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**Sinks as an option to meet CO₂ emission
reduction targets in Europe**

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This study was part of an internship at the European Topic Centre on Air and Climate Change (ETC/ACC), which is one of the topic centres of the European Environmental Agency (EEA). The study contributes to the framework development of a baseline scenario in the context of integrated assessment for air and climate change.

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Abstract

The Kyoto Protocol makes provisions in its article 3.3, 3.4, 6 and 12 for the Annex I countries to take into account land-use, land-use change and forestry (sinks) activities in order to accomplish partly their CO₂ targets during the 'commitment period' 2008-2012. This study focuses on whether the European countries intend to use of the sink option. If so, summarises the percentage of the overall CO₂ emission reduction, considering specific rules for sinks under the Protocol which were defined in Bonn and Marrakesh in 2001.

Based on the available data, the first estimates showed that the contribution of sinks is considerable for some countries. The percentages of this contribution range from 1% to 4% of the base-year emissions, with an average of around 2% for all the countries. However, uncertainty in these estimates still remains an important factor. Therefore, sinks are not a number one priority and countries intend to delay taking final decisions on the issue in order to have as reliable data as possible. This might happen when the new improved guidelines on reporting on land-use, land-use change and forestry related activities are produced in 2003.

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Abbreviations

ARD	: Afforestation, Reforestation, Deforestation
CDM	:Clean Development Mechanisms
CSD	:Country Specific Data
ETC/ACC	:European Topic Centre on Air and Climate Change
EU	:European Union
FAO	:United Nations Food and Agricultural Organisation
GHGs	:Greenhouse gases
IPCC	:Intergovernmental Panel on Climate Change
JI	:Joint Implementation
LULUCF	:Land Use, Land Use Change and Forestry
NC	:National Communication
RIVM	:National Institute of Public Health and Environment of the Netherlands
SBSTA	:Subsidiary Body for Scientific and Technological Advice
TBFRA	:Temperate and Boreal Forest Resources Assessment
UNFCCC	:United Nations Framework Convention on Climate Change

Samenvatting

Het Kyoto Protocol omschrijft in de paragrafen 3.3, 3.4, 6 en 12 de mogelijkheid voor geïndustrialiseerde (zo geheten Annex-I) landen om hun reductieverplichtingen van broeikasgasemissies tussen 2008 en 2012 (deels) te bereiken door gebruik te maken van zogenaamde 'sinks'. Sinks zijn het menselijk handelen dat leidt tot de additionele vastlegging van koolstof (het belangrijkste broeikasgas) in terrestrische ecosystemen (b.v. bossen en landbouwgebieden).

Sinds het Kyoto Protocol van 1997 heerst er veel onduidelijkheid rondom sinks. Een deel van deze onduidelijkheid is weggenomen tijdens de recente klimaatconferenties in Bonn en Marrakesh, waar een aantal regels zijn afgesproken. Zo is vastgelegd hoe om te gaan met sinks als gevolg van bebossingsprojecten (art. 3.3), veranderd beheer van bossen en landbouw (art. 3.4) en buitenlandse bebossingsprojecten (art. 6 en 12). Afgesproken is dat het rapporteren van de eerst genoemde sinks verplicht is, terwijl ieder land nog kan kiezen welke beheersopties men wil meenemen.

Het doel van dit onderzoek is om het technisch potentieel in en beleidspretenties van Europese landen weer te geven voor wat betreft sinks. Deze getallen worden onder andere vergeleken met de totale reductieverplichtingen van deze landen, rekening houdend met de afspraken in Bonn en Marrakesh.

Het rapport laat zien dat ondanks de onduidelijkheden sinks in veel landen de aandacht hebben. Veel landen hebben dan ook recentelijk hun cijfers betreffende hun sink potentieel vernieuwd. Naar verwachting volgen andere landen in de komende maanden. De (voorlopige) cijfers laten zien dat het potentieel in sommige landen aanzienlijk is. Met behulp van sinks is een reductie mogelijk van 1 - 4% van hun referentie emissies, met een Europees gemiddelde van ongeveer 2%. Deze cijfers zijn inclusief het potentieel van sinks via buitenlandse projecten. Het blijft echter onduidelijk of landen het totale potentieel daadwerkelijk willen gebruiken, onder meer vanwege de groot blijvende onzekerheden omtrent sinks (b.v. hun duurzaamheid). Definitieve beslissingen worden dan ook zo ver mogelijk uitgesteld. Zo hebben de meeste landen nog niet vastgelegd welke additionele activiteiten men wil meenemen (moet in 2008 bekend zijn). Nieuwe richtlijnen die in 2003 beschikbaar komen (gebaseerd op de afspraken van Bonn en Marrakesh) zullen naar verwachting meer duidelijkheid bieden, waarna landen tot een verdere uitwerking zullen overgaan.

Summary

Human induced activities in the land-use, land-use change and forestry (LULUCF) sector, which may lead to additional carbon sequestration by the terrestrial ecosystems, are known as carbon 'sinks'. The Kyoto Protocol makes provisions in its article 3.3, 3.4, 6 and 12 for the industrialised (Annex I) countries to take into account sinks in order to accomplish partly their CO₂ targets during the 'commitment period' 2008-2012.

After a long period of debates, some of the rules for using LULUCF activities under the Protocol were defined in Bonn and Marrakesh in 2001. As such, sinks were separated in categories. Firstly, emissions and sequestration from afforestation, reforestation and deforestation (ARD) activities, to which the Kyoto Protocol refers in its article 3.3. Secondly activities like forest management and agricultural activities, which are included in the article 3.4 of the Protocol and finally, sinks under the flexible mechanisms of Clean Development Mechanisms (CDM). Reporting on the article 3.3 is compulsory, while the countries have the option to decide if they are going to apply any or all the activities under the article 3.4.

This study focuses on whether the European countries intend to use sinks in order to achieve part of their CO₂ targets in the 'commitment period' 2008-2012. Additionally, it attempts to summarise the percentage of the overall CO₂ emission reduction of each European Annex I country that is going to be attributed to sinks.

The study shows that countries continue to investigate sinks potentials. Those, which do not have very recent data on sinks, are planning to update their first estimates at the latest in 3 months. Based on the available data, the first rough estimates of the maximum contribution of sinks in the countries' commitments showed that it could be considerable, if they were to be used. The percentages of this contribution range from 1% to 4% of the base-year emissions, with an average of around 2% for all the countries. However, uncertainty regarding sinks estimates still remains an important factor. Therefore, LULUCF issue is not a number one priority.

As the use of the LULUCF activities still remains a controversial issue, the countries will delay taking any actions on this issue in order to be as close to the commitment period as possible. Most of the countries investigated have not determined yet whether they going to use 3.4 activities, CDM or JI projects. The various account systems and indicators make an accurate quantification of the potential carbon sequestration difficult and countries would like to have as reliable data as possible in order to make their final decisions. New improved guidelines on LULUCF related activities are going to be produced in 2003, which will also take into consideration the rules, determined in Bonn and in Marrakesh.

1. Introduction

The Intergovernmental Panel on Climate Change (IPCC) 2001 Third Assessment Report, states that the climate will change more rapidly than historically observed (UNFCCC, 2002). It mentions that the global average surface temperature has increased over the 20th century by about 0.6°C (IPCC, 2001) and is projected to increase by 1.4 - 5.8 °C by 2100. The report also shows that considerable impacts are possible within the current century. The warming of the surface and the lower atmosphere may lead, for example, to irreversible disturbances in the biosphere system (EEA, 1995).

It becomes also more and more clear that the changes in climate are, at least partly initiated by direct human activities. Therefore, there have been a lot of advances in international community's response to the threat of climate change. The United Nations Framework Convention on Climate Change (UNFCCC) was entered into force in 1994 with the stabilisation of greenhouse gases concentrations in the atmosphere at safe levels as an ultimate objective (EEA, 1995). As a part of the processes towards such stabilisation, UNFCCC Parties adopted the Kyoto Protocol in 1997. Under the article 3.1 of the Protocol, industrialised countries (Annex I Parties) are committed to individual, legally-binding targets to limit or reduce their greenhouse gas emissions, adding up to a total cut of at least 5% from 1990 levels in the 'commitment period' 2008-2012 (UNFCCC, 2002).

The Kyoto Protocol makes provisions in its articles 3.3, 3.4, 6 and 12 for the Annex I countries to take into account human induced activities in the land-use, land-use change and forestry (LULUCF) sector in order to accomplish partly their CO₂ targets, (IPCC, 2000). These activities may lead to additional carbon sequestration by the terrestrial ecosystems, which are known as carbon 'sinks'.

The LULUCF issue was agreed in principle in Kyoto but its operational details were not clearly defined. At the Conferences of the Parties first in Bonn in July 2001 and then in Marrakesh in November 2001, some of these details were agreed upon. After these new developments, more Annex I countries might be interested, additionally to the measures for reducing their CO₂ emissions from fossil fuels burning, in taking into account sinks.

The objective of the study is to make an overview of the European countries, which, intend to use sinks in order to achieve part of their CO₂ targets in the 'commitment period' 2008-2012. Additionally, if possible, it aims to summarise the percentage of the overall CO₂ emission reduction of each European Annex I country that is going to be attributed to sinks. The research will also attempt to determine the type of sinks (in the agricultural or in the forestry sector) the countries will use and under which Kyoto mechanisms (Joint Implementation or Clean Development Mechanism) they are going to use them.

The sections 2 and 3 describe the three main categories of sinks and the research strategy followed for this study, respectively. The section 4 includes the overview both of the countries' plans and of the revisions made to the data related to the LULUCF activities after the Marrakesh decisions, as well as a comparison between the countries. Finally, section 5 elaborates on the results and presents the conclusions.

2. Sinks after the Marrakesh agreement

Both the UNFCCC and the Kyoto Protocol show the possible role of terrestrial carbon sinks in climate change policy. The Protocol deals with this possible role in several of its articles. Specifically, article 3.3 refers to afforestation, reforestation and deforestation (ARD) activities in Annex I countries, while article 3.4 refers to additional human induced activities leading to changes in carbon stocks. (Metz et al., 2000). Furthermore, sinks are included in article 6 and article 12 of the Protocol, as they might be the result of activities in foreign countries. Under article 6, Joint Implementation (JI) projects that reduce emissions could be undertaken by Annex I parties in other Annex I Parties, in return for emission reduction units (ERUs). On the other hand, Clean Development Mechanisms (CDM) provide for implementation of projects that reduce emissions in non-Annex I Parties, in return for certified emission reductions (CERs).

However, many issues related to sinks were fairly unclear in the past. For example, whether and how sequestration of carbon would be accepted in order to meet part of the emission reduction commitments was highly debated already before the Kyoto negotiations took place (Schlamadinger and Marland, 2000). The Kyoto Protocol does not define forests, afforestation, reforestation and deforestation. Some clarification, however, was necessary, as more than 130 definitions of forests are used around the world (Lund, 1999). Furthermore, the different quantification methods of CO₂ sequestration which have been proposed give different outcomes (Van Minnen et al., 2002). Finally, there was a great concern among some countries, that including sinks would lead to less focus on the primary causes of increasing CO₂ concentration in the atmosphere i.e. the combustion of fossil fuels (Kolshus, 2001). All these aspects result in uncertainties and opportunities for the policymakers.

When finally, some of the rules for LULUCF activities were defined in Bonn and Marrakesh, they included not only the definitions for articles 3.3 and 3.4 activities but also separated sinks in categories:

Firstly, there are the emissions or sequestration from afforestation, reforestation and deforestation (ARD) activities. Reporting on sinks under the article 3.3 is compulsory and the carbon change resulting from these activities must be accounted for towards emissions reduction targets during the commitment period (Hendrick and McAree, 2002). Any potential net emissions, which might occur from higher deforestation than afforestation, will be offset through forest management activities, up to a total level of 9 megatons of carbon per year for each country for the five year commitment period (Greenpeace, 2001).

Secondly, countries agreed in Marrakesh that the additional activities under the article 3.4 will include activities like forest management and agricultural activities. The remaining forest management activities, these which have not been used to offset the net emissions from article 3.3 activities, can be accounted for to help meet emission reduction targets. However, first they have to be subjected to an 85% discount and an individual cap for each Party, listed in an appendix in the Marrakesh Accords. (UNFCCC, 2002). The additional agricultural activities, which can be accounted under this article, are cropland management, revegetation and grazing land management. The total reporting on the 3.4 article is optional. The countries have to decide if they are going to apply any or all the activities under the article 3.4. Nevertheless, they have to declare which activities they are going to use at least two years

prior to the beginning of the commitment period. This is also the deadline for changing the cap values for the forest management. If the countries wish the re-evaluation of these values, they have to submit new data up to 2006.

Finally, there are sinks under the flexible mechanisms of Clean Development Mechanisms (CDM) and Joint implementation (JI). Under CDM, only afforestation and reforestation projects will be considered eligible. Greenhouse gas removals from such projects may only be used to help meet emission targets up to 1% of a Party's baseline for each year of the commitment period. On the other hand, both article 3.3 and 3.4 activities are eligible under the JI but countries have to include JI projects involving forest management in the cap of forest management under the article 3.4.

3. Research strategy

The original goal was that all European Annex I countries (about 30 countries) would participate in the study. However, due to time limitations, the countries were put in a prioritised order¹. At the end it was possible to collect information from 19 countries. These are the 15 countries of the European Union (EU 15), Norway, Liechtenstein, Switzerland and Estonia. Secondly, an effort was made to review the most updated sources of information for estimates and projections on sinks. Finally, data were collected through telephone contacts with the appropriate representative(s) of each country.

3.1 Sources of information for estimates and projections on sinks

The various account systems and indicators make an accurate quantification of the potential carbon sequestration difficult (Van Minnen et al., 2002). The most updated public available sources of information concerning estimates and projections on sinks, are the National Communications and the specific data submitted by the countries under the preparation of the discussions on the issue. The National Communication (NC) data are the most recent ones, but the country specific data are more relevant to the Kyoto because they can be processed according to the rules agreed at Marrakesh.

3.1.1 National Communications

Annex I countries have to report the steps they are taking or planning to take to implement the Convention. The report, known as 'National Communication', should contain current and past trends, as well as projections on emissions and removals of the greenhouse gases (GHGs) for all the sectors, including land use, land-use change and forestry (LULUCF) activities, following the IPCC good practice guidelines for the National Greenhouse Gas Inventories (UNFCCC, 2002). The National Communications usually refer to a total domestic number for the LULUCF activities, estimating projections under different scenarios and policies in 2010, without distinguishing between ARD and 3.4 activities. These estimates are usually net removals from forests.

Both the National Communications and the guidelines were developed for the Convention and not for the Protocol. As such, separate reporting of changes in carbon stocks resulting from 3.3 and 3.4 activities is not required. Furthermore, the guidelines do not make any provisions for the emissions of GHGs associated with LULUCF projects (e.g. CDM projects) (IPCC, 2000). Therefore, new improved guidelines on LULUCF related activities are going to be produced in 2003, which will also take into consideration the decisions in Bonn and in Marrakesh (IPCC, 2000).

¹ Firstly, information from the EU 15 would be collected, then the information from Norway, Switzerland and Iceland and finally the data from the accession countries.

Despite their pitfalls, National Communications remain one of the most important sources of information, concerning sink estimates. The most recent National Communication is the third one and the deadline for its submission was in November 2001. Despite of the deadline, 11 out of the 19 countries² considered in the study have submitted their National Communication until now.

3.1.2 Country Specific Data

The Subsidiary Body for Scientific and Technological Advice (SBTSA) requested Parties to provide submissions³ with an assessment of net changes in carbon stocks and changes in emissions by sources and removals by sinks, associated with activities under the article 3.3 and 3.4. Twelve countries⁴ from the European Union (EU 15) have sent a submission, as well as Norway, Switzerland and Iceland. These country specific data (CSD) were summarised in the FCCC/SBSTA/2000/9/Add.1 document and consisted the basis for the first quantification attempts of the implications of sinks after the Bonn Conference in July 2001. Estimates on the sinks categories mentioned in section 2 of this report, for each European Annex I country involved in this study, are presented in the Appendix I of this report.

The methodology used to estimate the numbers in the Appendix I is based on the methodology used in the table 1 of the Appendix II of Den Elzen et al., (2001).

The estimates in Appendix I have some shortcomings. Firstly, the data presented in the table are not complete. Some of the Parties did not provide any data for both articles 3.3 and 3.4, whereas other countries did not provide data for a full set of 3.4 activities (Pronk Proposal, 2001). In the report of Den Elzen et al., (2001), for the estimates of the forest management, only data from the Temperate and Boreal Forest Resources Assessment (TBFRA) of the United Nations Food and Agricultural Organisation (FAO) were used. These data were based on uptake rates for the year 2000 and not on projections. However, as the goal of the study is to find the most updated estimates for the projections, in the Appendix I, FAO data were used, only where there was lack of information (not any CSD). Finally, the credits from the CDM projects are the maximum credits that countries are allowed to acquire and not the credits they estimate they will acquire through planned projects.

Nevertheless, even though Appendix I does not clearly reflect the plans of the countries towards sinks, considering the data available, it provides a first estimate of the actual contribution of sinks to the countries' reduction targets, after the decisions in Marrakesh (COP7).

3.2 Telephone Contacts

Telephone contacts were established with national experts from research institutes, the national focal points of the European Environmental Agency and governmental

² Austria, Belgium, Finland, France, The Netherlands, Spain, Sweden, UK, Norway, Liechtenstein and Estonia

³ A specific format for the submission was agreed on the 12th session of the SBTSA

⁴ Belgium, Greece and Luxembourg didn't send any data. Portugal and Spain have sent their submission but did not include any quantified data, while Austria, Denmark and Ireland didn't provide data for the article 3.4.

organisations. Due to time limitations, usually just one expert from each country was contacted.

A questionnaire was prepared, based on the objectives of the study. The questions were focused on whether more updated numbers on sinks, compared to those mentioned in the section 3.1 of this report, are available and which are the intentions of the countries towards the use of 3.4 activities and the CDM projects as an option to achieve part of their commitments. More specifically, an attempt was made to obtain information on possible revised numbers for changes in carbon stocks (Mt C/year) related to human induced activities under the articles 3.3 and 3.4 as well as estimates on the credits of planned CDM and JI projects for the first commitment period.

4. Country overview and comparison

This section presents an overview of the intentions of the various European countries on this issue. Wherever it is possible, the most updated estimates for the contribution of sinks in the emission reduction targets are also mentioned, while for countries, which do not have information on revised numbers, the estimates from the Appendix I are mentioned. All the data are summarised in the Appendix II of this report.

4.1 European Union

Austria

For Austria, the most updated data are those that were submitted to the SBSTA in August 2000. Austria will report debits for article 3.3 (-0.20 Mt C/year) while the cap (maximum allowance of credits) for forest management is 0.63 Mt C/year. Taking into account the fact that Austria could acquire up to 0.21 Mt C/year from CDM projects, the contribution of sinks in total could be 0.84 Mt C/year. In the latest National Communication, Austria does not present any estimates projections. Decisions have not been made yet.

Belgium

Belgium didn't provide any data to the SBSTA in 2000. According to data which are under preparation, Belgium will report debits slightly below zero for the article 3.3, while for the article 3.4 it is unlikely that the credits from the forest management will reach their cap. Therefore, the total credits for the domestic sinks will be less than 0.03 Mt C/year. The maximum credits that could be acquired from CDM projects are 0.37 Mt C/year. As a result, the maximum contribution of sinks could be 0.4 Mt C/year. On the other hand, Belgium has published the third National Communication in 2001. However, as only the Walloon Region has reported estimates for sinks, these were applied for the whole country and they do not represent the situation in Belgium very accurate. The new data will be probably published in 3-4 months and then new developments regarding sinks might occur. Both regions are investigating article 3.3 activities. It is very clear that the Walloon region intends to use forest management. The agricultural activities are also being investigated but it is very possible that they are not going to be used because they don't seem to offer any credits. Decisions on CDM and JI projects have not been taken yet.

Denmark

According to the CSD of Denmark, the projection for the carbon stock change resulted from the 3.3 activities is 0.09 Mt C/year. The forest management activities could lead to removals of 0.05 Mt C/year (0.30 Mt C/year without the discount), which is also the maximum allowance for forest management activities for Denmark. Finally, the CDM projects could add to the total credits up to 0.19 Mt C/year. These data will be revised with a new report at the end of August 2002. It has not been decided yet if the article 3.4 is going to be used. This decision will be taken after 2003, when the good practice guidelines will be ready. CDM projects are not a very good option for Denmark. Joint Implementation projects could be

more feasible. The decision making process of revising how much each sector, including sinks, will contribute to the emission reduction targets, just started.

Finland

In the country's National Communication, the net removal by forest in 2010 is projected to be approximately 0.8-2.7 Mt C/ year. This is a total number for 3.3 and 3.4 activities and does not reflect the decisions of Marrakesh. However, one could argue that for Finland, this is similar to the number, which according to the decisions of Marrakesh refer to the forest management after compensation of the article 3.3 (see Appendix I). The number for the forest management after compensation from the country specific data is 1.82 Mt C/year, which is very close to the average of the range of numbers of the National Communication. Finland will achieve much more than the country's cap for forest management. Therefore, the credits for sinks domestically without counting the agricultural activities, are 0.16 Mt C/year (0 for article 3.3 + 0.16 the cap for forest management). The maximum potential credits from CDM projects is 0.21 Mt C/year, but until now only a small CDM project (afforestation) has been proposed but it has not been approved yet. Finland has not included the soil sequestration in the calculations of LULUCF activities. If it were included, the estimates would be much higher. It has not been decided if article 3.4 activities are going to be used. The decisions are going to be taken probably in 2004, but definitely after 2003, when the good practice guidelines are ready.

France

Under the article 3.3, debits will be reported (CSD revised number: -1.74 Mt C/year) and credits are not going to be acquired. France will also succeed much more than the cap in forest management (0.88 Mt C/year). As such, France will use the whole amount allowed. The option of the agricultural activities is not going to be considered. It has not yet been decided what will happen with CDM projects because domestic actions are more important. If France decides to implement CDM projects, the estimate for sinks CDM projects will be 0.45 Mt C/year instead of the potential 1.5 Mt C/year (see Appendix I). As a result, the total emission reduction that can be attributed to sinks is 1.33 Mt C/year. This is the sum of 0 Mt C/year for article 3.3, 0.88 Mt C/year for forest management under the article 3.4, 0 Mt C/year for agricultural activities and 0.45 Mt C/year for the CDM projects.

Germany

The estimate of sinks under article 3.3 (- 0.21 Mt C/year) could change in the future, as it seems that the rate of afforestation declines. Furthermore, the threshold for 3.4 forest management is not going to be exceeded (1.24 Mt C/year). However, it is too soon to make any decisions, because the discussions for all these options, including CDM and Joint Implementation projects have just started.

Greece

According to the data available, the cap for the forest management activities in Greece is 0.09 Mt C/year, which was defined according to the FAO data. The maximum allowance of credits for CDM projects is 0.29 Mt C/year. The Greek National Action Plan for Climate Change is under preparation. It will be publicly available after the 15th of July 2002, when it will be discussed at the Parliament.

Ireland

The estimate of sinks for Ireland for the first commitment period will be 0.36 Mt C/year for article 3.3 and 0.05 Mt C/year for article 3.4. Projections under the business as usual scenario show a 37% increase of emissions compared to 1990 emissions. The government's actual target is a 4.2 Mt C reduction per year until 2010, resulting in an emission of 15.9 Mt C/year (13% increase compared to 1990 emissions). The National Climate Change Strategy sees sinks contributing 0.28 Mt C/year (6.6%) to the reduction instead of 0.41 (0.36 + 0.05) Mt C/year, which is their maximum potential contribution as calculated above (Hendrick and McAree, 2002). This percentage does not include any CDM or JI projects.

Italy

Italy's third National Communication, which is under preparation, provides revised data for sinks. However, it was not possible to clarify the article 3.3 estimates before the end of this report. The existing estimate for this article is 0.47 Mt C/year. According to the National Communication, the potential contribution of sinks to the Italian carbon budget is 0.17 Mt C/year from forest management activities (after discount) and 1.15 Mt C/year from CDM projects. Italy will try in the future to revise the cap for forest management. Domestic sinks credits are not a very high number for Italy and CDM projects could be a more important number. However, no specific plans have been made yet. Estimations made by the Italian expert showed that the final contribution of sinks to the country's reduction target will be 10%-13%. The range of the percentage depends on the revision of the cap on the forest management, without calculating, however, the agricultural activities of article 3.4, which are under investigation.

Luxembourg

The forests in Luxembourg absorb approximately 0.3 Mt CO₂ per year or 0.08 Mt C/year in total. The cap for the forest management is 0.01 Mt C/year, while there are not any data for article 3.3 activities. Harvesting does not have a big impact on the forests, so this number remains the same since 1990. Currently, they are doing a new inventory of the forests and probably after that they could have new data. However, they will wait the good practice guidelines before they make any decisions. There are no decisions on CDM projects (maximum potential 0.04 Mt C/year).

The Netherlands

According to the CSD, the Netherlands reported 0 Mt C/year for the activities under the article 3.3. However, in the country's National Communication in 2001, the number has changed to 0.03 Mt C/year due to afforestation measures. The cap for forest management activities is 0.01 Mt C/year. In the CSD, the additional activities under the article 3.4 could result to removal of 0.02 Mt C/year. The maximum potential for CDM projects is 0.6 Mt C/year. The Netherlands is in a process of defining new methodologies, which will give more accurate numbers for sinks. The decisions, which will be taken after 2005, will be based on this numbers. Furthermore the Netherlands are planning, on using both CDM and JI projects in general, which will probably include also projects on sinks. There is a JI project already proposed but nothing has been decided yet.

Portugal

Portugal did not provide any quantified data to the SBSTA in August 2000. Therefore, there is not any information available for the article 3.3, while for the article 3.4 the forest management cap (0.22 Mt C/year) was defined according to FAO data. The maximum credits that could be acquired from CDM projects are 0.17 Mt C/year. Portugal is in a process of developing their national program and there will be a revision of the data in 2-3 months. It is certain that numbers for the article 3.3 will be provided. They haven't decided anything yet for CDM and JI projects.

Spain

Spain is in the process of developing their Forest Plan for 2002 to 2032, which will concentrate more on the 3.3 activities and the forest management activities. Spain is planning to acquire 1.86 Mt C/year from afforestation – reforestation activities (article 3.3) and 0.22 Mt C/year from forest management activities. Furthermore, the maximum amount of credits allowed from CDM projects is 0.84 Mt C/year but there are no clear plans on the implementation of such projects.

Sweden

The number for sinks, as reported in the national communication was 6.6 Mt C/year. This is a total number for the net removals of the LULUCF activities. It corresponds to the estimate for the forest management after article 3.3 compensation, which when it is subjected to the 85% discount, becomes 0.99 Mt C/year (see table 2, appendix II). The estimate from CSD reported the year 2000 was 4.5 Mt C/year, which after the discount becomes 0.66 Mt C/year. The personal opinion of the Swedish expert was that the actual numbers would be between the numbers in the National Communication and the numbers of 2000. However, both estimates (after the discount) are above the cap for forest management for Sweden. As such, their difference does not influence, the final amount of credits (which is the maximum amount allowed: 0.58 Mt C/year), Sweden could acquire from these activities. As a result, the total emission reduction that could be attributed to domestic sinks is 0.58 Mt C/year. This is the sum of 0 Mt C/year for article 3.3, 0.58 Mt C/year for forest management under the article 3.4, 0 Mt C/year for agricultural activities. Decisions for policies have not been taken yet. The data that the country submitted in August 2000 are estimation potentials for the first commitment period. In the National Communication, the numbers for sinks are higher because there was a decrease on the rate of felling. A review of the plans will be made in 2004 and then they will see if they need to implement CDM or JI targets.

United Kingdom (UK)

In the country's third National Communication, the number for 3.3 activities from 0.56 Mt C/year, which was submitted to the SBSTA in 2000, was revised to 0.6 Mt C/year. Furthermore, Great Britain will reach the cap for the forest management activities. As such, Great Britain will use the whole amount allowed (0.37 Mt C/year). For the article 3.4, also 0.25 Mt C/year from the additional activities could be counted. This number could become higher because of the new broader definitions of the agricultural activities. Therefore the total domestic sinks will be 1.22 Mt C/year. There are no decisions made yet regarding this issue, including CDM projects. The maximum credits allowed for this kind of project are 2.09 Mt C/year.

4.2 Associated with the EU Countries

Norway

Presently, Norway's sinks are around 3.8 Mt C/year, which means a 20-25% contribution to the overall emissions. The activities under the article 3.3 will be reported but because of the long rotation period of the Norwegian forests, their contribution could also be negative. Additionally, Norway has decided not to use any options under the 3.4 article (see also the Norwegian White Paper, which was discussed in the country's parliament in June). So, the actual contribution of sinks, domestically, will be around 0. Norway is very positive towards CDM projects, even without restrictions but as no specific rules have been yet established, they have to wait for the final decisions.

Switzerland

According to the CSD of Switzerland, debits (-0.02 Mt C/year) will be reported for the activities under the article 3.3. Furthermore, it is very unlikely that Switzerland is going to reach the 0.5 Mt C/year cap for forest management. The additional activities could lead to removals of 0.01 Mt C/year. The data for all activities and mostly for the additional activities (agricultural activities) are revised and they will be available in 2-3 months and it seems that they will be very different from the existing ones. As far as the CDM projects is concerned, the legal basis exists but the decisions have not been made yet. The maximum credits from CDM are 0.14 Mt C/year.

Liechtenstein

The third national communication of the country sinks projections, which are in the forestry sector, for 2010 were reported zero. CDM projects may be considered an option but nothing has been decided yet.

4.3 Accession Countries

Estonia

In Estonia's third National Communication estimates for sinks in 2010 are presented under two scenarios. Under the with measures scenario, the net removals from sinks are projected to be 1.96 Mt C/year. Under this scenario, Estonia will report debits for article 3.3. As such, according to the Marrakesh rules, this number is equivalent to the forest management after compensation of article 3.3. It becomes 0.29 Mt C/year after the discount. Under the scenario with additional measures, Estonia will report credits for the article 3.3 and the estimate for sinks will be much higher than the number in the first scenario. However, in both scenarios the numbers exceed the cap of forest management. As a result, in both cases, Estonia can use the whole amount of credits allowed for these activities. Therefore, depending on the scenario (debits or credits under article 3.3) the total credits for sinks will be equal to or more than 0.10 Mt C/year. Regarding, the use of article 3.4 activities and CDM projects, decisions have not been taken yet.

4.4 Comparison between countries

Among the countries included in this study Italy, Estonia, and Liechtenstein provide their most updated estimates on sinks in their Third National Communication. For Finland, Sweden, the Netherlands and the United Kingdom, their most updated estimates resulted as a combination of their National Communication data and their Country Specific Data. On the other hand, Austria, Switzerland, Denmark, Germany and Norway have as most updated projections only those based on their country specific data. For Belgium, Greece, Portugal and Luxembourg the estimates in the Appendix I are also their most updated numbers, even though they are not based on projections. Finally, the most recent estimates on sinks for France, Ireland and Spain come from updates of their Country Specific Data.

Concerning the revision of these estimates, as the table 1 shows, Greece, Switzerland, Belgium, Denmark, Spain and Portugal are in such process of updating their data, while Austria, Finland, the Netherlands, Sweden and Luxembourg will start this process after the development of the new good practice guidelines. On the other hand, for Italy, France, Ireland, Liechtenstein and Estonia the estimates are very recent and can be considered already as revisions. Furthermore, Germany, the United Kingdom and Norway have not defined exactly when they are going to do such a revision.

Table 1. Revision of data on sinks (of both the data from National Communications and the Country Specific Data)

	in 2-4 months	after 2003	Already	not defined when
EU 15				
Austria		+		
Belgium	+			
Denmark	+			
Finland		+		
France			+	
Germany				+
Greece	+			
Ireland			+	
Italy			+	
Luxembourg		+		
Netherlands		+		
Portugal	+			
Spain	+			
Sweden		+		
UK				+
Associated				
Norway				+
Switzerland	+			
Liechtenstein		+		
Accession				
Estonia			+	

Note: Based on data collected for this study:

+ = Yes

Regarding 3.4 activities, Norway is the only country that seems to be negative towards their use. According to the data available, most of the countries have the possibility to reach the cap of forest management. France, Ireland, Spain and Belgium see forest management activities as the important option under this article. France, Ireland and Spain have even decided to apply only them. For Italy and Switzerland, except from the forest management, additional activities are also an option. Nevertheless, as the relevant data are under preparation, decisions have not been taken yet. The rest of the countries have not determined what they will do in the future for any of the activities under the article 3.4.

Table 2. Countries intentions towards the use of articles 3.4

	use of 3.4 activities	
	forest management	Agricultural activities
EU 15		
Austria	?	?
Belgium	? /+	? / -
Denmark	?	?
Finland	?	?
France	+	-
Germany	?	?
Greece	?	?
Ireland	+	-
Italy	?	?
Luxembourg	?	?
Netherlands	?	?
Portugal	?	?
Spain	+	-
Sweden	?	?
UK	? /+	? /+
Associated		
Norway	-	-
Switzerland	?	?
Liechtenstein	?	?
Accession		
Estonia	?	?

Note: Based on data collected for this study:

+ = Yes

- = No

? = not decided yet

? / + = not decided yet, but possibly Yes

? / - = not decided yet, but possibly No

Assuming that the countries will decide to use their 3.4 activities, the table 3 shows estimates on sinks, considering all the available data. Norway, Liechtenstein, France, Ireland, Spain, Belgium and Estonia have made their first estimates on their domestic sinks to 0, 0, 0.88, 0.28, 2.08, less than 0.03 and at least 0.10 Mt C/year, respectively. For countries like Austria, Finland, Germany and Sweden the contribution of their sinks (article 3.3+3.4) could be equal to their caps for the forest management activities, which range between 0.16 to 1.24 Mt C/year. This derives firstly from the fact that they will not gain any credits for the article 3.3 and secondly from the fact that their forest management activities could

result to higher carbon stock changes than they are allowed to. As such, they are entitled to use the whole amount of the cap. The total credits for UK (1.22 Mt C/year), which is the sum of the credits from ARD activities, forest management activities and additional activities. This amount of credits could increase because of the additional activities but currently it could be used as the most representative estimate. Italy has revised estimates for sinks but it was not possible to clarify the number for article 3.3 activities before the end of the study. Therefore, the estimate (0.64 Mt C/year) for Italy is a combination of old and new data (old CSD for article 3.3 and new NC data for forest management). For Greece, Portugal and Luxembourg, which haven't provide any projections yet, it is not possible to determine a number for the actual removals resulted from the LULUCF activities during the commitment period. Therefore, until the new estimates are presented, the most accurate numbers are the ones that already exist (0.09, 0.22 and 0.01 Mt C/year, respectively). The existing estimate for domestic sinks could also be used for Denmark (0.14 Mt C/year). Finally, for Switzerland and the Netherlands, the credits from the forest management activities reported are very low compared to the credits from their caps. Therefore, countries are developing new methodologies for more accurate estimates, which will be closer to the cap. As a result, the maximum estimates of the sinks (Switzerland: 0.51 Mt C/year and The Netherlands: 0.06 Mt C/year) from all available data could be consider the best possible estimates.

Table 3. Estimates on the removals of sinks during the first commitment period (based on all available data)

	Base-year emissions	Max. estimates for sinks art. 3.3+3.4	Estimates for actual sinks art. 3.3+3.4 if art. 3.4 is used	Max. allowance for CDM sinks	Actual CDM sinks, if they were used	Possible total sinks, either max. or actual, if art. 3.4 and CDM were used	Estimates % base-year emissions
	Mt C/yr	Mt C/yr	Mt C/yr	Mt C/yr	Mt C/yr	Mt C/yr	
EU 15							
Austria	21.04	0.63	≤ 0.63	0.21	≤ 0.21	≤ 0.84	4.0
Belgium	37.24	0.03	< 0.03	0.37	≤ 0.37	< 0.40	1.1
Denmark	19.08	0.14	!	0.19	≤ 0.19	0.33	1.7
Finland	20.51	0.16	≤ 0.16	0.21	≤ 0.21	≤ 0.37	1.8
France	148.96	0.88	0.88	1.49	0.45	1.33	0.9
Germany	330.28	1.24	≤ 1.24	3.30	≤ 3.30	≤ 4.54	1.4
Greece	29.28	0.09	!	0.29	≤ 0.29	0.38	1.3
Ireland	14.59	0.41	0.28	0.15	≤ 0.15	≤ 0.43	2.9
Italy	141.64	0.65	!	1.42	1.15	~1.8	0.3
Luxembourg	3.67	0.01	≤ 0.01	0.04	≤ 0.04	≤ 0.05	1.4
Netherlands	59.77	0.06	0.055	0.60	≤ 0.60	≤ 0.65	1.1
Portugal	17.12	0.22	!	0.17	≤ 0.17	0.39	2.3
Spain	84.13	2.53	2.08	0.84	≤ 0.84	≤ 2.92	3.5
Sweden	19.25	0.58	≤ 0.58	0.19	≤ 0.19	≤ 0.77	4.0
UK	208.84	1.22	≥ 1.22	2.09	≤ 2.09	~3.31	1.6
Associated							
Norway	14.22	0.42	0	0.14	≤ 0.14	≤ 0.14	1.0
Switzerland	14.47	0.51	!	0.14	≤ 0.14	0.65	4.5
Liechtenstein	0.07	0.01	0	0	0	0	0
Accession							
Estonia	11.10	≥ 0.10	≥ 0.10	0.11	≤ 0.11	~ 0.21	1.9

Note: Based on data collected for this study:

! = inconclusive

≥ = equal to or more than

≤ = equal to or less than

> = more than

< = less than

~ = approximately

As far as sinks in CDM projects are concerned, none of the countries participating in the study have reached any conclusions about what will happen during the commitment period. France and Sweden indicate to more concentrate on domestic actions, whereas Finland showed interest to initiate a small CDM project. Italy, The Netherlands, Norway and Switzerland find CDM projects a good opportunity. However, as the discussions between the parties on the issue just started, they will wait for the outcome of these discussions.

Table. 4 Countries intentions towards the use of CDM and JI projects

	use of CDM and JI	
	CDM	JI
EU 15		
Austria	?	?
Belgium	?	?
Denmark	?/ -	?/ +
Finland	?	?
France	?	?
Germany	?	?
Greece	?	?
Ireland	?	?
Italy	?/+	?
Luxembourg	?	?
Netherlands	?/+	?/+
Portugal	?	?
Spain	?	?
Sweden	?	?
UK	?	?
Associated		
Norway	?/+	?
Switzerland	?/+	?/+
Liechtenstein	?	?
Accession		
Estonia	?	?

Note: Based on data collected for this study:

+ = Yes

- = No

? = not decided yet

? / + = not decided yet, but possibly Yes

? / - = not decided yet, but possibly No

5. Conclusions and discussion

Although, Marrakesh set the rules for the use of sinks under the Kyoto Protocol, countries have not determined yet their policies on this issue. The different accounting systems give different outcomes and make quantification of sinks difficult. As the use of sinks still remains a controversial issue, countries would like to have as reliable data as possible in order to make their final decisions. This means that the countries will delay taking any actions on the issue in order to be as close to the commitment period as possible. This is also enhanced by the fact that the countries have to report by 2006 whether they are going to apply 3.4 activities or they are going to change the cap of forest management.

However, countries continue to investigate sinks potentials. Those that have submitted data to the SBSTA already in 2000 don't seem to have defined revision as a first priority. Exceptions to this are Switzerland and Denmark. The existing estimates of Switzerland's sinks do not represent their potential so well any more, while in Denmark discussions have already started on revising how much each sector, including sinks, will contribute to the emission reduction targets. On the other hand, countries that do not have very recent data on sinks are planning their first estimates within the coming 3 months.

Regarding the countries that provided data on article 3.3 activities, most of the countries (i.e. Austria, Finland, France, Germany, Sweden, Switzerland and possible Norway and Belgium) will report debits for the ARD activities and thus will not receive any credits under the article 3.3. Furthermore, the numbers show that there is the possibility for the majority of the countries to reach or even exceed their forest management cap. Therefore, if they did decide to use their forest management activities, they could acquire, the maximum credits allowed for that. The option of the additional activities is also under investigation but they do not seem to be as important as the forest activities are.

CDM and JI projects are also under discussion. The 7th COP in Marrakesh has clarified the status of sinks under CDM and JI but the negotiations on defining the details of these flexible mechanisms, as a whole, just started. Consequently, even though countries have been thinking about the possibility of sinks CDM and JI projects and have been exploring their potentials, they are not going to decide on this issue in the near future. Furthermore sinks projects are not separated from the other possible projects implemented under the article 6 and 12 but they do not appear to be as significant as these other projects (e. g. energy projects).

The lack of the comparability still is a crucial barrier to the integration of the data. Therefore, the harmonisation between the LULUCF inventory reporting under the UNFCCC requirements and the Kyoto Protocol, including the requirements agreed at COP7 is needed. This can be proved less difficult to be succeeded after the development of the IPCC good practice guidelines. In summary, the first estimates of the maximum contribution of sinks in the countries' commitments (Table 3) showed that it could be considerable, if they were to be used. The percentages of this contribution range from 1% to 4% of the baseyear emissions, with an average of around 2% for all the countries. However, as uncertainty regarding sinks estimates, is still an important factor, LULUCF issue is not a number one priority. Consistent conclusions about the decisions on sinks as an option to reduce CO₂ emissions would be possible to be drawn after the introduction of the good practice guidelines.

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Appendix I: Existing Sinks Estimates

Table I. 1 Estimates of emissions by sources and removals by sinks under Article 3.3 and 3.4 based on CSD and TBFRA data

Base-year emissions	Art3.3		Art3.4				EU 15							
	MtC/yr	MtC/yr (+) or debits (-)	forest management (fm) CSD or TBFRA	compensation of article 3.3	forest management (fm) after compensation and discount	Appendix in Marrakesh Accords for fm after article 3.3 compensation and discount)	Max credits for fm	Agricultural activities	article 3.3 credits	total for art. 3.3 + 3.4	total for articles 3.3 + 3.4 % base-year emissions	CDM 1% base-year emissions	Total credits	% base-year emissions
MtC/yr	MtC/yr	MtC/yr	MtC/yr	MtC/yr	MtC/yr	MtC/yr	MtC/yr	MtC/yr	MtC/yr	MtC/yr	MtC/yr	MtC/yr	MtC/yr	MtC/yr
1	2	3	4	5=(3-4)*0.15	6	7	8	9	10=7+8+9	11	12	13=10+12	14	
Austria	21.04	-0.2	5.15	0.2	0.74	0.63	0.63	0.00	0.63	2.99	0.21	0.84	4.0	
Belgium	37.24	0.09	0.22	0.03	0.03	0.03	0.03	0.09	0.14	0.08	0.37	0.40	1.1	
Denmark	19.08	0.09	0.30	0.05	0.05	0.05	0.05	0.09	0.14	0.73	0.19	0.33	1.7	
Finland	20.51	-0.36	2.18	0.36	0.27	0.16	0.16	0.00	0.16	0.78	0.21	0.37	1.8	
France	148.96	-0.62	2.59	0.62	0.30	0.88	0.88	0.00	0.88	0.59	1.49	2.37	1.6	
Germany	330.28	-0.21	8.60	0.21	1.26	1.24	1.24	0.00	1.24	0.38	3.30	4.54	1.4	
Greece	29.28	0.91	0.59	0.09	0.09	0.09	0.09	0.09	0.09	0.31	0.29	0.38	1.3	
Ireland	14.59	0.47	6.95	0.05	0.05	0.05	0.05	0.91	0.96	6.58	0.15	1.11	7.6	
Italy	141.64	0.47	6.95	1.04	1.04	0.18	0.18	0.47	0.65	0.46	1.42	2.07	1.5	
Luxembourg	3.67	0.09	0.09	0.01	0.01	0.01	0.01	0.01	0.01	0.27	0.04	0.05	1.4	
Netherlands	59.77	0	0.03	0.005	0.005	0.01	0.01	0.00	0.03	0.05	0.60	0.63	1.1	
Portugal	17.12	1.45	1.45	0.22	0.22	0.22	0.22	0.22	0.22	1.29	0.17	0.39	2.3	
Spain	84.13	-0.09	4.49	0.67	0.67	0.67	0.67	0.00	0.67	0.80	0.84	1.51	1.8	
Sweden	19.25	-0.09	4.50	0.66	0.66	0.58	0.58	0.00	0.58	3.01	0.19	0.77	4.0	
UK	208.84	0.56	2.45	0.37	0.37	0.37	0.37	0.56	1.18	0.57	2.09	3.27	1.6	
Associated														
Norway	14.22	0.02	0.15	0.02	0.02	0.40	0.40	0.02	0.42	2.95	0.14	0.56	4.0	
Switzerland	14.47	-0.02	0.71	0.02	0.10	0.50	0.50	0.00	0.51	3.52	0.14	0.65	4.5	
Liechtenstein	0.07	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.01	0.01	14.3	
Accession														
Estonia	11.10	1.23	1.23	0.18	0.18	0.10	0.10	0.10	0.10	0.90	0.11	0.21	1.9	

Note: In the report of Den Elzen et al., (2001) for the calculations of the forest management only FAO (TBFRA) data were used. However, as the goal of the study is to find the most updated estimates for the projections, here FAO data are used only where there are not any CSD.

Appendix II: Revision of data regarding sinks

Table II. 1 Overview of the countries intentions regarding the revision of the existing data

	article 3.3			Art. 3.4			EU IS			total					
	Base-year emiss.	CSD	latest updated estimates	credits for article 3.3 based on the available CSD or latest updated data	forest management (fm) 3 rd NC	fm CSD or TBFRA	fm after compensation and discount CSD, TBFRA	Latest updated estimates for fm	Max credits for fm	CSD Agricultural activities	latest updated estimates on agricultural activities	Credits for agricultural activities	Max allowance of CDM	Max available estimate art. 3.3 + CDM	Max credits for 3.3+3.4 +CDM
	MtC/yr	MtC/yr	MtC/yr	MtC/yr	MtC/yr	MtC/yr	MtC/yr	MtC/yr	MtC/yr	MtC/yr	MtC/yr	MtC/yr	MtC/yr	MtC/yr	
Austria	21.04	-0.20	revision after 2003	0		5.15	0.74	Revision after 2003	0.63		revision after 2003		0.21	0.63	0.84
Belgium	37.24		new data next year			0.22	0.03	New data next year	0.03		revision after 2003	probably 0	0.37	0.03	0.40
Denmark	19.08	0.09	new data in August	0.09		0.30	0.05	New data in August	0.05		new data in August, probably not an important number		0.19	0.14	0.33
Finland	20.51	-0.36	revision after 2003	0.00	0.8-2.7 (after article 3.3 compensation) 0.12-0.41 (also after discount)	2.18	0.27	Revision after 2003	0.16		revision after 2003		0.21	0.16	0.37
France	148.96	-0.62	-1.74	0.00		2.59	0.30	7.61 (0.88 after compensation and discount)	0.88		0	0	1.49	0.88	2.37
Germany	330.28	-0.21		0.00		8.60	1.26	The cap is not going to be exceeded	1.24				3.30	1.24	4.54
Greece	29.28		when the National Action Plan on Climate Change is published			0.59	0.09		0.09				0.29	0.09	0.38
Ireland	14.59	0.91	0.36	0.36		0.35	0.19	0.05 (after compensation and discount)	0.05		0	0	0.15	0.41	0.56

Table II. 2 Overview of the countries intentions regarding the revision of the existing data (continue)

	article 3.3			Art. 3.4					CDM			total			
	Base-year emiss.	CSD	latest updated estimates	credits for article 3.3 based on the available CSD or latest updated data	forest management (fm) 3 rd NC	fm CSD or TBFRA	fm after compensation and discount CSD, TBFRA	latest updated estimates for fm	Max. credits for fm	CSD Agricultural activities	latest updated estimates on agricultural activities		Credits for agricultural activities	max allowance of CDM	Max. available estimate art. 3.3 + 3.4
	MtC/yr	MtC/yr	MtC/yr	MtC/yr	MtC/yr	MtC/yr	MtC/yr	MtC/yr	MtC/yr	MtC/yr	MtC/yr	MtC/yr	MtC/yr	MtC/yr	MtC/yr
EU 15															
Italy	141.64	0.47	not clarified		1.12			0.17 (after compensation and discount)	0.18		under preparation		1.42	0.65	2.07
Luxembourg	3.67														
Netherlands	59.77	0.00	0.03 (from NC)	0.03		0.09	0.01		0.01	0.02		0.02	0.04	0.01	0.05
Portugal	17.12					1.45	0.22	new data in 2-3 months	0.22				0.17	0.22	0.39
Spain	84.13					4.49	0.67	new data in 2-3 months from the Forest Plan	0.67				0.84	2.53	3.37
Sweden	19.25	-0.09		0		4.50	0.66	after 2003	0.58		after 2003		0.19	0.58	0.77
UK	208.84	0.56	0.60	0.60		2.45	0.37		0.37	0.25		0.25	2.09	1.22	3.31
Associated															
Norway	14.22	0.02	probably negative number	0 - 0.02		0.15	0.02	0 (see table 2)	0.40		0	0.00	0.14	0.42	0.56
Switzerland	14.47	-0.02	new data in 2-3 months	0.00		0.71	0.10	It is very unlikely that the cap of 0.5 Mt C/year is going to be reached. new data in 2-3 months	0.50	0.01	new data in 2-3 months. increased number	0.01	0.14	0.51	0.65
Liechtenstein	0.07		0.00	0.00		0.00	0.00	0	0.01				0.00	0.01	0.01
Accession															
Estonia	11.10		Emissions or removals depending on the scenario (NC)	> 0	at least 1.96 (after article 3.3 compensation) at least 0.29 (also after discount)	1.23	0.18		0.10				0.11	> 0.10	> 0.21

Appendix III: List of Experts

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Denmark

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National Council for Forest Research and Development

Italy

Domenico Gaudio
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Liechtenstein

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Portugal

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Spain

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4. Mr. R. Maas
5. Mr. B. Metz
6. Mr. R. Leemans
7. Mr. M. den Elzen
8. Mr. T. Kram
9. Mr. B. Eickhout
10. Mr. L. Bouwman
11. Mr. C. Graveland
12. Mr. J. Oude Lohuis
13. Mr. K. Wieringa
14. Mr. J. van Minnen
15. Mr. H. Eerens
16. Mr. F. de Leeuw
17. Mr. P. de Smet
18. Mrs. A. Proos
19. Mr. B. Bannink
20. Mr. J.-P. Hettelingh
21. Mr. K. van der Hoek

22. Mrs. H. Bersee (VROM)
23. Mrs. E. Trines(VROM)
24. Mr. H. Nieuwenhuis (VROM)
25. Mr. M. Vaino (DGenv, Brussels, BE)
26. Mr. P. Zapfel (DGenv, Brussels, BE)
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35. Mr. D. Koutendaki (National Observatory of Athens, Gr)
36. Mr. E.Hendrick (Nat. Council for Forest Research and Development, Dublin, Ier)
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