	0	-1/+1	-1/+1	+1	0	+2	0	0	0	0	0	0	0	+1
W5	-1/+1	-1/+1	0	0		0/+1	-1/+1	0	0	0	0	0	0	0	0	+2	+1	+1	+1	0	+1	+1	+1	+1	0	0	0	0	0	0	0	0/+1	+3
W6	+1	+3	+2	+3	0		-1/+1	0	0	0	+1	0	0	-1/+1	0	+2	+1	+1	+1	0	+1	+1	+3	+1	+1	0	0	0	0	0	0	0/+1	+3
E1	-1	-1	0	-2	-1	-1		+3	0	0	0	0	0	0	0	+1	-1	-1	-3	-3	+2	0	-2	+1	-1	0	0	-1/+2	-1/0	-2	0	-2	0
E2	0	0	0	0	0	0	+3		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-1/+2	-1	-1	0	0	0
E3	0	0	0	0	0	0	0	0		+3	0	0	0	0	0	+1	-1/0	-1/0	-1/0	0	+1	+1	-1/+1	+1	+1	-1/0	0	+2	0	-2	0	0	0
E4	0	0	0	0	0	0	0	0	+3		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	+2	0	-1	0	0	0
E5	-3	-2/+1	0	-1	0	-2/+2	0	0	0	0		+3	0	0	+1	+1	0	0	-1	0	0	0	0	0	0	0	0	+2	0	-1	0	-1	+1
E6	0	0	0	0	0	0	0	0	0	0	+3		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	+2	0	-1	0	0	0
E7	0	+1	0/+2	0/+2	0	0	-1/0	-1/0	-1/0	-1/0	-1/0	-1/0		+3	0	+1	0	0	0	0	+2	+2	0	+1	+3	0	0	+3	+1	+3	0	0	0
E8	+1	+1	0	+2	0	0	-1	-1	-1	-1	-1	-1	+3		-1	+1	0	0	0	0	+2	+2	0	0	+3	0	0	+3	+1	+2	0	0	0
E9	0	0	0	0	0	0	0	0	0	0	+1	+1	-1	-1		+2	0	0	0	0	0	0	0	0/+1	+2	0	0	-1/+1	0	0	0	0	0
E10	0	0/+1	0	0	0	0	-1	0	-1	0	-1	0	-1	-1	+1		0	0	0	0	0/+1	0/+1	0	0/+2	-2	0	0	-1	-1	0	0	0	0
L1	+3	+2	0	0	+2	+2	+1	0	+1	0	0	0	0	0	0	0		0	+2	+1	+1	+1	+2	+1	+2	0	0	+2	0	0	0	+2	+2
L2	+3	+2	0	0	+2	+2	+1	0	+1	0	0	0	0	0	0	0	0		+1	+2	+1	+1	+2	+1	+2	0	0	+2	0	0	0	+2	+2
L3	+1	+2	0	0	+1	+2	-1	0	+1	0	-1/+1	0	0	0	0	0	+1	+2		-1/+2	0	0	+1	+1	0	0	0	+3	0	0	0	+3	+2
L4	+1	+1	0	0/+1	+1	+1	-2	0	+1	0	+1	0	0/+1	0/+1	0	0	+1	+2	+3		-1	-1	+2	-1/+1	0	0	0	+2	0	+1	0	+1	0
F1	+1	+1	+1	+1	+1	+1	0	0	0	0	0	0	-1/0	-1/0	0	0	+2	+2	+2	+2		-1/+1	+1	+1	-1/+1	0	0	+1	0	0/+1	0	+1	+1
F2	-1/+1	-1/+1	-1/+1	-1/+1	0	-1/+1	0	0	0	0	0	0	+1	-1/+1	0	0	-1	-1	-1/0	-1/0	+2		-1	+1	+2	0	0	-1	0	+1	0	-1	-1
F3	+3	+3	0	0	+1	+2	-2	0	-2	0	-1/0	0	0	0	-1/0	0	+3	+3	+2	+2	-1/+1	-1/+1		+1	0	0	0	+1	0	0	0	+2	+2
F4	-1/+1	+1	+1	+1	+1	+1	0	0	0	0	0	0	+1	-1/+1	0	0	0/+1	0/+1	+1	+1	+1	+1	+1		+1	0	0	0	0	0	0	+1	+1
F5	0	+1	+3	+2	0	0/+1	0	0	0	0	0	0	+3	+3	0	+1	0	+1	0	+1	+1	+1	+1	+1		+1	0	+3	0/+1	+3	0	+1	0/+1
F6	+1	+1	0	+2	0	+1	0	0	0	0	0	0	0	+2	0	+1	0	0	+1	+1	-1	0	0	-1	+2		0	+2	0	0	0	+1	+1
F7	+1	+1	0	+2	0	+1	0	0	0	0	0	0	0	+2	0	0	+1	+1	+2	-2/+2	-2	0	-1/+1	-1	+2	+1		+3	0	0	0	+1	0
C1	+2	+2	0	+2	+2	+2	-1	0	-1	0	+1	0	0	+1	0	+1	+1	+2	+1	0	-1/+1	-1/+1	+1	+1	+1	+1	0		+3	+3	+3	+3	0
C2	0	0	0	0	0	0	0	-1	0	0	0	0	+3	+3	0	+2	0	0	0	0	+1	+1	0	+1	+3	0	0	+3		+2	0	0	0
C3	0	0	-1/+1	-1/+1	0	0	+2	+2	+2	+2	+2	0	+3	+2	0	0	0	0	0	0	+1	+2	0	0	+3	0	0	+3	+3		+3	0	0
C4	-2	-2	0	-1	0	0	0/+1	0	0/+1	0	0	0	-2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	+3	0	+3		0	0
C5	+1	+1	0	+1	+1	+2	-1/+1	0	0/+1	0	0	0	0	0	0	0	+1	+1	+1	-1/+1	-1/+1	-1/+1	+3	+1	+1	0	0	+3	0	0	0		+1
C6	+1	+2	-1/+1	-1/+1	+3	+3	0	0	0/+1	0	+1	0	0	-2/+2	0	+3	+1	+1	+2	+1	+2	+2	+2	+1	0/+1	0	0	0	0	0	0	+1	

Source: Munaretto & Witmer, 2017, p. 45.

Table 177 Interactions between EU policy objectives for the WLEFC sectors. Objectives and direction of influence were selected that have the highest number of interactions with other objectives.

Influencing	Influenced

	Synergy with objectives	Conflict with objectives	Synergy or conflict, depending on context and implementation
Water quality W1 Good quality status L, E, F, C > W	L1, L2, L3, L4: Restore and prevent soil degradation, prevent ILUC and maintain and enhance forest cover. E8: reduce energy consumption. F3, F6, F7: Provide environmental public goods in agriculture, reduce food waste and animal protein intake. C1, C5, C6: Reduce GHG emissions, increase climate-friendly land-use, climate adaptation.	E1, E5: Increase production of biofuel crops and hydropower C4: Support CCS	F1, F2, F4: Contribute to farm income under condition of environment rules, improve competitiveness, support rural economy.
Water quantity W2 Water supply W6 Mitigate scarcity W > L, E, F, C	L1, L2, L3: Restore and prevent soil degradation and maintain and enhance forest cover. E5, E10: Increase hydropower and energy security. F3: Provide environmental public goods in agriculture. C6: Climate adaptation.		E1, E8: Increase production of biofuel, reduce energy consumption F1, F2, F4, F5: Contribute to farm income under condition of environment rules and support rural economy, improve competitiveness and resource efficiency of agri-sector.
Water quantity W2 Water supply W6 Mitigate scarcity L, E, F, C > W	L1, L2, L3, L4: Restore and prevent soil degradation, prevent ILUC and maintain and enhance forest cover. E7, E8: Increase energy efficiency and reduce consumption. F3, F5, F6, F7: Provide environmental public goods in agriculture, improve resource efficiency in agri-sector, reduce intake animal protein. C1, C5, C6: Reduce GHG emissions, increase climatefriendly land-use, climate adaptation	E1: Increase production of biofuel crops. C4: Support CCS.	E5: Increase hydro-power F1, F2, F4: Contribute to farm income under condition of environment rules and support rural economy, improve competitiveness agri-sector.

Water Management of flood risk W5 Assess and manage flood risk, mitigate effects W > L, E, F, C	L1, L2, L3: Restore and prevent soil degradation, maintain and enhance forest cover. E5, E10: Increase hydropower, energy supply security F1, F2, F3, F4, F5: Contribute to farm income under condition of environment rules and improve competitiveness agri-sector, support environmental public goods and rural economy, resource efficiency in agri-food and forestry. C6: climate adaptation.		E1: Increase production of biofuel crops C5: More climate-friendly land-use.
Water Management of flood risk W5 Assess and manage flood risk, mitigate effects L, E, F, C > W	L1, L2, L3, L4: Restore and prevent soil degradation, prevent ILUC and maintain and enhance forest cover. F4: Support environmental public goods in agriculture. C1, C5, C6: Reduce GHG emissions, increase climate friendly land-use, climate adaptation.	E1: Increase production of biofuel crops.	F1, F3: Contribute to farm income under condition of environment rules and support rural economy.
Land use L1, L2 Restore and prevent soil degradation L > W, E, F, C	W1, W2, W5, W6: Good quality status, supply, flood risk management, address scarcity. E3:: Increase production of biomass. F1, F2, F3, F4: Contribute to farm income under condition of environment rules, improve competitiveness and support rural economy, provision of environmental public goods. C1, C5, C6: Reduce GHG emissions, more climate friendly land-use, climate adaptation.		E1: Increase production of biofuel crops.
L3 Maintain and enhance forest cover L4 Prevent ILUC	W1, W2, W5, W6: Good water quality status and supply, flood risk management, address water scarcity. E3: Increase biomass production. F3: Provision of environmental public goods in agriculture C1, C3, C5, C6: Reduce GHG emisisons, support development and uptake low-carbon technology, more climate friendly land-use, climate adaptation	E1: Increase production of biofuel crops.	E5: Increase hydro-energy production F1, F4: Contribute to farm income under condition of environment rules and support rural economy,
Land use L1, L2: Restore and prevent soil degradation W, E, F, C > L	W1, W2, W4, W5, W6: Good water quality status and water supply, reduce water consumption, flood risk management, address scarcity.	E1: Increase production of biofuel crops.	F2: Improve competitiveness agri-sector.

	F1, F3, F7: Contribute to farm income under condition of environment rules, provide environmental public goods in agriculture, reduce intake of animal protein. C1, C5, C6: Reduce GHG emissions, increase climate friendly land-use, climate adaptation.		
L3 Maintain and enhance forest cover L4 Prevent ILUC	W1, W5, W6: Good water quality status, flood management, address scarcity. F3, F5, F6, F7: provision of environmental public goods in agriculture, resource efficiency, reduce food waste and intake of animal protein. C6: Climate adaptation.	E1: Increase production of biofuel crops.	E5: Increase hydro-power. F1, F4: Contribute to farm income under condition of environment rules, support rural economy. C1, C5: Reduce GHG emissions, more climate friendly land-use.
Energy **renewables** E1 Increase production of biofuel crops E > W, L, F, C		W1, W2, W4, W5, W6: Good water quality status, water supply and mitigate scarcity, reduce water consumption, assess and manage flood risk and mitigate effects. L1, L2, L3, L4: Restore and prevent soil degradation, prevent ILUC and maintain and enhance forest cover. F3: Provide environmental public goods in agriculture C3, C5: Support low-carbon technology, more climate friendly land-use	F1, F4: contribute to farm income under condition of environment rules, support rural economy. C1: Reduce GHG emissions.
Energy **use** E7 Increase energy efficiency E8 Decrease energy consumption	W1, W2, W4: Good water quality status and water supply, reduce water consumption. F1, F2, F4, F5: Contribute to farm income, improve competitiveness, support rural economy, promote resource efficiency.		C1, C2, C3: Reduce GHG emissions, increase energy efficiency of transport system, support development and uptake low-carbon economy.
Agriculture and food **Financial support farms and rural areas**	L1, L2: Restore and prevent soil degradation.		W1, W2, W3, W4, W5, W6: Good water quality status and water supply, increase water efficiency and reduce water consumption, flood risk management, address scarcity.

F1 Contribute to farm income under condition of environment rules F4 Support rural economy F > W, L, E, C			L3: Maintain and enhance forest cover. E7, E8: Increase energy efficiency and reduce consumption. C1, C3, C5, C6: Reduce GHG emissions, support low-carbon technology, more climate friendly land-use, climate adaptation.
F3 Provision of **environmental public goods**	W1, W2, W5, W6: Good water quality status and water supply, flood risk management, address scarcity. L1, L2, L3, L4: Restore and prevent soil degradation, prevent ILUC and maintain and enhance forest cover. C1, C5, C6: Reduce GHG emissions, more climate friendly land-use, climate adaptation.		E1, E3: Increase production of biofuel crops and production of biomass.
Resource efficiency F5 Resource efficiency in agri-food and forestry F6 Reduce food waste F7 Reduce intake of animal protein	W1, W2, W3, W4, W6: Good water quality status and water supply, increase water efficiency and reduce water consumption, address scarcity. L1, L2, L3, L4: Restore and prevent soil degradation, maintain and enhance forest cover, prevent ILUC. E7, E8, E10: Increase energy efficiency and reduce consumption, energy security. C1, C3, C5, C6: Reduce GHG emissions, support low-carbon technology, more climate friendly land-use, climate adaptation.		
Financial support farms and rural areas F1 Contribute to farm income under condition of environment rules F4 Support rural economy W, L, E, C > F	W3, W5, W6: Increase water efficiency, flood risk management, address scarcity. L1, L2: Restore and prevent soil degradation. E1, E3, E7, E8, E10: Increase production of biofuel crops and biomass, energy efficiency and reduce energy consumption, energy security. C1, C2, C3, C6: Reduce GHG emissions, support low-carbon technology, increase efficiency of transport system, climate adaptation.		W1, W2, W4: Good water quality status and water supply, reduce water consumption.

F3 Provision of **environmental public goods**	W1, W2, W4, W5, W6: Good water quality status and water supply, increase water efficiency and reduce water consumption, flood risk management, address scarcity. L1, L2, L3: Restore and prevent soil degradation, maintain and enhance forest cover. C1, C5, C6: Reduce GHG emissions, more climate friendly land-use, climate adaptation.	E1: Increase production of biofuel crops.	E3: Increase production of biomass.
Resource efficiency F5 Resource efficiency in agri-food and forestry F6 Reduce food waste	W3, W4, W6: Good water quality status and water supply, increase water efficiency and reduce water consumption, flood risk management, address scarcity L1, L2: Restore and prevent soil degradation. E3, E7, E8: Increase production of biomass, energy efficiency and reduce consumption. C1, C3, C5: Reduce GHG emissions, support low-carbon technology, more climate friendly land-use.		W2: Water supply. C2: Energy efficiency in transport system.
Climate **mitigation** C1 Reduce GHG emissions to keep global temperature increase below 2 degrees C5 Incentivize more climate-friendly land use	W1, W2, W5, W6: Good water quality status and water supply, flood risk management, address scarcity. L1, L2, L3: Restore and prevent soil degradation, maintain and enhance forest cover. E5, E6, E7, E8, E9, E10: Increase hydro-energy, energy efficiency, reduce consumption, push forward energy infrastructure, energy security. F3, F5, F6, F7: Provide environmental public goods, promote resource efficiency, reduce food waste and intake of animal protein.		W3, W4: Increase water efficiency and reduce water consumption. L4: Prevent ILUC. E1, E2, E3, E4: Increase production and consumption of biofuel crops and biomass. F1, F2, F4: Contribute to farm income under condition of environment rules, improve competitiveness, support rural economy
Adaptation C6 Climate adaptation in key vulnerable EU sectors and MS	W1, W2, W3, W5, W6: Good water quality status and water supply, increase water efficiency, flood risk management, address scarcity. L1, L2, L3: Restore and prevent soil degradation, maintain and enhance forest cover. F1, F2, F3, F4: Contribute to farm income under condition of environment rules, improve competitiveness and support rural economy, provision of environmental public goods.		W3, W4: Good water quality status and water supply, reduce water consumption. E3: Increase production of biomass.

Mitigation C1 Reduce GHG emissions to keep global temperature increase below 2 degrees C5 Incentivize more climate-friendly land use	W3, W4: Increase water efficiency and reduce water consumption. L1, L2, L3, L4: Restore and prevent soil degradation, maintain and enhance forest cover, prevent ILUC. E5, E6, E7, E8: Increase production and consumption of hydro-energy, increase energy efficiency, reduce energy consumption. F3, F5, F6, F7: Provide environmental public goods, promote resource efficiency, reduce food waste and intake of animal protein.		W2, W6: Water supply, address scarcity. E1, E2, E3, E4, E9, E10: Increase production and consumption of biofuel crops and biomass, push forward energy infrastructure, energy security. F1, F2, F4: Contribute to farm income under condition of environment rules, improve competitiveness and support rural economy.
Adaptation C6 Climate adaptation in key vulnerable EU sectors and MS	W2, W3, W4, W5, W6: Good water quality status and water supply, increase water efficiency and reduce water consumption, flood risk management, address scarcity. L1, L2, L3: Restore and prevent soil degradation, maintain and enhance forest cover. E5, E6: Increase hydro-energy. F3, F5: Provide environmental public goods, promote resource efficiency.		F1, F2, F4: Contribute to farm income under condition of environment rules, improve competitiveness and support rural economy.

Greece

Table 178 Scoring matrix of coherence among policy objectives in the Greek case study

Clue to read the matrix: What happens to objective Y in the columns (affected) if we make progress on objective X in the rows (affecting)?

	W1	W2	W3	W4	W5	E1	E2	E3	E4	E5	E6	L1	L2	L3	L4	F1	F2	F3	F4	F5	F6	C1	C2	C3	C4	C5	T1	T2	T3	T4
W1		+3	+3	+3	+2	0	0/-1	0	0	0	0	+1	0	+2	+1	+2	0	+1	-1	+1	0	0	+2	+2	+1	0	0/+1	0	0	0
W2	+3		+2	+1	+2	0	0	0	0	0	0	+1	0	0	0/+1	+2	0	+1	-1	0	0	0	+2	+2	+1	0	0	0	0	0
W3	+3	+3		0	0	0	0/-1	0	0	0	0	+1	0	+2	+1	+2	0	+1	-1	+1	0	+1	+2	+2	+1	0	0/+1	0	0	0/+1
W4	+2	+2	0		0	0	0	0	0	0	0	0	0	0	0	0/+1	0	0	0	0	0	0	+3	+2	+1	0	0/+1	0	0	0
W5	+2	+2	0	0		0	0	0	0	0	0/+1	0	0	0	0	0	0	0	0	0	0	0	0/+1	0	0	0	0	0	0	0
E1	0	0	0	0	0		+3	+1	+2	+1	+2	0	0	0	0	+1	0	+1	0	0	0	+3	+2	+2	+2	+3	0/+1	0	0	0
E2	-1	0	-1	0	0	+3		+1	-1	0	0	+1	0	0	0/+1	-1/+1	0	0	0	0	0	+3	+3	+3	+2	+2	+1	0	0	0
E3	0	0	0	0	0	+1	+1		+2	+2	+3	0	0	0	0/+1	0	0	0	0	0	0	+3	+2	+2	0	+3	0/+1	0	0	0
E4	0	0	0	0	0	+1	+1	+1		+1	+2	0	+1	0	0	0	0	0	0	0	0	+2	0	0	0	+1	0	0	0	0
E5	0	0	0	0	0	+1	0	+1	+1		+1	0/+1	0	0	0/+1	0	0	0	0	0	0	+2	+1	+1	+1	+1	0/+1	0	0	0
E6	0	0	0	0	+1	+3	+3	+3	+2	+3		0	0	0	0/+1	+1	0	+1	0	0	0	+2	+2	+2	+2	+2	+1	0	0	0
L1	+1	+1	+1	+1	0	0	0	0	0	0	0		+2	+2	+2	+3	0	+3	0	+3	0	0/+1	0/+1	0	0	0	+2	0	0	0
L2	0	0	0	0	0	0	0	0	0	0	0/+1	+1		+1	+2	+2	0	+2	0	+1	+1	0	0/+1	0	0	+1	+2	+2	0	+1
L3	-1	0	-1	0	0	0	0	0	0	0	0	+2	0/+1		0	0	0	0	0	+3	0	0	0	0	0	0	-1	0	0	0
L4	0/-1	0/-1	0/-1	0	0	0	+1	0	0	0/+1	0	+2	+2	0		-1	0	-1	0	0	0	+1	0	+1	0	+2	0	0	0	0
F1	+2	+2	+1	0	+2	0	-1	0	0/+1	0	0/+1	+2	+1	+3	0		+3	+2	+3	+3	+3	+1	+1	+2	0/+1	0	0/+1	0/+1	0	0/+1
F2	0	0	0	0	0	0	0	0	0	0	0	0/+1	0	0	0	+3		0	+1	0	+3	0	+1	0	0	0	0	0	0	0
F3	-1	-1	-1	0	+1	0	-1	0	0/+1	0	0/+1	+2	+1	0	0	+2	0		0	0	+1	0	0	0	0	0	0	0	0	0
F4	+1	+1	+1	0	0	0	0	0	0	0	0	0	0	0/-1	0	+3	+2	0		0	+3	0	0	0	0	0	0	0	0	0
F5	+1	0	+1	0	0	0	0	0	0	0	0	+2	+1	+3	0	+2	0	0	0		+1	0	0	+2	0	0	0	0	0	0
F6	+1	+1	+1	0	0	0	0	0	0	0	0	0	0	0	0	+2	+3	+2	+3	+2		0	0	0	0	0	0	0	0	0/+1
C1	0	0	0	0	0	+3	+3	+3	+1	+2	+3	0	+1	0	0/+1	+1	0	+1	0	0	0		+3	+3	+2	+3	+1	0	0	0
C2	+1	+1	+1	+3	+1	+3	+3	+3	+1	+2	+3	+1	0	0	0/+1	+1	+1	0	0	0	0	+3		+3	+2	+3	+1	0	0	0
C3	+1	+1	+1	+3	+1	+2	+2	+2	+2	+2	+2	+1	0/+1	0	0/+1	0/+1	0	0	0	0	0	+3	+3		0	+1	+1	0	0	0
C4	0	0	0	0	0	+1	+1	0	0	0/+1	+1	+1	0	0	0	0/+1	0	0	0	0	0	+1	0/+1	0		0	0/+1	0	0	0
C5	0	0	0	0	0	+3	+1	+1	+2	0	+2	0	+1	0	+1	0	0	0	0	0	0	+3	+2	+1	0		0	0	0	0
T1	+1	+1	+1	0/+1	+2	0/+1	+1	0/+1	0	0/+1	+1	+1	+2	-1	0	0/+1	0	0	0	0	0	0/+1	+1	+2	0	0		+2	+2	+2
T2	0	0	0	0	0	0	0	0	0	0	0	+1	+2	0	0	0/+1	0	0	0	0	0	0	0	0	0	0	+2		+2	+3
T3	0	0	0	0	0	0	0	0	0	0	0	0	0/+1	0	0	0	0	0	0	0	0	0	0	0	0	0	+3	+2		+2
T4	0/+1	0	0/+1	0/+1	0	0	0	0	0	0	0	0/+1	+2	0	0/+1	0/+1	0	0	0	0	0	0	+1	+1	0	0	+3	+2	+2	

Source: Papadopoulou, Papadopoulou, & Laspidou, 2018.

Latvia

Table 179 Scoring matrix of coherence among policy objectives in the Latvian case study

Clue to read the matrix: What happens to objective Y in the columns (affected) if we make progress on objective X in the rows (affecting)?

	E1	E2	E3	FA1	FA2	FA3	W1	W2	W3	L1	L2	FO1	FO2	C1	C2
E1		3	0	2	1	1	-1/0	-2/0	-1/0	-1/+1	-1/0	-2/0	-1	2	0/+1
E2	3		0	2	-2	1	0	-2/0	-1/0	1	-2/0	0	0	1	-1/0
E3	1	0		1	0	1	0	0	0	0	0	0	1	3	1
FA1	2	2	0		2	1	0	1	1	0	2	0	0	1	2
FA2	0	0	0	0		0	2	3	3	0	2	0	0	2	0
FA3	0	0	0	1	-1		0	-1/0	-1/0	-1	-1	-1	0/+1	-1/+1	-1/+1
W1	0	0	0	0	0	0		1	1	0	0	0	0	0	0
W2	-1/0	-1/0	0	1	3	0	2		2	0	1	0	0	0	1
W3	0	-1/0	0	1	2	0	1	3		0	0	0	0	0	1
L1	0/+1	0	0	2	1	1	0	-1/0	-1/0		-1/+1	0	0	1	1
L2	-1/0	-2/0	0	2	2	0	0	2	1	1		2	1	1	1
FO1	-1/+1	0	0	0	0	1	0	1	1	2	2		3	2	2
FO2	1	1	0	0	0	1	0	0	0	0	0	0		1	0
C1	3	3	3	2	2	0	0	0/+1	0/+1	0	0	3	1		1
C2	0	0	1	3	0	2	0	2	2	0	2	2	0	0	

Source: Indriksone & Bremere, 2018.

Netherlands

Table 180 Scoring matrix of coherence among policy objectives in the Dutch case study

Clue to read the matrix: What happens to objective Y in the columns (affected) if we make progress on objective X in the rows (affecting)?

	A1	A2	A3	A4	A5	A6	A7	A8	A9	F1	F2	F3	F4	F5	F6	F7	L1	L2	L3	L4	L5	N1	N2	N3	N4	N5	N6	N7	N8	N9	N10	W1	W2	W3	W4	Wa1	Wa2	Wa3	Wa4	Wa5	Wa6
B1	0	0	0	0	3	-2	2	-2	3	3	0	1	-1	0	0	0	0	2	0	0	0	0	-1	-1	-2	0	3	0	0	0	0	0	0	0	0	1	0	0	1	0	1
B2	0	0	0	0	0	0	2	-1	0	0	0	0	0	0	0	0	0	-1	0	0	0	0	0	0	-1	0	0	0	0	0	3	0	0	0	0	0	0	0	1	0	0
B3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	2	3	0	0	0	0	0	0	0
B4	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	1	1	1	1	0	0	1	0	0
B5	0	0	0	0	1	0	1	0	0	1	0	3	0	0	3	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	3	0	0	0	1	0	0	1	0	0
B6	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
B7	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	3	3	0	0	0	0	0	1	0	0
B8	0	0	0	0	0	0	0	0	0	1	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
B9	0	0	0	0	1	1	1	1	0	1	0	0	0	0	0	0	1	2	0	2	0	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

	B1	B2	B3	B4	B5	B6	B7	B8	B9
A1	1	0	0	0	0	0	0	0	0
A2	-1	0	0	0	0	0	0	0	0
A3	-1	0	0	0	0	0	0	0	0
A4	-1	0	0	0	0	0	0	0	0
A5	1	0	0	0	0	0	0	0	1
A6	1	1	0	0	0	0	0	0	0

A7	2	1	0	0	0	0	0	0	1
A8	2	2	0	0	0	0	0	0	1
A9	3	0	0	0	0	0	0	0	1
F1	0	0	0	0	0	0	0	0	0
F2	0	0	0	0	0	0	1	0	0
F3	0	0	0	0	0	0	0	0	0
F4	0	0	0	0	0	0	0	0	0
F5	0	0	0	0	0	0	0	0	0
F6	0	0	0	0	3	0	1	0	0
F7	0	0	0	0	0	0	3	0	0
L1	0	0	0	0	0	0	0	0	0
L2	2	2	0	0	0	0	0	0	0
L3	0	0	0	0	0	0	0	0	0
L4	-1	0	0	0	0	0	0	0	0
L5	0	0	0	0	0	0	0	0	0
N1	0	0	0	0	0	0	0	0	0
N2	-1	0	0	0	0	0	0	0	0
N3	-1	0	0	0	0	0	0	0	0
N4	2	2	0	0	0	0	0	0	0
N5	0	0	0	0	0	0	0	0	0
N6	3	0	0	0	0	0	0	0	0
N7	0	0	0	0	0	0	0	0	0
N8	0	0	0	0	0	0	3	0	0
N9	0	2	0	0	0	0	0	0	0
N10	0	3	0	0	0	0	0	0	1
Ws1	0	0	0	0	0	0	3	0	0
Ws2	0	0	0	0	0	0	3	0	0
Ws3	0	0	0	0	0	0	0	0	0
Ws4	0	0	0	2	0	0	1	0	0
W1	-1	-1	0	1	1	0	-1	-1	0
W2	1	1	0	0	0	0	0	0	0
W3	0	0	0	0	0	0	0	0	0
W4	0	0	0	0	0	0	0	1	0
W5	0	0	0	0	0	0	0	0	0
W6	2	2	0	0	1	1	0	2	0

Source: Selnes, Linderhof, & Marinissen, 2018.

Sweden

Table 181 Scoring matrix of coherence among policy objectives in the Swedish case study

Clue to read the matrix: What happens to objective Y in the columns (affected) if we make progress on objective X in the rows (affecting)?

	E1	E2	C1	C2	F1	F2	H1	H2	H3	H4	W1	W2	W3	W4
E1	NaN	2	1	1	2	1/-1	-1	-1	0	1/-1	-1	-1	-1	1
E2	3	NaN	2	3	0	0	0	1	0	0	0/-1	0	0	0
C1	2	2	NaN	3	1	1/-1	1	-1	1	0	1	1	1	1/-1
C2	2	2	3	NaN	1	0	-1	-1	0	1	1	1	1	1/-1
F1	2	0	1	1	NaN	-1	0	0	-1	-1	-1	-1	-1	-1
F2	-1	0	1/-1	0	-1	NaN	1	-1	2	2	2	1	2	1
H1	-1	0	0	-1	0	1	NaN	1/-1	1	0	1	0	0	1
H2	-1	1	-1	-1	0	-1	1/-1	NaN	1/-1	-1	-2	-1	-1	0
H3	0	0	0	0	-1	2	1	1/-1	NaN	0	2	2	2	0
H4	1/-1	0	0	1	-1	2	0	-1	0	NaN	2	2	2	0
W1	-1	0	1	1	-1	2	1	-2	2	2	NaN	2	2	2
W2	-1	0	1	1	-1	1	0	-2	2	2	2	NaN	2	1
W3	-1	0	1/-1	1/-1	-1	2	2	-1	2	2	2	2	NaN	1
W4	1	0	1	1	-1	1	1	0	0	0	2	1	1	NaN

Source: Teutschbein & Blicharska, 2018.

Andalusia

Table 182 Scoring matrix of coherence among policy objectives in the Andalusian case study

Clue to read the matrix: What happens to objective Y in the columns (affected) if we make progress on objective X in the rows (affecting)?

	W1	W5	W15	W16	W23	W26	W27	W29	W31	W33	L1	L8	L9	L12	L13	E1	E2	E3	E4	A1	A6	A9	A13	A16	A17	A18	C1	C2	C3	C5	C6	C8
W1		3	1	1	1	2	2	2	3	0	0	3	2	2	2	0	0	0	0	1	0	2	2	2	2	0	1	2	1	1	1	1
W5	3		2	2	1	3	3	3	2	1	0	3	3	2	2	1	0	0	1	2	0	2	1	2	1	0	1	1	0	1	1	0
W15	2	2		1	3	3	3	1	1	2	0	1	2	0	0	-2	0	0	-1	3	2	1	1	0	2	1	-1	-1	-1	-1	-1	0
W16	1	2	2		1	3	2	2	1	0	0	0	2	1	1	-1	0	0	-1	2	0	1	1	0	2	0	-1	0	0	-1	0	0
W23	1	1	2	1		2	2	1	2	2	0	1	2	1	0	1	1	1	1	2	1	2	3	1	1	1	2	0	0	1	1	0
W26	2	3	2	2	1		3	2	2	3	0	1	3	1	0	3	(+/-) 1	(+/-) 1	2	2	1	1	1	1	2	0	3	0	0	2	2	0
W27	2	2	2	1	1	2		2	1	1	0	1	2	1	0	1	0	0	1	2	0	1	1	1	2	0	1	0	0	1	1	0
W29	3	3	1	2	1	2	2		1	0	0	2	3	1	1	0	0	0	0	-1	0	1	1	2	1	0	0	0	0	0	0	0
W31	3	2	2	1	1	1	1	1		0	0	3	2	2	2	0	0	0	0	1	0	1	1	2	2	0	0	0	0	2	3	1
W33	0	2	2	0	1	3	2	0	0		1	0	2	1	1	3	3	3	3	2	0	1	1	1	3	0	3	0	0	3	2	0
L1	(+/-) 1	(+/-) 1	0	0	0	0	0	0	0	0		(+/-) 1	(+/-) 1	(+/-)1	(+/-) 1	(+/-) 1	(+/-) 1	(+/-) 1	(+/-) 1	0	0	0	0	(+/-) 1	(+/-) 1	(+/-) 1	0	0	(+/-) 1	(+/-) 1	0	(+/-) 1
L8	3	2	0	2	1	0	0	0	1	0	0		1	2	2	0	0	0	0	0	0	1	1	0	1	0	0	0	0	0	0	0
L9	2	3	2	1	1	3	3	2	2	0	0	1		1	1	0	0	0	0	1	0	1	1	2	2	0	0	1	0	0	0	0
L12	2	2	0	0	0	1	1	2	2	2	(+/-) 2	2	2		2	1	1	1	1	(+/-) 2	-2	1	1	3	3	(+/-) 2	2	3	3	2	2	2
L13	2	2	0	0	0	0	0	2	2	1	(+/-) 2	2	2	3		1	1	1	1	(+/-) 2	-2	2	2	3	3	(+/-) 2	2	3	3	2	2	2
E1	0	2	-2	-1	1	3	-1	0	0	3	0	0	0	1	1		0	0	2	1	0	2	1	1	3	0	3	2	0	3	0	0
E2	0	0	1	0	1	(+/-) 1	0	0	0	3	(+/-) 2	0	0	(+/-) 1	(+/-) 1	0		3	3	(+/-) 1	0	0	1	1	3	1	3	0	0	3	1	0
E3	0	0	1	0	1	(+/-) 1	0	0	0	3	(+/-) 2	0	0	(+/-) 1	(+/-) 1	0	3		3	(+/-) 1	0	0	1	1	3	1	3	0	0	3	1	0
E4	0	0	0	0	1	2	0	0	0	2	(+/-) 2	0	0	(+/-) 1	(+/-) 1	2	3	3		(+/-) 1	0	1	1	2	3	0	3	0	0	3	1	0
A1	(+/-) 1	(+/-) 1	3	1	1	2	2	0	1	2	(+/-) 1	(+/-) 1	(+/-) 1	(+/-) 1	(+/-) 1	2	(+/-) 1	(+/-) 1	(+/-) 1		(+/-) 2	2	2	(+/-) 3	2	(+/-) 2	3	0	0	(+/-) 2	(+/-) 2	0
A6	0	0	1	0	2	1	0	0	0	0	0	0	0	(+/-) 1	(+/-) -1	0	0	0	0	(+/-) 2		2	2	(+/-) 1	(+/-) 2	3	0	1	0	0	0	0
A9	2	2	2	0	2	2	2	0	2	2	0	2	2	(+/-) 2	(+/-) 2	2	2	2	2	3	(+/-) 1		3	2	2	(+/-)1	2	3	2	2	2	2
A13	1	2	2	0	2	2	2	0	1	1	0	1	2	1	1	2	1	1	1	2	1	2		2	2	1	2	1	1	1	1	1
A16	2	2	(+/-) 1	1	1	3	2	2	2	3	(+/-) 1	2	2	3	3	0	2	2	2	(+/-) 3	0	2	1		2	0	2	2	3	2	2	3
A17	1	3	(+/-) 1	3	1	3	3	2	2	3	(+/-) 1	1	3	1	1	3	2	2	2	3	0	3	2	2		0	3	1	2	3	2	1
A18	0	0	2	2	2	0	0	0	0	0	(+/-) 2	1	0	2	2	0	0	0	0	(+/-) 2	3	0	1	(+/-) 1	0		2	2	(+/-) 1	1	0	0
C1	1	1	-1	1	2	3	1	0	0	3	(+/-) 1	1	2	(+/-) 1	(+/-) 1	3	3	3	2	3	0	3	2	(+/-) 2	2	0		2	(+/-) 1	2	1	1
C2	2	3	3	2	2	3	3	3	3	3	0	2	3	2	2	3	0	0	3	(+/-) 3	(+/-) 3	3	2	3	3	(+/-) 2	2		(+/-) 1	2	2	2
C3	1	0	0	0	0	0	0	0	1	0	(+/-) 2	1	0	3	3	0	0	0	0	(+/-) 2	0	2	2	3	3	0	(+/-) 2	(+/-) 2		3	1	2
C5	2	1	-1	-1	1	3	1	0	1	3	0	1	1	3	3	3	3	3	3	(+/-) 2	0	2	2	3	3	0	3	3	3		3	(+/-) 3
C6	2	2	2	0	1	2	3	2	3	2	0	2	2	1	1	2	0	0	1	2	1	2	2	2	3	0	2	2	1	2		1
C8	1	0	1	0	1	0	0	1	1	1	0	1	1	2	2	0	0	0	0	2	0	2	1	3	1	0	1	2	2	3	1	

Source: Martinez, Blanco, & Castaño, 2017.

Sardinia

Table 183 Scoring matrix of coherence among policy objectives in Sardinia

Clue to read the matrix: What happens to objective Y in the columns (affected) if we make progress on objective X in the rows (affecting)?

	E1	E2	E3	E4	E5	FA1	FA2	FA3	W1	W2	W3	L1	L2	C1	C2	C3	T1	T2	FO1	FO2
E1		3	-2	1	0	1	1\-1	1	0	0	0	-2	0	2	1	0	0	0	0	2
E2	3		2	2	0	1	0	1	0	0	0	-1	0	2	2	2	0	1	0	0
E3	0\-1	1		0	0	0	0	0	0	0	0	1	0	1	2	0	1	1	0	0
E4	2	2	0		0	1	1\-1	1	1\-1	1	0	-1	0	1	3	1	0	0	0	0
E5	1	2	-1	0		1	0	1	0	0	0	0	0	2	3	1	1	1	0	0
FA1	0	0	0	1	0		1\-1	2	1	0	0	0	0	2	2	1	0	1	0	2
FA2	0	1	1	2	1	1		2	2	2	1	1	-1	-1	1	1	2	1	1	1
FA3	1	1	2	2	1	2	2		1	1	1	-1	-1	1	1\-1	1	2	2	1	2
W1	0	0	0	-1	0	2	-2	2		0	0	0	0	0	2	1	-1	0	0	0
W2	1	1	0	2	0	1	-1	1	0		2	0	0	0	3	3	-1	1	0	0
W3	0	0	0	1	0	3	-1	1	1	0		0	1	0	1	1	-1	0	1	2
L1	-1	1	1	-1	0	0	0	1	0	0	0		1	0	0	0	0	1	1	1
L2	0	0	0	0	0	2	0	1	0	0	0	1		1	2	2	1\-1	0	2	2
C1	3	3	1	2	3	2	1	1	1	0	0	-1	0		1\-1	1	-1	1	2	2
C2	1	2	2	2	3	3	1	2	3	3	1	0	1	1\-1		3	1	2	2	2
C3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3		0	0	0	0
T1	1	1	0	0	2	1	1	2	1	2	2	0	1	1	1	1		2	1	2
T2	1	1	1	0	2	1	1	2	0	0	2	2	2	1	2	2	2		2	2
FO1	0	0	0	0	0	1	0	2	1	1	0	0	0	2	2	2	0	0		1
FO2	1	0	0	0	1	2	0	1	0	1	1	1	1	2	2	1	0	2	2	

Source: Mereu et al., 2018, p.35.

South-West England

Table 184 Scoring matrix of coherence among policy objectives in South-West England

Clue to read the matrix: What happens to objective Y in the columns (affected) if we make progress on objective X in the rows (affecting)?

	W1	W2	W3	W4	W5	W6	E1	E2	.E3	E4	A/F1	A/F2	A/F3	A/F4	A/F5	L1	L2	L3
W1		2	1	2	1	1	0	1/-1	1	1	3	3	0	1	2	2	2	2
W2	2		2	2	1	-1	1/-1	0	1	0	3	3	1	3	3	2	3	3
W3	2	3		2	0	-1	1/-1	1	0	0	3	3	1	3	3	2	3	2
W4	2	3	2		2	2	2	2	2	0	2	3	1	1	2	2	2	2
W5	2	0	-1	2		-1	1/-1	0	3	-1	1	1	0	1	1	1	0	0
W6	2	2	1/-1	-2	2		1/-1	1	1/-1	0	1	2	1	1	2	2	2	1
E1	0	0	0	0	1	0		1	2	1/-1	0	0	1	0	0	1	0	0
E2	1	1	0	1	2	1	2		1/-1	2	1	1	1	0	1	2	1	0
E3	0	1	0	2	2	0	1/-1	2		1/-1	1	1	1	0	0	0	0	0
E4	2	1	0	1	1	0	1/-1	2	1/-1		1/-1	0	1	0	-1	1	1	1
A/F1	1	2	2	2	1	0	1/-1	1	2	0		3	1/-1	1/-1	2	2	3	3
A/F2	1	1	0	1	0	0	0	1	0	0	2		2	1/-1	2	2	3	3
A/F3	1	1/-1	1	1	0	1	1/-1	1	1	0	1/-1	1		1/-1	1/-1	2	2	1/-1
A/F4	1	2	2	1	0	0	1/-1	1	1	0	3	2	2		1	2	2	2
A/F5	0	0	1	1	1	0	+1/-1	0	2	0	2	2	1	1/-1		2	2	2
L1	3	2	1	2	1	0	2	1	2	0	3	3	1	1	1		3	3
L2	1	2	2	2	1	0	1/-1	1	1	1	3	3	1/-1	1/-1	2	2		3
L3	0	1	1	1	0	0	0	0	0	0	3	2	1/-1	1/-1	1	2	3	

Source: Hole, Mitchell, Smith, & Griffey, 2017.

Transboundary DE-CZ-SK

Czech Republic

Table 185 Scoring matrix of coherence among policy objectives in the Czech Republic

Clue to read the matrix: What happens to objective Y in the columns (affected) if we make progress on objective X in the rows (affecting)?

	E1	F1	F2	F3	F4	F5	F6	L1	L2	L3	L4	L5	L6	L7	L8	L9	L10	L11	L12	L13	W1	W2	W3	W4	W5	W6	W7	W8	W9	W10	W11	W12	C1	C2	C3
E1		3	-2	0	-2	-3	-2	1	1	1	1	1	1	1	-1	0	-2	-1	-1	-3	-1	-1	1	1	0	0	-1	-3	0	0	0	1	-1	-1	3
F1	3		-2	0	-2	-3	-1	1	1	1	1	1	1	1	-1	0	-2	-1	-1	-3	-1	-1	1	1	0	1	-1	-3	0	0	0	1	-1	-1	3
F2	2	2		1	2	1	1	0	1	1	1	1	1	3	0	1	2	1	1	2	2	2	1	1	1	0	2	2	0	1	0	3	3	3	-2
F3	0	0	2		0	0	1	3	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
F4	-2	-1	2	2		2	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	0	0	2	2	0	0	0	2	3	3	-2
F5	-1	-1	0	1	2		2	3	0	0	0	0	0	0	2	0	1	1	1	2	2	2	1	0	0	0	1	3	0	0	0	2	3	3	-3
F6	-2	-1	2	2	2	2		0	0	0	0	0	0	1	0	1	0	1	0	0	3	3	1	1	1	0	2	2	0	0	0	0	3	3	0
L1	-3	-1,5	2	1	3	2	2		3	1	0	1	0	0	0/+2	1	3	3	1	2	3	3	1	2	0	0	3	3	-1	2	3	3	3	3	-3
L2	-3	-1,5	2	1	3	2	2	3		1	0	2	0	0	0/+2	0	2	3	1	2	3	3	2	1	0	0	3	3	-1	2	3	3	3	3	-3
L3	-3	-1,5	2	1	3	2	3	3	3		3	3	0	-1	0/+2	1	3	3	1	2	3	3	3	3	3	1	3	3	-1	0	3	3	3	3	-3
L4	0	0	2	0	3	2	0	0	0	0		0	3	0	0/+2	1	0	1	1	0	2	2	0	1	0	0	3	3	-1	1	1	3	3	3	0
L5	-2	-3	2	0	3	2	2	2	3	1	3		1	0	0/+2	0	1	1	1	2	2	2	0	1	1	1	3	3	-1	1	1	3	3	3	-3
L6	0	0	1	0	3	0	0	0	0	0	0	0		1	0/+2	1	0	1	1	0	0	0	0	0	1	2	0	1	1	-1	0	0	1	3	3	0
L7	0	0	0	0	0	0	0	0	0	0	0	0	1		-3	0	0	0	0	0	0	0	0	0	1	3	0	1	0	3	-1	0	1	0/+2	0/+2	0
L8	0	0	0	0	0	0	0	0	0	0	0	0	0	-3		0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
L9	-2	-2	1	1	0	1	0	0	0	0	0	0	0	-1	0/+1		1	1	1	0	1	1	2	0	0	0	0	0	0/+1	3	0	0	3	3	0
L10	-3	-3	2	1	1	2	0	0	0	0	0	0	0	-1	0/+2	3		1	1	3	3	3	2	3	0	1	0	3	0/+1	3	0	3	3	3	-3
L11	-2	-2	2	1	2	1	1	0	0	0	0	0	0	-1	0/+1	1	0		1	1	1	1	2	2	1	1	2	3	1	2	2	3	3	3	-2
L12	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	1	1	1	1	2	0	0	0	0	0	2	3	3	3	0
L13	-3	-3	2	1	3	3	1	0	0	0	0	0	0	0	0/+3	0	3	1	1		0	0	1	2	0	0	3	3	0	2	0	3	3	3	-3
W1	-3	-1	2	2	1	1	3	2	0	0	0	0	0/+1	3	0/+2	1	2	2	1	3		2	3	0	3	0	0	3	2	1	3	3	3	3	-3
W2	-3	-1,5	2	2	1	1	3	2	0	0	0	0	0/+1	3	0/+2	1	2	2	1	3	2		3	0	3	0	0	3	2	1	2	3	3	3	-3
W3	-3	-1,5	2	1	1	1	1	2	3	3	3	3	0/+1	0/+3	0/+2	1	2	2	1	3	3	3		0	3	0	0	3	2	3	3	3	3	3	-3
W4	0	0	2	1	1	1	2	3	3	3	3	3	0/+1	0/+3	0/+2	1	2	2	1	3	3	3	3		3	3	0	3	2	3	3	3	3	3	-3
W5	0	0	1	0	1	1	3	1	0	3	3	3	0/+1	0/+3	0/+2	1	2	2	1	2	3	3	0	3		0	0	1	2	1	3	3	3	3	-3
W6	0	0	1	0	0	0	0	0	0	0	0	0	0/+1	0/+1	0/+1	1	1	0	0	2	0	0	3	2	0		0	0	0	1	0	3	3	3	0
W7	-3	-1	2	1	1	0	2	1	1	3	3	3	0	0/+3	0/+1	1	2	2	1	3	1	1	3	3	3	1		3	2	0	3	3	3	3	-3
W8	-2	-1	2	1	1	1	0	0	0	0	0	0	0	0	0/+1	1	1	2	1	2	2	3	0	2	3	1	0		0	0	0	3	3	3	-3
W9	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0/+1	1	0	0	0	0	0	0	0	3	0	0	0	0		0	0	3	0	0	0
W10	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	2	0	1	0	0	0	1	2	3	0	0	0	1	2		0	0	1	1	0
W11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0/+1	1	0	1	1	0	1	1	0	3	0	0	0	0	0	0		3	3	3	-2
W12	-3	-1,5	2	2	3	3	2	3	3	3	3	3	0/+1	3	0/+1	1	3	3	1	3	3	3	3	3	3	3	3	3	2	3	3		3	3	-3
C1	-1	-1	2	0	3	3	0	1	3	3	3	3	3	1	0	1	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3		3	-3
C2	-1	-1	2	0	3	3	0	1	3	3	3	3	3	1	0	1	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3		-3
C3	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	1	0	0	0	0	0	0	0	0	-1	-3	

Source: Hesslerová, Pokorný, Kröpfelová, & Baxa, 2018.

Slovakia

Table 186 Scoring matrix of coherence among policy objectives in Slovakia

Clue to read the matrix: What happens to objective Y in the columns (affected) if we make progress on objective X in the rows (affecting)?

	E1	F1	F2	F3	F4	L1	L2	L3	L4	L5	L6	L7	L8	L9	L10	L11	L12	L13	W1	W2	W3	W4	W5	W6	W7	W8	W9	W10	W11	W12	C1	C2	C3
E1		0	-2	0	-3	0	0	1	1	1	0	0	0	-1	-1	-1	-2	-2	-1	-1	1	1	0	0	-1	-3	0	0	0	1	0	0	3
F1	2		-3	-1	-2	1	1	0	0	1	0	0	-1	-1	-1	0	0	-2	-1	-1	1	1	0	0	-2	-3	0	0	-1	1	0	0	3
F2	1	1		0	1	-1	0	0	0	0	2	2	-1	0	1	0	0	1	2	2	1	1	1	1	0	0	0	0	0	2	3	3	-3
F3	-1	-1	1		-1	2	-1	-1	-1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
F4	-2	-1	1	1		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	1	0	0	0	2	3	3	-2
L1	-2	-2	1	0	2		2	0	-1	0	-1	-1	1	0	1	2	0	1	3	3	1	1	0	0	3	3	0	2	2	3	3	2	-3
L2	-3	-2	1	0	2	1		0	0	0	-1	-1	-1	-1	0	0	0	0	3	3	2	1	0	0	3	3	0	1	3	3	3	3	-3
L3	-3	-2	1	0	2	1	2		2	2	-1	0	0	0	2	2	0	1	3	2	2	3	2	1	2	3	0	0	3	3	3	3	-3
L4	0	0	1	0	2	0	0	0		-1	2	-1	0	0	0	0	0	0	2	1	0	0	0	0	3	2	0	0	1	2	3	3	0
L5	-3	-3	1	-1	2	1	2	1	2		0	0	0	-1	0	0	0	0	1	2	0	1	0	0	3	2	0	0	1	2	3	3	-3
L6	-1	0	0	2	-1	-1	-1	0	0	0		0	1	0	-1	0	0	0	1	0	0	1	2	0	1	1	0	0	0	1	3	0	0
L7	0	0	0	0	0	0	0	0	0	0	0		-2	-1	-1	-1	0	0	0	0	0	0	3	0	1	0	2	0	0	1	0	0	0
L8	0	0	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0
L9	-3	-3	0	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0	1	2	0	0	0	0	0	0	2	0	0	3	3	0
L10	-3	-3	1	0	0	0	0	0	0	0	0	0	0	0		0	0	1	2	2	1	2	0	1	0	0	0	2	0	3	2	3	-3
L11	-1	-3	1	1	1	0	0	0	0	0	0	0	0	0	0		0	0	2	1	2	2	1	0	0	2	1	2	1	3	2	3	-3
L12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		-1	1	0	0	1	1	0	0	0	0	9	2	3	3	3	0
L13	-3	-2	2	1	2	0	0	0	0	0	0	0	0	0	0	0	0		0	0	1	1	0	0	0	2	0	1	0	3	3	2	-3
W1	-3	2	2	0	0	1	0	0	0	0	0	0	0	1	1	1	1	2		2	2	0	3	0	0	2	2	1	2	3	3	3	-3
W2	-3	-3	1	1	1	1	0	0	0	0	0	2	1	1	2	1	1	2	2		2	0	2	0	0	2	2	1	1	2	3	3	-3
W3	-3	-3	1	0	0	2	2	2	2	3	0	0	0	2	1	2	1	2	2	2		0	2	0	0	2	2	2	3	2	3	3	-3
W4	0	0	1	0	0	2	2	3	3	2	1	2	1	2	2	1	1	2	2	2	2		2	3	0	3	2	3	3	3	3	3	-3
W5	0	0	1	1	0	0	0	2	2	2	1	1	1	1	1	1	1	1	2	2	0	2		0	0	1	1	1	3	3	3	3	-3
W6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2	0		0	0	0	0	0	3	3	3	1
W7	-3	-1	1	0	0	1	1	2	3	2	0	0	0	1	2	1	1	2	0	0	2	2	3	1		2	1	0	3	3	3	2	-3
W8	-3	-1	0	0	0	1	0	0	0	0	0	0	0	1	1	1	1	2	0	0	2	0	0	0	0		0	0	0	3	3	2	-3
W9	-1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	0	0	0	0		0	0	2	0	0	0
W10	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	1	0	1	2	2	0	0	0	0	0	0		0	0	1	0	0
W11	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	0	0	1	0	2	0	0	0	0	0	0		3	2	3	-2
W12	-3	-2	2	2	2	3	3	3	2	3	3	0	2	1	3	3	0	2	3	3	3	3	3	3	2	2	2	3	3		2	3	-3
C1	0	0	2	0	2	1	2	3	3	3	2	1	0	0	2	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3		3	-3
C2	0	0	2	0	2	1	2	3	3	3	2	1	0	0	2	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3		-3
C3	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	

Source: Kravčík et al., 2018.

Germany

Table 187 Scoring matrix of coherence among policy objectives in Germany

Clue to read the matrix: What happens to objective Y in the columns (affected) if we make progress on objective X in the rows (affecting)?

	W1	W2	W3	W4	W5	E1	E2	E3	E4	E5	F1	F2	F3	F4	F5	F6	L1	L2	L3	L4	C1	C2
W1		0	-1/0	+2/+3	0	0	0	0	0	0	+1/+2	-1/-2	0	0	+2	+1	0	+3	-1/0	+1	0	+1
W2	+2		0	+1	0	0	0	-1/0	0	0	-2/-1	-2/-1	0	0	+1	+1	0	+2	0	+1/0	0	+1
W3	-2/-1	0		-2/-1/0	-1/0	0	0	0	0	0	0	0	0	0	-1/0	-1/0	+2	-1/0	0	-1/0	0	0
W4	+2/+1	+1/0	-1		0	0	-1/0	0	0	0	0	0	0	0	+2	+2	0	+1	0	0	0	+1
W5	0	0	-1/0	0		0	0	0	0	0	0	+1/+2	0	0	0	0	+1	0	0	0	0	0
E1	0	0	0	0	0		+1/0	0	0	0	0	0	0	0	0	0	0	+1	0	0	+2/-2	+1
E2	0	+1/0	0	-1	0	+1/0		+1	0	0	0	-1/0	0	0	0	0	0	+2	0	0	+3	+2
E3	0	-1/0	0	0	0	0	+1		0	0	0	-2/-1	0	-1	0	0	0	+1/0	0	0	+1/0	+1
E4	0	0	0	0	0	0	+2/+3	0		+1	0	0	0	0	0	0	0	0	0	0	+1/0	0
E5	0	0	0	0	0	0	0	0	0		0	0	0	0	0	0	0	+2	0	0	+3	+1
F1	-2/-1	-1	0	0	0	0	0	0	0	0		-1/0	+1	+1	0	0	0	0	0	0	0	0
F2	-2/-1	-1	0	0	0	0	-1/0	-1	0	0	-1/0		0	0	-1/0	0	0	-2/-1	-1/0	-2/0	-1	0
F3	0	0	0	0	0	0	0	0	0	0	+3	+3		0	+3	+1	0	0	0	0	0	0
F4	+1	+1	0	0	0	0	0	-1	0	0	+1	0	0		0	0	0	+2	0	0	+1/0	+2
F5	+1	0	0	+2	0	0	0	0	0	0	0	-1	+1	0		+3	-1/0	+1	-1/0	0	0	0
F6	0	0	0	+2	0	0	0	0	0	0	0	+1	0	0	+2		-1/0	+2	-1	+2	0	0
L1	0	0	+2	0	0	0	0	0	0	-1/0	0	0	0	0	0	0		-1/0	0	-1/0	0	0
L2	+3	+2	-1/0	+2	0	+1	+2	+1/0	0	+2	0	-2	0	+2	+1	+2	-1/0		-3	+3	+2	0
L3	-1/0	0	0	0	0	0	0	0	0	-1/0	0	-1/0	0	0	-1/0	-1/0	0	-3		-1/0	-1	0
L4	+1	0	-1/0	+1/0	0	0	0	+1/-1	0	0	0	-2/0	0	0	+2	+2	-1	+3	-1/0		0	+1
C1	0	0	0	0	0	0	+2	+1/0	0	+3	0	-1/0	0	0	0	0	0	+1	-2	0		+1
C2	**+1/0**	**+1/0**	**0**	**+1/0**	**0**	**0**	**+1**	**+1**	**0**	**+2**	**0**	**0**	**0**	**+1**	**+1**	**+1**	**0**	**+1**	**-1**	**+1**	**+1**	

Source: Conradt, 2017.

Transboundary DE-FR

Table 188 Scoring matrix of coherence among policy objectives in the transboundary DE-FR case

Clue to read the matrix: What happens to objective Y in the columns (affected) if we make progress on objective X in the rows (affecting)?

	GL1	GL2	FL3	FL4	GL5	GC1	TBC 1	TBF 1	TBF 2	GE1	FE2	TBW 1	TBW 2	TBW 3
GL1		0	+1/+ 3	0	0	+2	+2	0	0	0	0	+2	+2	0/+1
GL2	-2		**-1/2**	0	**-1**	0	-2	0	**-1**	0	0	0	0	0
FL3	+1/+ 3	0		0	0	+1/+ 2	+2	0	0	0	0	+2	+1	+1
FL4	**-1**	0	-2		0	0	-2	0	**-1**	0	0	0	0	0
GL5	+2	0	+1	0		0	0	0	0	0	0	+2	0	0
GC1	+2	0	+1/+ 2	0	0		0	0	0	0	0	0	+1	+1
TBC1	+2	0	+2	0	0	0		0	0	0	0	0	0	0
TBF1	0	0	0	0	0	0	0		0	0	0	0	0	0
TBF2	**-1/-2**	0	**-1/-2**	0	0	0	0	0		0	0	**-1/-2**	0	**-1/-2**
GE1	-1/+1	0	0	0	0	0	+2	+1	**-1**		0	0	0	0
FE2	0	0	**-1/0**	0	0	0	+2	+1	**-1**	0		**-1/0**	0	0
TBW1	+2	0	+2	0	0	0	0	0	0	0	0		0	0
TBW2	+2	+1	+2	+1	0	0	0	0	0	0	0	0		0
TBW3	+2	0	+2	0	+1	+1	0	0	+1	0	0	0	0	

Source: Strosser et al., 2018.

Appendix 4 - Formal and informal arrangements in the case studies

Greece

Table 189 Formal and informal arrangements in Greece

Type of arrangement (formal/informal)	Description of arrangement	Function of the arrangement (coordination, decision making, knowledge sharing, etc.)	Why it is working or not working (enabling and limiting factors)	How the arrangement affects the achievement of nexus critical objectives
Formal	Collaboration committee between the Ministry of Environment and Energy and the School of Chemical Engineering (NTUA).	Consultation and knowledge sharing concerning the establishment of regional (NUTS2 level) plans for combating climate change impacts.	The committee works effectively during the policy design process on the basis of knowledge exchange (consultation process). There are common goals and interests. Its members cooperate in order to establish policy papers that will turn into implemented policies (transparent government rules). There is a high level of trust among the members of the committee.	This arrangement supports the goals for combating climate change, protecting the quality of atmosphere and increasing the country's adaptation ability against climate change impacts.
	Collaboration between the Athens Labor Unions Organization with several Ministries.	Consultation and knowledge sharing on issues having to do with environmental impacts on employees and laborers (urban environment) – Environmental impacts on working conditions.	The committee works effectively during the policy design process or the assessment of already implemented policies (knowledge exchange / consultation). There is trust among its members who are working towards	This arrangement supports the goals concerning the protection of urban environment, the confrontation of climate change impacts, the protection of atmosphere, the sustainable use of water resources,

			the achievement of common goals. One of its basic missions is the elaboration of transparent policy directions.	land use regulations and energy saving.
	Collaboration committee between the Ministry of Environment and Energy and the Directorate of International Energy Issues (Ministry of Foreign Affairs).	Coordinate decisions and knowledge sharing on issues having to do with the international/ bilateral cooperation of Greece in the energy sector (international energy issues).	The committee is working effectively; it takes serious decisions concerning the design and implementation of energy policies. Common goals, common interests and confidence characterize such cooperation. Exchange of knowledge and expertise on energy issues.	The arrangement supports the goals for energy saving and climate change adaptation.
	Inter-ministerial committee between the Ministry of Environment and Energy, the Ministry of Rural Development and Food and the Ministry of Tourism.	Coordinate decisions and knowledge sharing about land use regulations, infrastructures with visual disturbance in tourist regions and the management of geothermal springs.	The committee is working effectively; it takes serious decisions during the policy design process and aims at the successful implementation of the respective policies (transparent government rules). The cooperation is based on common interests and common perspectives. It aims at the exchange of knowledge and experience. Its members trust each other.	The arrangement supports the goals having to do with the sustainable development of tourism, the development of alternative tourist activities, the sustainable development of agriculture, the establishment of a balanced spatial pattern of development, the regulation of land uses and the sustainable management of natural resources.
	Collaboration committee between the Ministry of Environment and	Coordinate decisions and knowledge sharing on issues	The committee is working effectively during the policy design process	This arrangement supports the goals having to do with the sustainable

	Energy and the Hellenic Public Power Corporation S.A.	concerning the management of energy resources, the production of electricity and environmental management.	(exchange of knowledge and expertise). Sometimes conflicts arise concerning the content of policy documents and the role (responsibilities) of HPPC as a national energy provider but usually a compromise decision is taken as there are common interests and common goals.	management of energy resources and the protection of natural environment.
	Collaboration of the Greek Ombudsman with several public authorities (cross-sectoral arrangement).	Coordinate decisions concerning policy implementation and relative conflicts.	Effective collaboration during the assessment of policy implementation. The collaboration is mainly based on problems reported by citizens during policy implementation. It aims at improving policies that do not "work well". This refers to possible policy gaps, unexpected results, etc. Knowledge and experience are exploited in order to improve current policies and their implementation.	This arrangement supports the goals having to do with the effective implementation of the nexus-related policies and the problems/conflicts arise during their implementation.
	Collaboration of the School of Mechanical Engineering (NTUA) with the National Council of Energy Strategy.	Coordinate decisions and knowledge sharing on issues having to do with energy policy.	Effective collaboration during the policy design process (knowledge exchange – consultation). Serious decisions are taken and turn	This arrangement supports the goals having to do with the attainment of the national energy goals, the promotion of RES and energy saving.

			into implemented policies (transparent government rules). There are common interests, common goals and trust among the members of the committee.	
	Collaboration of the National Documentation Centre (National H2020 contact point on energy issues) with the General Secretariat of Research and Technology.	Coordinate decisions and knowledge sharing on issues having to do with research and policies in the energy sector.	Effective collaboration concerning energy issues (exchange of experience and expertise). Feedback and knowledge exchange, dissemination of knowledge and results from research programmes and establishment of business and research partnerships. Common interests, common goals and trust among the members of the committee.	This arrangement supports the promotion of energy saving, the promotion of RES and the attainment of the national energy goals.
	Collaboration of the National Cadastre and Mapping Agency S.A. with the Ministry of Environment and Energy.	The National Cadastre and Mapping Agency S.A. has a supportive role (consultant) during the design of land policies.	Effective collaboration. Consultancy and supply of geo-data and geo-information. Trust among the members of the committee.	This arrangement supports the goals having to do with the establishment of a balanced spatial pattern of development and the regulation of land uses.
Informal	Collaboration of the Ministry of Environment and Energy with the Hellenic Association of Photovoltaic	Coordinate decisions concerning environmental, financial and legal issues having to do with energy	The coordination is working effectively during the energy policy design process, aiming at the effective implementation of	This arrangement supports the achievement of goals for energy production from PVs through the promotion of PVs

	Energy Producers (consultant).	production from PVs.	the designed policies. Sometimes conflicts arise (e.g. management of the amount of electricity produced from PVs) but compromise solutions are found. The committee has common interests and common goals.	and the increase of their sharing in the final energy mix. It also supports the goals for combating climate change.
	Collaboration between Piraeus Bank (consultant) and private individuals (agricultural and energy investors/private initiatives).	Coordinate actions having to do with consultation and funding of agricultural and energy investments.	The coordination works effectively in case the Bank and the investors have the same interests. It fails to work in case of conflicting interests between the two sides.	This arrangement supports the achievement of goals having to do with the sustainable development of agricultural sector, the promotion of RES and energy saving.
	Cooperation among farmers.	Actions having to do with the adopted cultivation practices, certification of agricultural products, funding opportunities, trade of agricultural products, training activities, land use conflicts and water allocation.	Cooperation work effectively in case where farmers trust each other and follow the rules having informally (not mandatory by law) agreed among them. In some cases cooperation don't work because farmers are not willing to follow the "rules" or conflicting interests (e.g. water allocation for irrigation) exist among them.	This arrangement supports the sustainable development of agriculture and the rational use of resources by the agricultural sector.
	Cooperation among the members of the Hellenic Association for Cogeneration of Heat and Power.	Actions having to do with feedback exchange in the sector of cogeneration, scientific and technical support, diffusion of	Cooperation work effectively towards the implementation of policies concerning cogeneration of electricity and heat. Common interests,	This arrangement supports the goal having to do with the promotion of cogeneration technologies and the adoption of cogeneration

		knowledge and expertise.	common goals and trust exist among the members of the committee.	systems for the production of electricity and heat.
	Collaboration of Mills of Crete enterprise with farmers and food producers.	Actions having to do with the further development of agricultural and food sectors.	Effective cooperation in the context of policy implementation (agricultural and food policies). Exchange of knowledge and expertise – Consultancy. Common interests and perspectives.	This arrangement supports the goals concerning the sustainable development of agriculture and the safety of food and fodders.
	Cooperation of WWF Greece with several Ministries (Ministry of Environment and Energy, Ministry of Rural Development and Food, etc.).	WWF Greece acts as lobbyist and exerts pressure during the policy design and policy implementation processes. It submits proposals having to do with biodiversity, climate change, Common Agricultural Policy, water policy, land use policies, etc.	Sometimes the cooperation work effectively and the two sides have common interests and common perspectives. Some other times conflicts arise between the two sides and the cooperation meets a dead end.	This arrangement supports the goals having to do with the protection, sustainable management and effective use of all the nexus components.
	Cooperation of Greenpeace Greece with several Ministries (Ministry of Environment and Energy, Ministry of Rural Development and Food, etc.) and municipalities.	Greenpeace Greece acts as lobbyist (campaign group) and exerts pressure during the policy design and policy implementation processes. It submits proposals having to do with energy, agriculture and fishery.	Sometimes the cooperation work effectively and the two sides have common interests and common perspectives. Some other times conflicts arise between the two sides and the cooperation meets a dead end.	This arrangement supports the goals having to do with the promotion of RES, the attainment of the national energy goals, the promotion of energy saving, the sustainable development of agriculture, the protection of plant genetic resources, the rational use of pesticides and the safety of food and fodders.

Latvia

Table 190 Formal and informal arrangements in Latvia

Type of arrangement (formal/informal)	Description of arrangement	Function of the arrangement (coordination, decision-making, knowledge sharing, etc.)	Why it is working or not working (enabling and limiting factors)	How the arrangement affects the achievement of nexus critical objectives
Formal	Council for National Economy – Collaboration between Ministry of Economy, Latvian Chamber of Commerce and Industry, Employers' Confederation of Latvia, Free Trade Union Confederation of Latvia, The Latvian Association of Local and Regional Governments	Elaborates and evaluates proposals for the long-term development of national economy	The Council meets upon the need, organizes working groups on topics e.g. energy involving various stakeholders in evaluation and elaboration of proposals	This arrangement supports implementation of sustainability principles in the business sector
	Intermenstrual collaboration (working group) on Climate and Energy policy for the period from 2020 – 2030	Elaborates coordinated opinions on issues related to energy and climate policy developments up to the year 2030.	The working group comprises high level officials from the Ministries involved in the decision making on Climate and Energy issues	This arrangement supports the goals concerning climate change mitigation, sustainable use of energy sources
	Consultative Board for Climate change Financing Instrument (meets twice a year)	Provides proposals for improvements of legislative framework related to application of climate change financial instrument (green investment scheme), follows the funding procedure and implementation of projects	The Board comprises representatives from the Ministries (Environmental Protection and Regional Development; Economy, Transport, Agriculture, Education) and NGOs	This arrangement supports the goals concerning climate change mitigation (reduction of GHG emissions in energy, transport, construction sector by improving energy efficiency, promoting use of renewable energy sources)

	Interinstitutional Expert working group on climate change adaptation	Ensures information exchange on issues related to climate change adaptation (e.g., research, measures, policy document, legislative framework)	The Group is compromised by specialists from ministries and their subordinated institutions. The group is meeting at least twice a year.	This arrangement supports the climate change adaptation policy goals.
	The Council for cooperation on Climate technologies	Promotes information exchange and cooperation on technologies for climate change mitigation and impact reduction. Elaborates recommendations for improvement of policy and legislation in the field	The Council is coordinated by the Ministry of Environmental Protection and Regional Development. Council members are representatives from professional (branch specific) organizations e.g., various renewable energy sources, municipalities. The Council meets every 3 months.	This arrangement supports climate change mitigation Goals (reduction of GHG emissions)
	Environmental Consultative Board	Provides consultancy and promotes involvement of the society (provides consolidated opinions) in policy development and implementation in various fields of environmental protection.	The Board consists of representatives from various non-governmental organisations being active in the field of environmental protection. The Board meets at least every 2 months.	This arrangement supports goals of sustainable resource management, environmental protection
	River basin management consultative boards	Coordinates the interests and activities of state authorities, municipalities, entrepreneurs, NGO on issues related to environmental quality in a	There are 4 River basin district consultative boards in Latvia consisting of representatives from public (state, municipal) institutions, NGOs. The Board is having biannual meetings.	This arrangement supports meeting the water policy goals.

		particular River basin.		
	Consultative board of Agricultural NGOs	Ensures collaboration between the Ministry of Agriculture and NGOs and elaborates proposals for the policy development in the agriculture sector	The Consultative board consists of nine NGOs representing the interests of farmers, rural inhabitants, and food producers in Latvia. The board meets ad hoc depending on the need.	This arrangement supports the goals of sustainable agricultural policy and rural development.
	Agriculture and Environment Consultative Board	Prepares consolidated proposals for the policy development in the field of agriculture and environmental protection to ensure the balanced representation of the interests of agriculture and environmental protection	Comprises representatives from the Ministry of Environmental Protection and Regional Development, Ministry of Agriculture and their subordinated institutions, environmental NGOs. The board meets ad hoc depending on the need.	This arrangement supports the goals of sustainable use of land use, agriculture, and environmental protection.
	Consultative Board on Forestry	Provides consultancy and coordinates submission of opinions to policy development in the field of forestry	The Board consists of managers of public and private forests, forestry industry, environmental specialists. The Board meets at least once per quarter.	This arrangement supports the goals of sustainable forestry.
Informal	Energy Committee of the "Latvian Chamber of commerce and industry"	The Committee aims to elaborate proposals for energy pricing policy (including the mandatory purchase of energy produced	The committee comprises members/experts of the association "Latvian Chamber of commerce and industry". It meets	This arrangement supports the goals of sustainable energy, energy efficiency

		from RES) promoting entrepreneurship in the country	ad hoc upon the need.	
	Collaboration of the Ministry of Economy with NGOs	Ministry of Economy collaborates with more than 100 NGOs on various issues related to the competencies of the ministry e.g., use of energy sources, energy efficiency, biofuels.	The Ministry organises the collaboration with NGOs in the frame of various committees and events.	This arrangement supports the goals of sustainable development in various sectors

The Netherlands

Table 191 Formal and informal arrangements in The Netherlands

Arrangement	Enabling and limiting factors	Result
Formal governmental project: Conflicting interests in policy (Botsende belangen in beleid (2011). Carried out by consultants	Inventory of conflicting interests and obstacles + how to deal with them in the policy for the biobased economy (incl biomassa)	Government cleared out whether or not the issues had to be resolved: improved implementation
Formal arrangement for consultation: The Transition House for the Biobased Economy	A meeting place for a better connection between knowledge and business.	Improves the ability to see and report (to government on) opportunities, limitations and obstacles and to enhance the (mutual) understanding.
Formal arrangement: Front Runners Office (Koplopersloket)	Stimulation of innovative action	Establishing innovations or improving practice might very well strengthen the NCO achievement
Formal government project: Acceleration Team Green Gas (Versnellerteam Groen Gas (2013):	Market parties signalling problems and solutions in national policy. Network link with the Foundation Green Gas (Stichting Groen Gas Nederland, Programmadirectie Biobased Economy:	Shorter and better procedures & licensing; improvements of investment subsidy SDE+.
Formal arrangement for 3 months and then informal continuation: Energy Dialogue: consultation from April 2016	All parties share their views on the future energy system and to contribute to the design of the policy agenda.	Input for the Energy Policy Agenda. Instrumental in fostering awareness of the energy transition in the Netherlands

Formal governmental process: National Agreement on the Circular Economy (Grondstoffenakkoord, 2017)	Joint ambitions for steps to utilise raw materials more effectively, by reducing our dependency on non-renewable, raw materials and less waste and pollution.	Indirectly effect by its agenda setting power. New is the link to a social agenda for effects on the labour market (prospects for healthy, honest work).
Formal governmental process: Transition Agenda Circular Economy (2018)	A major project with a multi-stakeholder approach (180 signatures). For the implementation of the Natural Resource Agreement;	Agenda transformed to action by stakeholder working groups.
Formal Cabinet Approach Climate (Kabinetsinzet Klimaatakkoord, 2018)	Clear objectives for the future. Built on further consultation on how to proceed.	Framework with objectives and for better collaboration and a more integrated approach.
Formal arrangement: Climate Governmental Consultation 2018	Interdepartmental Management Table (Regietafel Interbestuurlijk Programma): Cabinet, provinces (IPO), municipalities, (VNG), and the Dutch Water Authorities (UvW).	More focus on the climate effects of the policy, sharpening the focus.
Informal arrangement: the 2018 consultations with organizations and businesses.	The ministry felt well served with many good ideas for instant reduction of CO2 emissions.	Agenda forming by establishing consensus and enthusiasm.

Sweden

Table 192 Formal and informal arrangements in Sweden

Type of arrangement	Description	Function	Enabling & Limiting Factors	Effect on the achievement of nexus-critical objectives
formal	Appropriation directions from the government (public service agreements, so-called 'regleringsbrev')	Annual directions from the government provided to all authorities, outlining key activities, targets, budget and how the budget will be allocated to different activities. Specifies what goals should be achieved and the reporting required	Very strong regulatory instrument that authorities follow every year	Supports all critical objectives, however may change depending on priorities (e.g. Recent priorities in Sweden are linked to climate and energy objectives)
Formal	Supervisory role of county boards in following up	County boards are supervising local level decision	There are established routines for this work that has been in	Contributes to fulfilment of all critical nexus

	national level interests in local decisions	making, checking if they are in line with national level policies and particularly the key national interests	operation for many years, so it is working effectively. The authorities usually have a long experience in combining different objectives in their decision making	objectives, with particular importance for the different environmental quality objectives (on agriculture, forests, water quality, wetlands). Facilitates synergies between objectives
Formal	Spatial planning system	Spatial planning is conducted at the level of municipalities to support land use decisions	There are established routines for this work that has been in operation for many years, so it is working effectively. The authorities usually have a long experience in combining different objectives in their decision making	Contributes to fulfilment of the nexus objectives linked to land (particularly agriculture) and environment (horizontal objectives). Facilitates synergies between objectives, as it coordinates different goals simultaneously
Formal	Formal process of public participation (consultations, exhibitions, land owner meetings, etc.)	Process of participation allowing actors outside the formal planning system to participate in	Sweden is seen as pioneer in public participation arrangement and have long history of stakeholder involvement. However, in practice the quality of participation depends on particular representatives of authorities, thus some participation processes are of low quality (superficial participation)	Supports collaboration of different actors contributing to finding synergies between different critical objectives. Particularly important in land use (agricultural & environmental objectives) and infrastructural (energy objectives) decisions
formal	Ecological compensation required by Environmental Code	The legislation requires that compensation is conducted in situation of	There are no standards and routines yet on how to conduct a process of compensation, so	Potentially would support environmental objectives, but still not well

		potential damages that an investment can impose.	it is still rarely conducted in practice. It only takes place if very strict legal requirement is in place, mostly in case of investments that can influence NATURA 2000 areas	implemented in practice
Formal	Regional development and cooperation in the environmental target system (RUS)	Network of county boards collaborating in the implementation of different environmental quality objectives. Main goal is knowledge exchange.	Driven by engaged individuals from county boards works quite well. Some funding from the environmental protection agency helped development of the important knowledge base. Still resources are lacking for full development of this initiative.	Relevant particularly for environmental objectives and to land sector objectives
informal	Collaboration organized by water authorities	Organized with an aim of coordinating activities across sector to facilitate implementation of water framework directive	The water authorities do not have formal power to influence forestry sector or municipalities, so they only can suggest collaboration. Forestry sector and municipalities participate but do not have strong incentives for common activities	Supports implementation of water related objectives, and, to some extent environmental objectives linked to forests, agriculture and water quality
Informal	EU project funding in the forestry sector	Forestry authorities apply for external funding to increase knowledge base, with focus on linking knowledge from different sectors (e.g. recent large life project “Grip On Life IP” about wetlands, forests and water management that will improve	With sufficient funding there is potential. However, the application process is usually very long and time consuming, which may hinder the application	Particularly forestry, water, energy and environmental objectives

		collaboration of local forestry authorities, county boards and fisheries management organizations) in water-related questions		
Informal	Informal arrangements for knowledge sharing	Different authorities at local and regional level organize informal arrangements, working groups	The arrangements are not obligatory/binding and depend on "good will" of participants; thus in some situations they work very well, but not in others. Depend to large extent on local leaders	Depending on the sector may facilitate fulfilment of any objectives
informal	Informal collaboration with NGOs in promoting some goals	County boards and local municipalities collaboration with NGOs in pursuing some objectives (e.g. Wetland restoration by the Swedish Anglers Association supporting Thriving wetlands objective and different biodiversity objectives)	Works well through voluntary engagement of NGOs and support fork authorities side (win-win for both parts)	Depending on NGO, can be about any objective, however in most cases links to environmental or land sector objectives

Andalusia

Table 193 Formal and informal arrangements in Andalusia

Type of arrangement (formal/informal)	Description of arrangement	Function of the arrangement (coordination, decision-making, knowledge sharing, etc.)	Why it is working or not working (enabling and limiting factors)	How the arrangement affects the achievement of nexus critical objectives
Formal	Andalusian Environmental Council. It is a body for social participation constituted by different agents interested in environmental issues in the region (regional government, agricultural organisations, NGOs, etc.)	Coordination, knowledge sharing	This council works as a platform to discuss proposed environmental actions in Andalusia	Contributing to environmental protection
	Andalusian Water Council. It is an advisory body in water issues of the regional government. The members are water users, NGOs, as well as the regional government, etc.)	Coordination, knowledge sharing	This council works as a forum to inform and advise, as well as to propose measures that improve water resources sustainability in Andalusia.	Contributing to sustainable water management
	Andalusian Land Planning Council. It is an advisory body in land planning and urbanisation of the regional government. The members are the regional government, trade	Coordination, knowledge sharing	This council works as a forum to discuss actions regarding land planning in Andalusia	Contributing to resource efficiency use

	unions, business associations, universities, NGOs, etc.			
	Regional government agreement to formulate the Andalusian bio economy strategy	Decision-making	This agreement has boosted the design and implementation of a bio economy strategy in the region	Promoting resource efficiency use and biomass and biofuel production
	Inter-ministerial Committee to identify measures to design the RDP 2014-2020.	Decision-making	This collaboration enabled the implementation of targeted and effective measures promoting energy efficiency. However, some trade-offs with water policies were not considered adequately.	Promoting energy saving and efficiency
	Inter-ministerial Committee for framing the law on measures addressing climate change	Decision-making	This committee facilitates the integration of the different sectors and the views of the different regional governments	Setting up measure to cope with climate change
	Collaboration between (IFAPA, IAS) and the regional administration	Knowledge sharing, decision-making	Research centres advice the regional government (reports about specific issues). However, this collaboration could be further developed.	Promoting resource use efficiency and environmental protection
	Cooperation between water users associations and river management authorities	Coordination, decision-making	This cooperation enables the participatory elaboration of river basin management plans	Ensuring good status of water bodies and rational water use to ensure long term water supply
	Covenant of Mayors for Climate & Energy. Initiative integrated in the Andalusian Urban Sustainability	Coordination and knowledge sharing	The covenant is working as 1700 municipalities in Spain and more than 7000 in Europe have signed it. It	Contributing to reduceGHG emissions and increasing resilience against climate change impacts.

	Strategy to meet the objectives of reducing emissions. 546 municipalities in Andalusia have signed it		promotes the knowledge sharing and the collaboration between different institutions	
	Bureau of water formed by the Federation of irrigation farmers of Almeria (FERAL) and several agricultural professional organisations (COAG, ASAJA)	Coordination	This forum is working as a common platform for farmers to pursue their interests and resolve water problems	Promoting sustainable water management
Informal	Irrigation farmers in Almeria collaborate together to develop a project to desalinate a water pond, using solar energy	Management	It is working as a measure to face water scarcity and water quality problems in Almeria	Improving water quality and water availability Using renewable energy in desalination

South-west England

Table 194 Formal and informal arrangements in South-west England

Type of arrangement (formal/informal)	Description of arrangement	Function of the arrangement (coordination, decision-making, knowledge sharing etc.)	Why it is working or not working (enabling and limiting factors)	How the arrangement affects the achievement of the NCOs
Formal	Direct (basic farm) payments provide funding to farmers and land managers to farm in a way that supports biodiversity, enhances the landscape, and improves the quality of water, air and soil (excluded as an instrument)	Mechanism of control	Enabled by funding and support systems provided by relevant agencies.	Helps improve water quality; builds farm businesses; improve soil structure and composition

Informal	Devon Wildlife Trust acts as intermediary between SWW and farmers	Knowledge sharing	Acts as intermediary between water company and farmers	Helps improve water quality; reduce pesticide pollution; improve the agri-environment
Informal	Farming communities tend to rely on informal networks with neighbouring farms (in the pub etc.) and these are often more trusted than more formal networks (which farmers often don't have time to attend).	Informal networks/ knowledge sharing	Peer-to-peer networks more trusted than formal networks.	Helps maintain and improve the agri-environment; build farm businesses; increase the use of renewable resources.
Formal	Continuity in local political leadership (excluded as not an arrangement)	Governance/ coordination	Embedding sustainable practices requires long-term political commitment.	Helps build all aspects of NCOs
Formal	Cornwall and the Isles of Scilly have some of the best natural resources for renewable energy in Europe, including wind, solar, marine and geothermal. The distribution network, however, is operating close to capacity, meaning that despite the renewable resource potential, new renewable generation projects are becoming increasingly uneconomical, due to the need for costly high voltage	Partnership	Shared objectives	Helps increase energy security; meet carbon budgets; increase the use of renewable resources

	network reinforcement. Not all of the issues affecting Cornwall and the Isle of Scilly's electricity grid will be able to be met through Smart Cornwall activity. Through the wider Green Cornwall programme, a Cornwall Grid Group has been set up with participant from Cornwall Council, Western Power Distribution, Ofgem and DECC.			
Informal	23 community energy groups across the county of Devon (the highest number in England). These groups run 62 community owned renewable projects, which have generated 17,431 MWh of clean green energy, saving 6,080 tonnes of CO2 emissions and helping 2,717 homes to save on energy bills and increase their energy efficiency. The 12.3 MW of capacity installed by community energy groups represents 1.3 per cent of the total renewable electricity installed in Devon.	Coordination/ Knowledge sharing	Community energy is well supported. Cuts in subsidies (Feed-in tariffs) has reduced activity and impact, but also motivated community energy groups in Devon to do more on energy efficiency, fuel poverty, and community engagement.	Helps increase energy security; increase the use of renewable resources; address affordability of energy for customers.

	Community energy organisations in Devon have raised £14.1 million of investment, enabling them to create 33 FTE jobs.			
Formal	Cooperation between the Wadebridge Community Energy Network (WREN) and SWW to install solar to power its water and sewage treatment plants in the area (e.g. Nanstallon)	Cooperation	Strong and committed partnership between energy CSO and water company.	Increase the use of renewable resources.
Formal	Local Economic Partnerships (LEPs) are voluntary partnerships between local authorities and local private sector businesses. They play a central role in determining local economic priorities and undertaking activities to drive economic growth and job creation, improve infrastructure and raise workforce skills within the local area. https://heartofswlep.co.uk/ https://www.cioslep.com/	Partnership	The rural economy is a key priority for many LEP areas.	Helps build all aspects of the nexus sectors
Formal	A range of food and drink policies and strategies initiated at regional/ local levels, including	Partnerships/ knowledge sharing/ marketing and promotion	Provide effective promotion of regional food and knowledge about sustainable and	Helps build farm businesses; protect standards of food production.

	Exeter Food Strategy, Cornwall Food and Drink; and Taste of the West (hard to say what it is?)		healthy food systems. City food policies require continuity of support from local politicians.	
Formal	The Cornwall Local Energy Market (LEM) project is a three-year trial from 2017 to 2020 jointly funded through the European Regional Development Fund and Centrica. The project is led by Centrica in association with project partners Western Power Distribution, National Grid, the University of Exeter and Imperial College London. The trial will test the role of flexible demand, generation and storage via a new virtual marketplace. This will be supported by the installation of new low carbon technologies into over 150 homes and businesses.	Partnership/ knowledge sharing	Enabled by funding support and ability of partners to work together on shared objectives	Helps increase energy security and decarbonisation of energy supply.
Formal	Upstream Thinking plans (http://www.upstreamthinking.org/) and SWEEP - www.sweep.ac.uk - investment of funds at the top of the	Partnership working. Environmental interventions.	Enabled by govt. funding. Involves water company investment, but plans can compete rather than complement.	Helps protect and enhance aquatic environments; enhance the sustainability of water service delivery; and improve environmental land

	catchment that leads to lower costs downstream. One example: partnership of South West Water, the Devon Wildlife Trust, the Cornwall Wildlife Trust, the Westcountry Rivers Trust and the Exmoor National Park Authority, is building on work begun in 2008 to change land management practices to protect rivers. The programme is part of South West Water's long term business plan to reduce its environmental footprint and manage the impact of diffuse pollution on customers' bills. The Upstream Thinking Initiative has seen a wide array of innovative catchment management and other environmental interventions delivered, including: mires restoration, culm grassland restoration by Devon Wildlife Trust, pesticide advice and guidance by Cornwall Wildlife Trust			management.
Informal	Beaver dams on the	Knowledge sharing	It is important that	Helps with flood

	river Otter, Devon are slowing the flow and helping to reduce flooding. This means there are discussions going on about beaver dams as a natural water flow regulation mechanism; and there has been data collection by the University of Exeter now which supports this, and this data has been presented to Defra – research-led influence.		dissemination is in a format that policy-makers can understand.	mitigation
Formal	Catchment Sensitive Farming (CSF) raises awareness of diffuse pollution from agriculture by giving free training and advice to farmers in selected areas in England, including the SW. The aim of the advice is to improve the environmental performance of farms. Advice is only available in high priority areas for water quality. These areas will contribute most to meeting Water Framework Directive objectives. CSF has been working in specific Priority Catchments where agriculture is having the most significant impact on rivers, lakes and	Raising awareness/ training and advice	Enabled through farmers applying for Countryside Stewardship fund to improve water quality and biodiversity and to reduce flood risk. Only available in high priority areas for water quality.	Helps develop catchment sensitive farming; maintain and improve the agri-environment; protect and enhance the natural of aquatic environments.

	estuaries. This includes the SW River Basin. The purpose of a river basin management plan is to provide a framework for protecting and enhancing the benefits provided by the water environment. To achieve this, and because water and land resources are closely linked, it also informs decisions on land-use planning.			
Formal	Exmoor Coastal Streams is one of 37 groups to receive funding from Defra in the latest national competitive round of Countryside Stewardship Facilitation Fund awards (Feb 2018). This includes partnership working by 15 farmer members covering 6938ha of north-west Exmoor. The group aims to focus on landscape scale management including habitats such as moorland, grassland and woodland with a key focus on priority habitats and species. Flood risk and water management also included, along with	Partnership/ knowledge sharing	Enabled by funding. 'Working and learning together will help the land managers to improve the resilience of their businesses and will provide multiple environmental benefits'.	Helps improve environmental land management; mitigation of flood risk and flooding.

	enhancement of the historic environment.			
Formal	WILD project (see: http://www.ccri.ac.uk/wild/) enhancing European Water Framework Directive (WFD) delivery through the integration of a number of different objectives. The partnership activity includes: individual parish plans for ditches and water courses, integrated development of Surface Water plans, delivery of Catchment Sensitive farming programmes developed by NGOs such as the Wildlife Trust and Cotswold Rivers Trust. WILD 2 – linking issues to do with water quality/farming practices and communities.	Partnership	Enabled by funding. Shared objectives	Enhances Water Framework delivery; develops catchment sensitive farming.
Informal	Informal agreements in tenanted sector avoid long legal processes eg. when landlord wants to take back land to install solar panels/AD etc. may offer free electricity, alternative land or farm house/ building	Informal agreements	Landlord and tenant farmers need to agree, but can also threaten small farm tenancies.	Helps increase use of renewable resources; build farm businesses.

	renovation as compensation.			
Informal	Growers' Groups are coming together to share experience, how to interpret policy, and to share advice to help make informed decisions. This is about being informed and clear interpretation of what decisions mean for the business.	Knowledge sharing	Sharing knowledge and advice helps growers make informed decisions. There are examples of people making strong business plans only for policy to change. Time awareness is crucial.	Helps build farm businesses; maintain and improve the agri-environment; protect standards of food production.
Formal	A 'collaboration fund' of up to £10 million was announced in February 2018 as part of a series of measures to help farmers and small producers compete and thrive alongside larger businesses in the food supply chain. The fund will be designed in consultation with the farming industry and will work by bringing together those interested in co-operation. These groups will be supported by the funding to formally establish, develop or expand, so that farmers and growers can take advantage of new market opportunities to help their businesses to thrive.	Cooperation/ knowledge sharing	Enabled by funding. Collaboration between farmers can bring substantial economic benefits, enabling farmers to benefit from economies of scale, share knowledge and jointly market their produce.	Helps build farm businesses; maintain and improve the agri-environment; protect standards of food production.

Transboundary DE-CZ-SK

Germany

Table 195 Formal and informal arrangements in Germany

Type of arrangement (formal/informal)	Description of Arrangement	Function of the arrangement (coordination, decision-making, knowledge sharing, etc.)	Why it is working or not working (enabling and limiting factors)	How the arrangement affects the achievement of nexus critical objectives
Formal	Formal agreement between farmer and water boards regarding the reduction of fertilizer usage. Farmer receive payments, if they reduce their usage of fertilizer. Objective is the reduction of nitrate pollution in groundwater. Similar agreements exist informal without the involvement of money.	Reduction of groundwater pollution.	The agreement works to a certain degree, if economic interests are not significantly endangered, because both sides need groundwater with good quality.	This arrangement could help reducing groundwater pollution and in the long term secure food production and quality.
	Conference of environment ministers. Participants are the respective ministers and senators of Germany and it´s federal states. Meetings are two times per year.	Coordinating environment policies.	The conference is working. Decisions are not binding law, just recommendations.	This conference could help achieve all environment related NCOs, since cooperation between the respective federal states is needed to achieve them.
	Workshop regarding the adjustment to climate change. Participants include e.g. member of ministries and	Sharing information's and supporting decision-making	The workshop is working as intended.	This workshop could help achieve all environment related NCOs. The consideration of all affected groups is

	representatives of society groups. Objective is the improvement of the decision-making process regarding handling climate change.			important for the achievement of the NCOs.
	Conference of agriculture ministers, Participants are the respective ministers and senators of Germany and it´s federal states. Meetings are two times per year.	Coordinating agriculture policies.	The conference is working. Decisions are not binding law, just recommendations.	This conference could help achieve all agriculture related NCOs, since cooperation between the respective federal states is needed to achieve them.
	Conference of ministers responsible for land use planning. Participants are the respective ministers and senators of Germany and it´s federal states. Meetings are once per year.	Coordinating land use planning.	The conference is working. Decisions are not binding law, just recommendations.	This conference could help achieve all NCOs related to land use, since cooperation between the respective federal states is needed to achieve them.
	Conference of ministers of transport. Participants are the respective ministers and senators Germany and it´s federal states. Meetings are two times per year.	Coordinating transportation policies.	The conference is working. Decisions are not binding law, just recommendations.	This conference could help achieve the objectives related to infrastructure, since cooperation between the respective federal states is needed to achieve them.
	Workshop regarding water. Participants are the department heads of the respective federal state authorities and representatives of the national state. Meetings are two times per year. Related to the	Supporting decision-making.	The workshop is working as intended. Supports the Conference of environment ministers.	This workshop could help achieve the objectives related to the water sector.

	Conference of environment ministers.			
	Workshop regarding the protection of the environment, landscape management and regeneration. Participants are the department heads of the respective federal state authorities and representatives of the national state. Meetings are two times per year. Related to the Conference of environment ministers.	Supporting decision-making.	The workshop is working as intended. Supports the Conference of environment ministers.	This workshop could help achieve the objectives related to the environment and land use.
	Workshop regarding immission control. Participants are the department heads of the respective federal state authorities and representatives of the national state. Meetings are two times per year. Related to the Conference of environment ministers.	Supporting decision-making.	The workshop is working as intended. Supports the Conference of environment ministers.	This workshop could help achieve the objectives related to the environment and climate.
	Configuration of the Council of the European Union responsible for agriculture and fishing. Participants are most of the time the respective ministers of the member states. Meetings are	Coordinating policies and law-making.	The council is working as intended, since it's one of the law-making organs of the European Union and the participating ministers have the power to make decisions.	The council is fundamental for the coordination of agriculture policies in Europe and is necessary for the achievement of the NCOs.

	normally four times a year.			
	Configuration of the Council of the European Union responsible for transport, telecommunication and energy. Participants are most of the time the respective ministers of the member states. Meetings are normally four times a year.	Coordinating policies and law-making.	The council is working as intended, since it's one of the law-making organs of the European Union and the participating ministers have the power to make decisions.	The council is fundamental for the coordination of e.g. energy policies in Europe and is necessary for the achievement of the NCOs in the respective sectors.
	Configuration of the Council of the European Union responsible for the environment. Participants are most of the time the respective ministers of the member states. Meetings are normally four times a year.	Coordinating policies and law-making.	The council is working as intended, since it's one of the law-making organs of the European Union and the participating ministers have the power to make decisions.	The council is fundamental for the coordination of e.g. environment policies in Europe and is necessary for the achievement of the NCOs in the respective sectors.
	Council for sustainable development. Appointed by the German Government. Members are fifteen people with positions with significance for the topic from e.g. research and economy. A meeting, at which developments are discussed with politicians, researchers and the economy, is held once a year.	Supporting decision-making and raising awareness.	The council is working as intended.	The council is of importance as meeting point of relevant actors and can support and influence the future decision-making of policy-makers.

Informal	Informal agreement between forest owners regarding forest cultivation. Forest owners support each other to better manage their forests. Some cases lead to the establishment of forestry associations.	Coordinating and supporting forest cultivation.	The agreements work, if the respective partners are dependable and trustworthy. The professional handling of forests is only improved, if the owners are capable.	This arrangement could help the preservation of forests, since it supports the professional handling.
	Informal cooperation between forest owner organisations and farmer organizations. Objective is the management of issues related to forest usage. Securing professional handling is another objective. Many farmers are forest owners at the same time.	Managing the cooperation of farmers and forest owners.	The cooperation only works, if interests match, otherwise its mostly difficult.	This arrangement could help the preservation of forests, since it supports the professional handling.
	Agreement related to the shared use of bees. Cooperation between farmers and beekeepers. Money is involved in most cases: “rent-a-bee”. Bees are needed for cultivation.	Securing pollination.	The agreement works, especially if the payment of money is involved.	This arrangement could help secure food production and quality.
	Informal agreement between farmers regarding sharing equipment. The sharing makes it possible to avoid significant costs for additional equipment.	Sharing equipment.	The agreement works because the farmer know and trust each other.	This arrangement could help secure food production and quality.
	Informal agreement between farmers regarding the shared storage of	Sharing storages for biofertilizer.	The agreement works because the farmer know and trust each other.	This arrangement could help secure food production and quality.

	biofertilizers. The sharing makes it possible to avoid significant costs for additional storages.			
	Informal agreements between farmers and water boards regarding the protection of groundwater. Main topic is the reduction of fertilizer use to avoid groundwater pollution.	Reduction of groundwater pollution.	The agreement works to a certain degree, if economic interests are not significantly endangered, because both sides need groundwater with good quality.	This arrangement could help reducing groundwater pollution and in the long term secure food production and quality.
	Informal agreements between farmers and environment organizations mainly regarding wildlife conservation and ecological cultivation. Objective is the change of cultivation practices to better preserve natural habitats and biodiversity.	Planning land use and changing practices.	The agreement only works, if the economic interests are not significantly endangered by the proposed changes.	This agreement could help e.g. by the preservation of biodiversity and the protection of animals.

Czech Republic

Table 196 Formal and informal arrangements in Czech Republic

Type of arrangement formal/informal	Description of arrangement	Function of the arrangement (coordination, decision making, knowledge sharing, etc.)	Why it is working or not working (enabling and limiting factors)	How the arrangement affects the achievement of nexus critical objectives
Formal	Inter-resort commission WATER-DROUGHT Consists from the 15 experts from ministries and research	Preparation of measures to mitigate the negative impacts of drought and water scarcity based on cooperation of	The commission has been working, because the drought is being hot topic; after adopting the strategic document *Concept for*	Potential to suggest changes in landscape in order to solve landscape - water-drought issues; however again lack of

	institutions, State land soil fund + 22 members of advisory board (usually from research institutions, universities), Meeting +/- half a year	Ministry of Agriculture and Ministry of Environment; providing information about drought (maps, methodology of monitoring, scientific knowledge and expertise, etc…) Effort for systematic education of public in terms of water resources and drought In 2016 prepared strategical document *Concept for protection against drought consequences for the Czech Republic* The document was approved by the Government of the Czech Republic on 28 July 2017, J.Pokorný was member of the team. The document states strategy for monitoring, action and prevention of drought/floods	*protection against drought consequences for the Czech Republic* and primary scientific drought analysis the activities seems to be slightly declining – no particular subsequent activities leading to suggestion and implementation of concreate measures in order to improve drought	complex treatment of all objectives related to land – water – climate – agriculture – energy; one cannot expect successful changes leading to improvement of landscape water retention ability The commission has provided extensive research analyses and tools for monitoring; the recommendations should be implemented into policy The strategical document has been in force for 10 months. As other similar documents its implementation goes slowly namely in real measures of drought prevention in landscape. There are principal miss-conceptions on functioning of vegetation, water cycle, water bodies among scientists and other experts The document fits with the nexus critical objectives and with the objectives of the transboundary case study (CZ-G-SK): retention of water in landscape, erosion prevention, direct

				effect of vegetation on local climate and negative feedbacks of cultivation of biofuel crops.
Formal	Office of the Government of the Czech Republic, Department for Sustainable Development Committee on Landscape, Water and Biodiversity 30 members from universities, research institutions and ministry	Addressing policy issues of spatial development; elaboration of a long-term integrated inter-departmental cooperation program to improve the landscape water regime and other adaptation measures to climate change; restoring its ecological infrastructure; to ensure effective cooperation between the landscape users and managers	No particular impact on water and landscape issues; the recommendations in most cases stay on paper despite the political mandate; the decisions are sometimes implemented into policy documents (these ones convenient for the top politicians)	Potential to suggest changes in landscape in order to improve landscape water regime – however there is no political interest to implement water retention measures
Formal	Technology Platform for Sustainable Water Resources Association of business subjects (14), state enterprises (2), universities (4), research institutions (4), public benefit corporations (4) whose common link is water	Focus on water management (and land) in the landscape with regard to climate change in connection with agricultural and non-agricultural use of the landscape, as well as the reuse and recycling of water in industry, developing systems to support decision-making and monitoring, intelligent technology.	Irregular activities based mainly on excursions, education, workshops, project preparation, etc… No political mandate only formulating visions	Water as a common issue in landscape for subjects with different background – so their comments on water and soil management could be potentially taken into consideration in policy arrangements
Formal	New project of The Technology Agency	Preparatory and announcement of the new project	ENKI actively participates; topics	potential to realize other projects on

	of the Czech Republic (BETA 2)	*System of Landscape Adjustments for Adaptation of the Agricultural (agro-forestry) Landscape to Climate Change in the Period 2030+*	on water retention can be involved	agriculture landscape changes
Informal	Regular seminars (since 2015; already 8) on water in landscape and urban areas organized by ENKI and city councils of Třeboň and Dačice	Seminars for regional offices, state administration, schools, business (usually 60 – 110 participants); knowledge sharing	Deep interest of all participants, potential for acquiring and spreading knowledge about water-vegetation-climate; potential to implement the water-vegetation-climate concept on regional decisions	Providing simple and science-based approaches to assess the role of water and vegetation in the climate and the distribution of solar radiation for schools and the state administration; education and potential implementation in practice should start from the ground level
Informal	Associations for rural development act on regional and communal level supported via Ministry of Agriculture from EU funds	The Association joins local municipalities, small land owners, farmers and small entrepreneur living in a given region	There are dozens of Associations of different activities. They organize seminars on agriculture policy, environmental issues etc. Working because of the men´s enthusiasm	In year 2017 three seminars in different regions were organised by the association in which S4N team actively took part and met stakeholders for the March 2018 meeting at Třeboň. The Association provides valuable feedback on real conditions in rural areas for the transboundary case study CZ-G-SK

Transboundary DE-FR

Table 197 Formal and informal arrangements in DE-FR

Name of arrangement	Description
International Commission for the Protection of the Rhine (ICPR)	**Type of arrangement (formal/informal)** Formal: Transboundary governance organization **Description of arrangement** International Commission for the Protection of the Rhine (ICPR) of which 29 European countries are members. The Commission derives its legitimacy from the renewed international convention between riparian countries of the Rhine and European directives such as the Water Framework Directive and the Floods Directive. The ICPR published a 2020 Program on the Sustainable Development of the Rhine. **Function of the arrangement (coordination, decision-making, knowledge sharing, etc.)** Coordination of policies. **Why it is working or not working (enabling and limiting factors)** Little information was retrieved firsthand about the International Commission for Protection of the Rhine. **How the arrangement affects the achievement of nexus critical objectives** It enhances transboundary coherence between water sectors and between water and water using sectors to preserve the ecological functions of the river area. An example of coherence between policy domains is that habitat network connectivity is one of the goals outlined in the Climate adaptation strategy.
Upper Rhine Council	**Type of arrangement (formal/informal)** Formal: Transboundary governance organization **Description of arrangement** Upper Rhine Council exists since 1997. It can make resolutions, for example on flood protection. The parliament consists of representatives from regions in France, Germany and Switzerland amongst which Alsace and Baden-Württemberg.

	Function of the arrangement (coordination, decision-making, knowledge sharing, etc.) Coordination of policies. It is described in interviews as the political counterpart of the Conference. **Why it is working or not working (enabling and limiting factors)** Multiple interviewees hinted towards competition in the past between these organizations. This was related to the fact that the Conference has existed for longer and therefore the agenda of the Council seemed less credible and potentially less aligned with regional needs. Currently, agendas are aligned. **How the arrangement affects the achievement of nexus critical objectives** In theory the Conference enhances cooperation and coherence of multiple sectors. Lack of information about practice.
Upper Rhine Conference	**Type of arrangement (formal/informal)** Formal and informal characteristics: Transboundary governance organization **Description of arrangement** The Upper Rhine Conference enhances transboundary cooperation across multiple issues. The Government Commission connects Germany, France and Switzerland through their Foreign Ministries. Administrations and specialized authorities are represented in the Conference. There is a common secretary, 11 working groups and 36 expert committees. Projects are largely financed by European Fund for Regional Development (ERDF) via Interreg and regional government. **Function of the arrangement (coordination, decision-making, knowledge sharing, etc.)** The Conference has multiple functions: - Knowledge sharing - Building networks - Coordination of policies through proposals - Fostering negotiation - Promotion of the regions - Research - Lobbying The Conference implements projects and events and can commission new associations with their own projects. The regions organize calls for projects. Main outputs are: maps, projects, educational programs, proposals for changes of law. **Why it is working or not working (enabling and limiting factors)** Enabling factors: - See the section below “informal arrangements” - Formulate policy proposals slightly different in respective language to navigate legal possibilities imposed by different legal systems - Interreg fund provides means to enable transboundary research and policy coordination through projects - Make use of certain formulations in policy proposals that align incoherent policies

	- Trust building next to formal meetings through eating and cultural activities Limiting factors: - Complex decision-makings structures: difficult to find right person in various layers (also within regions a problem) - Centralization of France governance structure limits Alsace independence to operate and representation of transboundary interests at more centralized Grand Est level - Changes in persons in office every 2-3 years provides little stability to build on (trust) networks - Lack of time and human resources to invest in transboundary relationships and address issues - Funding barriers in research and projects: difficult to access funds and lack of knowledge about them, while not all is spent - Lack of information exchange - Differences in legal systems **How the arrangement affects the achievement of nexus critical objectives** Some examples: - Proposals to make policies coherent: maintain biological diversity objective: through proposals to align of e.g. hunting and fishing regulation - Recent guideline for implementation of the Espoo convention should enhance negotiation processes of environmental impact assessments. However, it is yet too early to judge its success since the first project has been declared recently. - Successful alignment of interests may carry an impact up to the European level: the Conference lobbied for limitations to the liberalization of the wine market. The satisfying outcome of the reform was an increase of land authorized for wine production that represents 1% of the planted area per year (EU No 1308/2013).
Ramsar'Rhinatur	**Type of arrangement (formal/informal)** Formal: Interreg projects "operational arm of Upper Rhine Conference" and experts groups of the Conference **Description of arrangement** Project to cooperatively manage Ramsar and Natura 2000 zones along the Rhine River. The project is lead by LPO Alsace (Ligne Protection Oiseaux, member of the NGO Alsace Nature). It receives half of the total 804.000 euros budget through Interreg, the European Regonal Development Fund. The 11 partners in the projects are administrative governance bodies in charge of nature protection, research institutes and private businesses. **Function of the arrangement (coordination, decision-making, knowledge sharing, etc.)** Currently: - Knowledge sharing and development Objective: - Development and coordination of plans - Establish network

	Why it is working or not working (enabling and limiting factors) Enabling factors: - Stakeholder participation: various organizations ranging from public to private and across the border. **How the arrangement affects the achievement of nexus critical objectives** Enhance cooperation and coherence for biodiversity protection on the level of instruments.
APRONA	**Type of arrangement (formal/informal)** Formal: Interreg projects **Description of arrangement** The organization APRONA surveys the status of the Alsace and Sundau groundwater bodies. One of the partners is the Upper Rhine Conference expert group on water. The river impacts ground water quality because some of its water seeps through into the aquifer. About 30 to 40% of the investigated points surpass limitations for pesticides [15]. **Function of the arrangement (coordination, decision-making, knowledge sharing, etc.)** - Research: create common transboundary knowledge - Coordinate plans **Why it is working or not working (enabling and limiting factors)** Enabling factor: - Funds **How the arrangement affects the achievement of nexus critical objectives** Increase transboundary ground water quality through communal research.
ERMES	**Type of arrangement (formal/informal)** Formal: Interreg projects **Description of arrangement** ERMES Interreg project evaluates ecological resources and monitors ground water in France, Germany and Switzerland **Function of the arrangement (coordination, decision-making, knowledge sharing, etc.)** - Research: create common transboundary knowledge **Why it is working or not working (enabling and limiting factors)** Enabling factor: - Funds **How the arrangement affects the achievement of nexus critical objectives** Increase transboundary ground water quality through shared knowledge. It has allowed a joint work with agriculture, industries and institutions on the ground water table.

[15] Frédéric APRONA, 'Premiers résultats de qualité d'eau de la nappe phréatique d'Alsace et des aquifères du Sundgau sur les nitrates et les pesticides', 2017.

Nature conservation area alignment	**Type of arrangement (formal/informal)** Formal: Regional cooperation through administrations **Description of arrangement** Transboundary cooperation for biodiversity protection through alignment of areas and species along the Rhine. Regional administrations work on this together. **Function of the arrangement (coordination, decision-making, knowledge sharing, etc.)** - Creating shared knowledge - Coordinating plans **Why it is working or not working (enabling and limiting factors)** Limiting factors: - Different governance structures: getting to know these takes time - Different national categories of protected areas and species Enabling factors: - Time and willingness on the behalf of people participating **How the arrangement affects the achievement of nexus critical objectives** Transboundary coherent biodiversity instruments.
IdeeAlsace	**Type of arrangement (formal/informal)** Formal: Regional non-profit organization with transboundary potential **Description of arrangement** The non-profit organization IdeeAlsace works on a circular economy in the port of Strasbourg for more efficient use of resources. Initially funded by Eurometropole Strasbourg (grouped municipalities) and the port of Strasbourg. Currently through a tender by the region Grand Est, ADEME (Environment and Energy Management Agency) and group of enterprises. **Function of the arrangement (coordination, decision-making, knowledge sharing, etc.)** Developing business case and projects. **Why it is working or not working (enabling and limiting factors)** Enabling factors: - Funds (would have been available for transnational cooperation, but a willing partner was lacking) Limiting factors: - Unsuitable regulations to reuse resources such as certain wood types - Lack of willingness at the port and city of Kehl to work together **How the arrangement affects the achievement of nexus critical objectives** Energy, water and agriculture efficiency helps to maintain ground water quantity

Renewal Kembs hydropower station contract	**Type of arrangement (formal/informal)** Formal: transboundary participatory policy development processes **Description of arrangement** Process for the development of conditions for the renewal of the EDF hydropower station contract at Kembs in the 2000's. Implemented measures aim to increase the ecological flow and control bank erosion and gravel inputs. **Function of the arrangement (coordination, decision-making, knowledge sharing, etc.)** - Policy coordination and development **Why it is working or not working (enabling and limiting factors)** Enabling factors: - Stakeholder participation process to define restoration measures. Further action regarding other power plants situated on the Grand Canal d'Alsace [16] **How the arrangement affects the achievement of nexus critical objectives** Transboundary coherence and coherence between water quality and quantity objectives.
Integrated Forest and Nature conservation strategy	**Type of arrangement (formal/informal)** Formal regional participatory policy development processes **Description of arrangement** Integrated Forest and Nature conservation strategy (policy document), GER. Need for integration of nature conservation laws in forestry policies, which deal with a relatively long time frame of 50-100 years. **Function of the arrangement (coordination, decision-making, knowledge sharing, etc.)** - Policy coordination and development **Why it is working or not working (enabling and limiting factors)** Enabling factors: - Through these practices implementation is more likely to take place: "politics of being heard" are necessary - Planning and developing a business based on the reuse and recycle of resource coordination - Increased changes implementation because less likely resistance in this phase from stakeholders Forestry is subject to the critical look of other stakeholders: "what we do in the forests is displayed in a shopping window".

[16] Agnes Barillier and A Garnier, 'Improvement of the Kembs Environmental Project through Cross-Border Discussions. Hydro 2017-Sevilla', 2017; Vera Lúcia Meira Marmelo, 'Definition of Ecological Flows for Rivers Located in the North and Center of Portugal', 10.

	How the arrangement affects the achievement of nexus critical objectives Enhances coherence between biodiversity and forestry objectives. The latter serves different interests such as commercial and ecological and climate interests. Also coherence in implementation is improved.
Integrated Climate and Energy Strategy	**Type of arrangement (formal/informal)** Formal regional participatory policy development processes **Description of arrangement** Integrated Climate and Energy Strategy, GER. Strategy for electricity transition from nuclear to renewable electricity sources. **Function of the arrangement (coordination, decision-making, knowledge sharing, etc.)** - Policy coordination and integration **How the arrangement affects the achievement of nexus critical objectives** Baden-Württemberg's strategy has been an example for other states to create coherence between climate and energy policies.
SRADDET	**Function of the arrangement (coordination, decision-making, knowledge sharing, etc.)** - Policy coordination and integration **Why it is working or not working (enabling and limiting factors)** Cannot yet fully be judged since it is not implemented yet: Enabling factors: - Early involvement of (transboundary) stakeholders in development - Vague nature of the binding status allowed for a broader discussion even on conflicting topics. Hindering factors: - Vague status of the binding nature of the document limits the ambition and the effort put in the preparatory work (and likely in the implementation phase) **How the arrangement affects the achievement of nexus critical objectives** Aims to achieve coherence between sectors on a strategic level. Transboundary coherence: international stakeholders are involved One piece in the construction of a long term trend in policy integration.