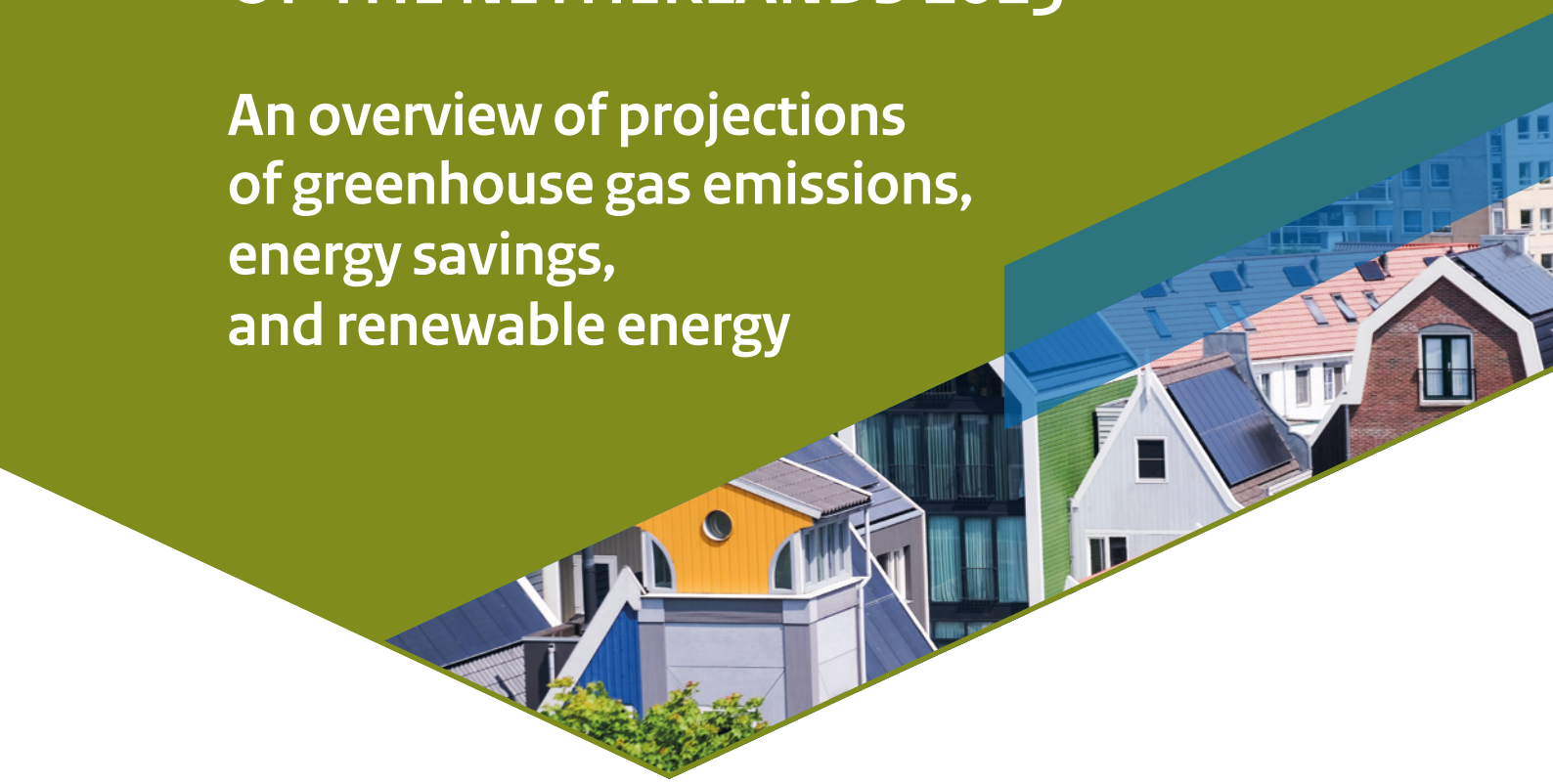
CLIMATE AND AND ENERGY OUTLOOK OF THE NETHERLANDS 2023

An overview of projections of greenhouse gas emissions, energy savings, and renewable energy



PBL Netherlands Environmental Assessment Agency

National Institute for Public Health and the Environment
Ministry of Health, Welfare and Sport

Statistics Netherlands

Netherlands Enterprise Agency

TNO innovation for life

WAGENINGEN UNIVERSITY & RESEARCH

Colophon

Climate and Energy Outlook of the Netherlands 2023
English summary of the full Dutch report "Klimaat- en Energieverkenning 2023' (KEV)
An overview of projections of greenhouse gas emissions, energy savings and renewable energy

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The Climate and Energy Outlook 2023 was produced through collaboration between PBL Netherlands Environmental Assessment Agency, TNO Energy and Materials Transition, Statistics Netherlands (CBS), the Netherlands Enterprise Agency (RVO), the National Institute for Public Health and the Environment (RIVM) and Wageningen University & Research (WUR). This publication contains integrated results, which means the contributions are not traceable to any particular institute. Nevertheless, each institute has its own responsibility, which we indicate below.

As project coordinator, PBL has final responsibility for the KEV report as a whole. PBL contributes to almost every part of the report and manages an important part of the KEV calculation instruments. PBL is responsible for policy assessment statements contained in the report.

TNO supports PBL in establishing and interpreting projections. In 2023, TNO has played a greater role in analysing and reporting on renewable energy and energy saving. In addition, TNO brings in knowledge for several subjects in the KEV, including the built environment, industry, natural gas and oil extraction and greenhouse horticulture.

CBS provides and describes the energy-related data. These include energy statistics, price statistics and economic statistics and are compiled by CBS itself.

RIVM provides all the monitoring data from the Pollutant Release and Transfer Register (PRTR) and also contributes to the projections of non-CO_2 greenhouse gases such as methane, nitrous oxide and F-gases from industry.

RVO provides information obtained by monitoring various policy instruments in the field of energy efficiency and renewable energy (such as SDE++ and ISDE). This concerns information on trends in recent years, implemented projects and, where possible, planned activities.

Wageningen University & Research (WUR) contributed to the 2023 update of the land use projections.

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Summary

About the Climate and Energy Outlook 2023

Rationale and objective of the Climate and Energy Outlook (Klimaat- en Energieverkenning, KEV)

The Dutch 2019 Climate Act requires PBL Netherlands Environmental Assessment Agency to publish an annual Climate and Energy Outlook. In these outlook reports, PBL describes past, present and future trends in greenhouse gas emissions and developments in the energy system in the Netherlands. It also describes the contribution of national climate and energy policies to these developments, and takes into account, insofar as possible, current developments in other policy areas that affect greenhouse gas emissions, such as nitrogen policy, as well as developments outside the Netherlands. The outlook report is used to verify projected developments against major national and European climate and energy targets.

Uncertainty about status of policy plans due to the fall of government

On 7 July 2023, the fourth Dutch Government led by Prime Minister Rutte fell. As a result, the Cabinet has caretaker status. Subsequently, on 12 September, the House of Representatives decided which policy proposals were to be declared controversial. Given the planning and working process for this KEV report, it has not been possible to take into account the fall of the government and possible declarations of controversy of certain policy proposals. This report is based on the energy and climate policies as they stood on 1 May 2023, before the fall of the Rutte IV Government, and the projections provided here should be read in that light. If there are delays in the elaboration and implementation of policy plans or if plans are scrapped, this will make it even more difficult to meet the climate target of 55% greenhouse gas reduction in 2030 relative to 1990 levels. This is all the more so as time to elaborate and implement 2030 policies is becoming increasingly limited.

The 2023 KEV report: an overview of projections presented in two parts

In this 2023 KEV report, we update the projections of last year's report along general lines. This is because the available capacity and expertise had to be divided over other projects running at the same time. Therefore, here we focus on recent changes to climate policies that have a considerable impact on greenhouse gas emissions, energy savings and renewable energy by 2030. These policies include the additional climate measures announced by the — now outgoing — government in its Spring Memorandum 2023 (EZK, 2023a; hereafter: Spring Package), national climate policy plans that are currently on the agenda, and European policies. In addition to the recent policy changes, several other modifications to statistics, models and sectoral developments have been included if they have a meaningful impact.

Along with all the calculated changes, one new projection has been made for greenhouse gas emissions, energy savings and renewable energy for the 2030 horizon year. The projection is based on adopted and proposed policies and on plans that are still to be discussed and we compare it with the projections from the 2022 KEV report. Chapter 1 provides more information on the reporting approach, the considered climate policies and other changes.

In 2023 we are publishing the KEV report in two parts. The first part only includes projections for greenhouse gas emissions and was released, at the request of the government, together with the Budget Memorandum on Budget Day (19 September). In compliance with the Climate Act, this full KEV report was published on the fourth Thursday of October. It includes projections for greenhouse gas emissions as well as for energy savings and renewable energy.

Spring Package climate plans still insufficiently specified

The 2022 KEV report showed that there were still major additional tasks to be undertaken to bring the climate targets within reach with sufficient certainty. The government responded to this by including additional national climate policy plans as it drew up the Spring Package for the 2023 Spring Memorandum, aiming to achieve a supplementary emission reduction of 22 Mt CO_2 eq by 2030. For this step, the government assumed that climate plans that are still to be discussed — in addition to the adopted and proposed policies calculated in the 2022 KEV report — would produce around 13.5 Mt of emission reductions by 2030, as described in the Interdepartmental Climate Policy Survey (IBO) (EZK, 2023c).

With the climate plans still under discussion and the additional measures from the Spring Package, the government focussed on a 60% emission reduction by 2030 compared to 1990 levels, a resolution that had been laid down in the 2022 Coalition Agreement. The government thereby anticipated possible setbacks in achieving the 55% greenhouse gas reduction target by 2030. This target was laid down in the amended Climate Act on 21 July 2023.

Which policies exactly are analysed in the 2023 KEV report?

On 1 May 2023, PBL had to affirm that a large number of the existing climate plans and the additional measures from the Spring Package were not yet sufficiently specific. Still, for some of these, we were able to make outline projections of possible emission reduction effects by 2030. For other plans, this was not possible, because there were not enough starting points to work from.

In addition to analysing all the Spring Package climate plans in this report, PBL has also looked at the concrete (adopted and proposed) policies and the policies still under discussion in the 2022 KEV report, as well as the European climate and energy policies (*Fit for* 55 climate package and *REPowerEU*), checking them for changes and, where necessary, recalculating them.

Findings

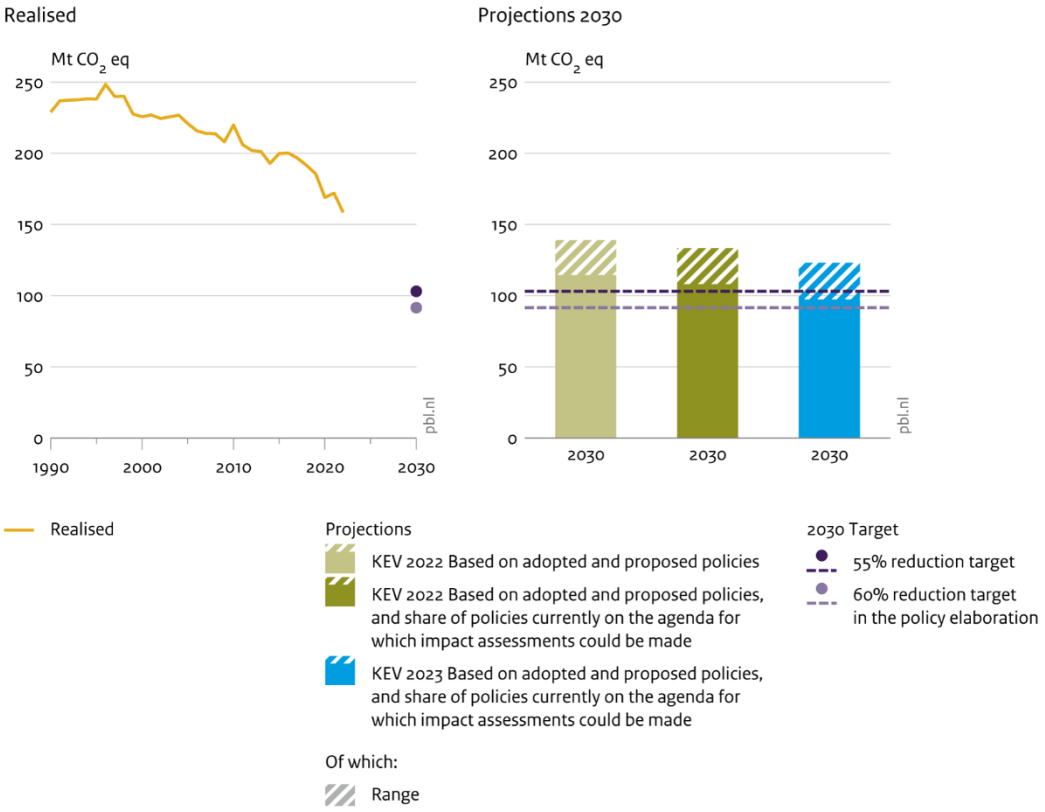
To what extent can the climate plans achieve the 2030 targets? What level of emission reduction has been achieved? In which sectors can greenhouse gas emissions be cut down the most? Do the climate plans achieve the more stringent European targets for energy savings and renewable energy? The main findings are explained below in 11 points.

1) *emission reduction of 46% to 57% by 2030 is possible under the climate plans for which an assessment could be made*

The climate target aiming for a 55% emission reduction by 2030 compared to 1990 levels falls within the range of projected emissions (Figure 1). Under all the climate plans that were known and calculable on 1 May 2023, a reduction in greenhouse gas emissions by 2030 of 46% to 57% compared to 1990 levels is possible (Main Table 2). The volume the reduction may eventually reach depends on all sorts of uncertainties, such as expected policy impact, the level of electricity imports or exports, economic growth, energy prices, the weather and technological developments. In the 2022 report, the possible emission reduction under all climate plans was still found to be in the range of 41% to 52% compared to 1990 levels. Under the new and adjusted plans we calculated in 2023, emissions can be cut further. However, in order to actually achieve a 55% reduction, all climate plans for which an impact assessment could be made here must be virtually fully effective by 2030. Uncontrollable factors, such as the weather and electricity exports, will also need to play out in such a way as to result in a maximum emission reduction by 2030.

How many megatonnes (Mt) do the percentages outlined above entail? An emission reduction ranging from 46% to 57% corresponds to an emission level of 97–123 Mt CO_2 eq in 2030 (Figure 1, Main Table 2). The 55% reduction relative to 1990 levels corresponds to an emission level of 103 Mt by 2030. That figure is at the lower boundary of the projected emissions for that year. Given the range of projected greenhouse gas emissions, we can conclude that the additional effort required to reach the 55% target could be as high as 20 Mt.

Figure 1
National greenhouse gas emissions and emission targets



Source: Pollutant Release and Transfer Register (PRTR); Climate and Energy Outlook 2022 and 2023 projections

In addition, there is the part of the 2030 climate plans that had not been sufficiently worked out, meaning that no impact assessment could be made for this report. In the Spring Package, the government assumed that with those climate plans it should be possible to achieve a further emission reduction of roughly 10 Mt by 2030. This means, there could be a greater certainty of reaching the 2030 climate target of 55% reduction if all climate plans in the Spring Package were to be elaborated and implemented in time, in concrete terms and as extensively as possible, including those that were not yet sufficiently tangible to be included in this report.

2) Indicative sectoral emission targets coming into view, except for agriculture and land use

The Spring Package identifies indicative residual emissions by sector. The KEV projections show that these indicative targets for the electricity, industry, built environment and mobility sectors are within the range of the projection, though not by a wide margin (Figure 2, Main Table 2). This means that the indicative sectoral targets will only be achieved if most climate plans for which an impact assessment could be made have maximum effect. Moreover, uncontrollable factors, such as the weather or electricity exports will need to play out in such a way as to result in a maximum emission reduction by 2030. Attainment of the target for these indicative residual emissions would become more certain if the climate plans that were not substantial enough to be included in this report would be elaborated and implemented in time, in concrete terms and as extensively as possible.

For the agriculture and land use sectors, the indicative sectoral targets do not fall within the projected emission range. It should be noted that important plans — such as the National

Programme for Rural Areas (NPLG) and some strategies to combat peatland emissions — have not yet been factored into the projections because their development is still pending. The NPLG is also the main instrument for meeting the target set in the Methane Strategy. With this programme, the Netherlands commits itself to reduce national methane emissions by 30% between 2020 and 2030. This KEV report concludes that, under all the climate plans for which an impact assessment could be made, the reduction of methane emissions between 2020 and 2030 will come to somewhere between 17% and 25%.

3) Impact of climate plans likely greatest in mobility, industry and built environment sectors

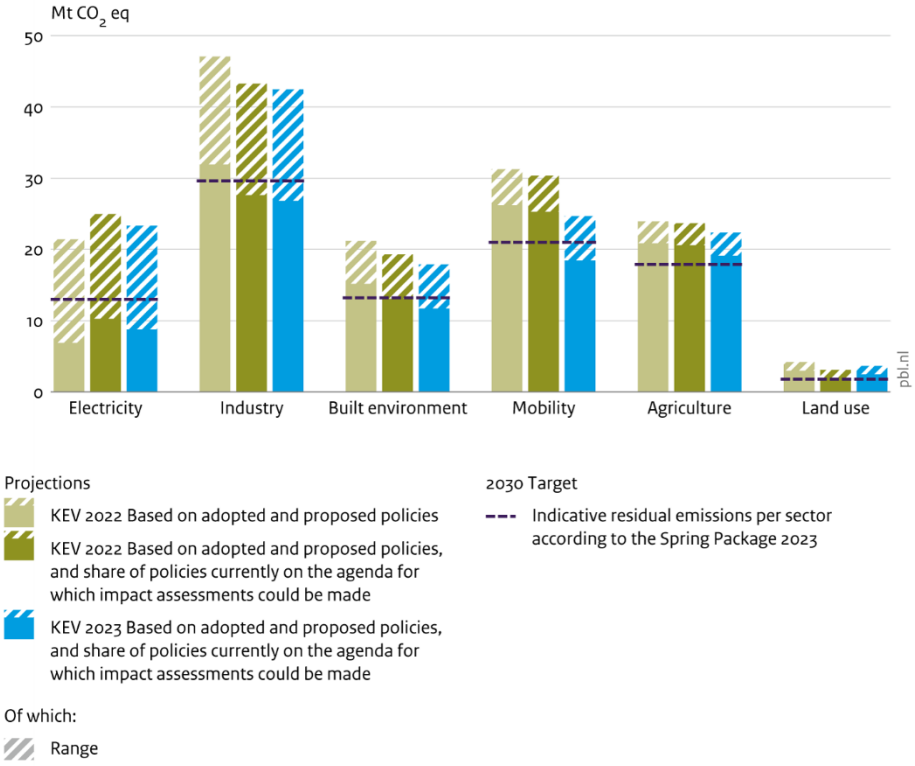
Mobility

Under all the climate plans for which this report presents an impact assessment, greenhouse gas emissions in the mobility sector can be reduced to a level of 18–25 Mt CO_2 eq in 2030. This level is 7–8 Mt lower than the KEV 2022 projections based on adopted and proposed policies (Main Table 2). The estimated reduction can be attributed to the following plans: the implementation of the European Renewable Energy Directive (RED III) in combination with an additional 20 petajoules of biofuels for road transport from the Spring Package, the introduction of 'Pay-by-Use' for private vehicles and light commercial vehicles, and measures to make light and heavy freight transport more sustainable.

Industry

Under all the climate plans for which this report presents an impact assessment, greenhouse gas emissions in the industry sector can be reduced to a level of 27–42 Mt CO_2 eq in 2030. This level is about 5 Mt lower than the projections based on adopted and proposed policies in the 2022 KEV report (Main Table 2). In the industry sector, the estimated reduction can be attributed to the following plans: the budget from the Climate Fund earmarked to finance custom-made agreements with large emitters and the plan to promote the use of green hydrogen in industry and oil refining.

Figure 2
Greenhouse gas emissions and residual emissions per sector, 2030



Source: Climate and Energy Outlook 2022 and 2023 projections

Built environment

Under all the climate plans for which this report presents an impact assessment, greenhouse gas emissions in the built environment sector can be reduced to a level of 12–18 Mt CO_2 eq in 2030. This level is about 3 Mt lower than the projections based on adopted and proposed policies in the 2022 KEV report (Main Table 2). Plans that make a substantial contribution to the reduction are: the standardisation of hybrid heat pumps, the update to the lists of recognised measures for the energy-saving obligation, and the sustainability upgrade of residential rental properties and non-residential buildings with poor energy label ratings. As in last year's report, the green gas blending requirement is not factored into projections for the built environment, but into the range for total national emissions.

Agriculture

In the agriculture and land use sectors, the plans lead to smaller reductions. With regard to agriculture, under all the climate plans for which this report presents an impact assessment, greenhouse gas emissions can be reduced to a level of 19–22 Mt CO_2 eq in 2030. This level is 1.6 Mt lower than the projections based on adopted and proposed policies in the 2022 KEV report (Main Table 2). The estimated reduction is mainly due to the impact of the following plans: the limitation of the energy tax exemption on natural gas input for combined heat and power installations, the subsidy for energy savings in greenhouse horticulture from the EU Energy Conservation Scheme and the new decision on derogation from the EU Nitrates Directive which includes annual cutbacks on derogation and supplementary conditions. The estimated emission reduction is also a result of the adjustments this report has made to the impact of several phasing-out schemes in the livestock

sector. In addition, new schemes have been included, such as the LBV-plus national phasing-out scheme for peak load-emitting livestock farms.

Land use

Under all the climate plans for which this report presents an impact assessment, greenhouse gas emissions in the land use sector can be reduced to a level of 2.7–3.7 Mt CO_2 eq in 2030. This level is about 0.5 Mt lower than the projections based on adopted and proposed policies in the 2022 KEV report (Main Table 2). In this sector, the emission reduction is mainly due to the plans to create additional forest cover and to increase the carbon content of soils.

Electricity

Under all the climate plans for which this report presents an impact assessment, the electricity sector shows a potential increase in greenhouse gas emissions to a level of 9–23 Mt CO_2 eq by 2030. This is about 2 Mt higher than the projections based on adopted and proposed policies in the 2022 KEV report (Main Table 2). The increment is because electricity demand may start rising substantially as a result of climate plans for other sectors which involve, among other things, the use of electricity in green hydrogen production and in the mobility sector with its growing number of electric vehicles.

4) Major share of climate plans still lacking sufficient detail

By 1 May 2023 a large number of climate plans had not yet been worked out in sufficient detail and we have therefore not been able to make impact assessments for those plans here. They are mainly related to the following areas; the emission reduction envisaged by the government is given in parentheses:

- the National Programme for Rural Areas in the agriculture sector (4 Mt);
- negative emissions from waste incineration plants and the more stringent CO_2 tax rules on waste incineration plants (3 Mt);
- the generic boosting of negative emissions in the electricity sector (1.5 Mt);
- the subsidy scheme for CO_2-free gas-fired power plants (1.3 Mt).

Plans on a smaller scale for which we have not been able to make impact assessments are: the demand-side response programme, the battery requirement for solar parks, standardisation measures for circular demolition and bio-based construction, intensification of the peat meadow approach, upgrading river transport sustainability to emission label B, greening travel habits, and tightening standards for sustainable procurement in the mobility sector.

In its Spring Package, the Rutte IV government expected it should be possible for all these climate plans to produce an additional emission reduction of roughly 10 Mt by 2030. If a substantial reduction impact is still to be achieved by 2030, these plans — whether or not amended or tightened by a new government — must be elaborated and implemented in time, in concrete terms and as extensively as possible.

5) Exploiting the potential of climate plans requires prompt and ambitious elaboration and implementation

With the climate plans from the Spring Memorandum a huge step can be taken towards the realisation of the now statutory target of a 55% reduction in greenhouse gas emissions by 2030 relative to 1990 levels. To meet this target with greater confidence, it is crucial that all climate plans are elaborated and implemented as ambitiously and rapidly as possible. Given that the task is huge and the time remaining until 2030 severely limited, the risk of not achieving the 55% emission

reduction is heightened by delays stemming from the upcoming elections and the formation of a new government, and from possible changes made by the new administration to policies that are still on the agenda.

When climate plans are being worked out, quite often decisions still need to be made on the selection and extent of policy instruments such as subsidies, norms, obligations and fiscal measures. An example of an obligation still requiring further development is the revision of the RED III Renewable Energy Directive. Under the new rules, the obligation to use renewable energy in transport is extended to the overall supply of fuels to the transport sector, including bunker fuels for international aviation and maritime transport. A relevant design choice is whether there will be separate obligations for domestic mobility and transport or for international bunkers.

The development of climate plans also requires specifying issues such as financing and timing of policy instruments and assigning responsibilities: who is going to implement, monitor, safeguard and enforce the policy instrument? To give an example, a point of particular interest in the built environment sector is the need for enforcement regarding compliance with the energy-saving obligation in the services sector and with the standards for hybrid heat pumps in homes.

Furthermore, when new instruments are developed, the question remains how effectively they can be implemented and executed before 2030. Take, for instance, the growing congestion in electricity grids. This is a serious obstacle to the intended increase in renewable electricity, electrification in the industry sector and the roll-out of charging infrastructure for electric freight transport. How is the industry sector supposed to continue to electrify in response to a possible hike in the carbon tax rate, if the existing electricity infrastructure and new installations planned up to 2030 cannot handle the demand? Is it even possible to realise extensive electricity infrastructure projects before 2030 if they were not yet included in the grid operators' investment plans in early 2023? Another example has to do with the sustainability of the mobility sector. It is crucial that sufficient biofuel resources are available to be able to scale up the use of renewable fuels. But since the new EU obligations are leading to increased demand from other Member States too, the necessary scale-up rate and quantity of biofuels could become obstacles.

6) Cumulative ESR emissions target in sight under assessed climate plans but attainment sensitive to pace of implementation

The Netherlands also has to comply with international agreements. The European Commission establishes, through its Effort Sharing Regulation (ESR), a national target for each EU Member State for greenhouse gas emissions not covered by the European Emissions Trading System (ETS), a scheme to reduce emissions from large, energy-intensive industries and the electricity sector by 2030. Put more specifically, the Effort Sharing Regulation covers emissions in small industry including waste treatment, the built environment, mobility and agriculture; in this report these are referred to as the *ESR sectors*.

The ESR has set a cumulative emissions budget of 833 Mt CO_2 eq for the Netherlands — the amount the country is allowed to emit between 2021 and 2030. That target is in sight. Considering all the climate plans for which this report has made an impact assessment, the Netherlands will arrive at 794–834 Mt CO_2 eq between 2021 and 2030. A small policy challenge of 1 Mt might still remain in this period. Under adopted and proposed policies, the estimated ESR sector emissions up to 2030 in this report are lower than those of last year's report. This is mainly due to additional reductions that the climate plans can produce in the mobility sector and in the built environment.

The ESR target is more likely to be attained if the climate plans that were not yet sufficiently concrete to be included in this report are developed and implemented in time.

Cumulative emissions are sensitive to the pace of policy implementation. The sooner in the 2021 to 2030 period a policy measure structurally starts cutting emissions, the longer that cutback will contribute to a reduction in cumulative emissions over that stretch of time. This means that rapid implementation of policies increases the likelihood of meeting the target.

7) In 2022 emissions were 31% below 1990 levels, due partly to high natural gas prices and mild winter

There was a marked decrease in greenhouse gas emissions in 2022. Emissions came to a rounded figure of 158 Mt CO_2 eq and were therefore about 14 Mt below 2021 levels. Total greenhouse gas emissions in 2022 were 31% below 1990 levels.

The reason for this drastic reduction in 2022 is that the industry, built environment and agriculture sectors consumed less natural gas. This is explained by price hikes for natural gas in 2022, which largely resulted from Russia's invasion of Ukraine and the subsequent geopolitical tensions between Russia and European countries. Because of the high prices, large industrial companies and greenhouse farmers adjusted their production processes or shut down production partially or completely. Households, businesses and institutions turned down their thermostats, burning less natural gas to heat their homes, buildings and greenhouses. More hours of sunshine and a mild winter are additional reasons for the reduced consumption of natural gas for heating.

Besides the sharp drop in emissions in 2022, the National Institute for Public Health and the Environment (RIVM) adjusted the historical emissions in its Emission Register with regard to the figures set in agreement with last year's insights. As a result, according to the latest insights, 1990 emissions are 1.9 Mt CO_2 eq higher than in earlier estimates. This brings total 1990 emissions to 228.9 Mt. The reasons for this upward adjustment are the improved estimates for diesel consumption by mobile equipment and for methane and nitrous oxide emissions, particularly those from sewage treatment plants. Methods for determining emissions from land use have also been improved. Given the higher figure for 1990 emissions, a 55% reduction compared to 1990 levels now puts the absolute emission target for 2030 at 103.0 Mt CO_2 eq.

8) More stringent energy saving target for final energy consumption within reach, but only if circumstances remain favourable

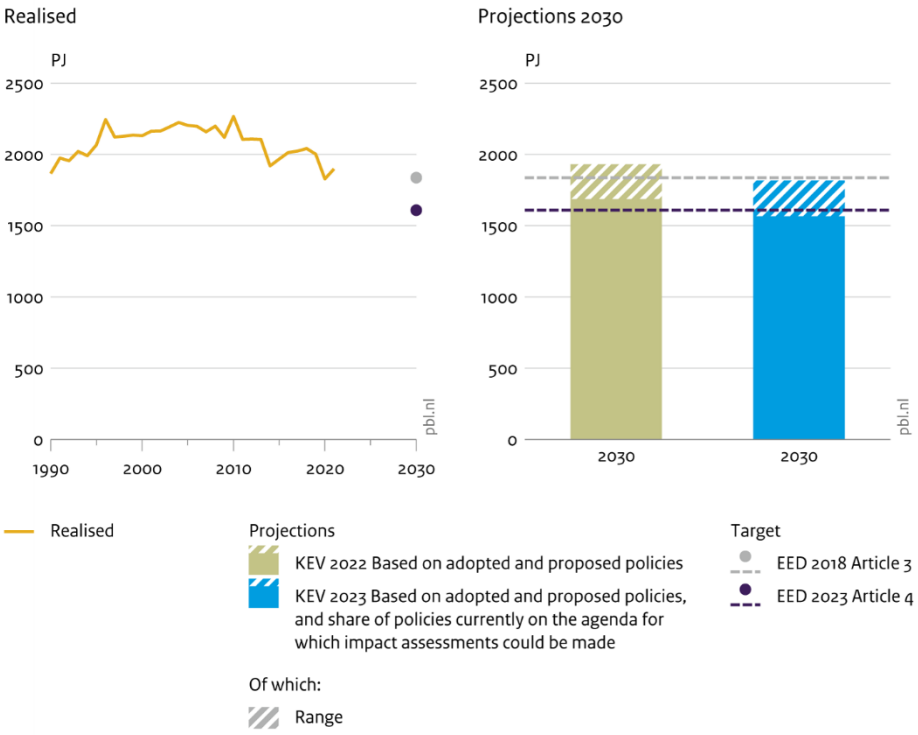
The European target for savings on final energy consumption has become more stringent due to the recasting of the European Energy Efficiency Directive (EED). In the directive, *final energy consumption* is defined as the energy consumption of final consumers in the industry, built environment, agriculture and mobility sectors and in international aviation. The recast EED requires Member States to reduce their final energy consumption by 11.7% relative to an EU reference scenario with projections for energy consumption in 2030. At the end of this year, the scenario will be revised; the calculations in this report are based on the reference scenario created in 2020. They translate into an upper limit for final energy consumption in the Netherlands of 1,609 petajoules in 2030. At the European level, this target is binding.

In 2021 final energy consumption reached 1,898 petajoules. Figures for 2022 are not yet available. Based on the climate plans from the Spring Package for which an impact assessment could be

made, this report foresees final energy consumption in 2030 to come to 1,566 to 1,818 petajoules (Figure 3). This means that the stricter target of 1,609 petajoules falls within the projected range, but is only attainable if circumstances remain favourable, including uncontrollable factors, such as energy prices and the weather. The climate plans from the Spring Package contribute to savings on final energy consumption by promoting the use of heat pumps through standardisation of heating installations, making rental housing with a poor energy label more sustainable, and maintaining the energy-saving obligation, Pay-by-Use in mobility, and custom-made agreements in industry.

Figure 3

Final energy consumption according to Energy Efficiency Directive (EED) target definition



Source: Eurostat (realised); Climate and Energy Outlook 2022 and 2023 projections

Cumulative savings on final energy consumption for 2021–2030

In addition to the 2030 targets for reductions in final and primary energy consumption, the EED also contains a binding target for the cumulative contribution to savings on final energy consumption to be brought about by national policies in the period 2021 to 2030. Cumulative savings means that savings are added up over the years and consequently, the sooner a savings impact is achieved, the longer it can be a factor in the calculations. The tightened target for cumulative savings from 2021 to 2030 is 1,285 petajoules. Based on the climate plans from the Spring Package for which an impact assessment could be made, this report foresees cumulative savings of 1,168 to 1,415 petajoules. The target for cumulative savings stemming from national policies is therefore within reach. This is, however, under the condition that the implementation of the climate plans is fully effective and that monitoring is in place to corroborate energy savings when reporting to the European Commission.

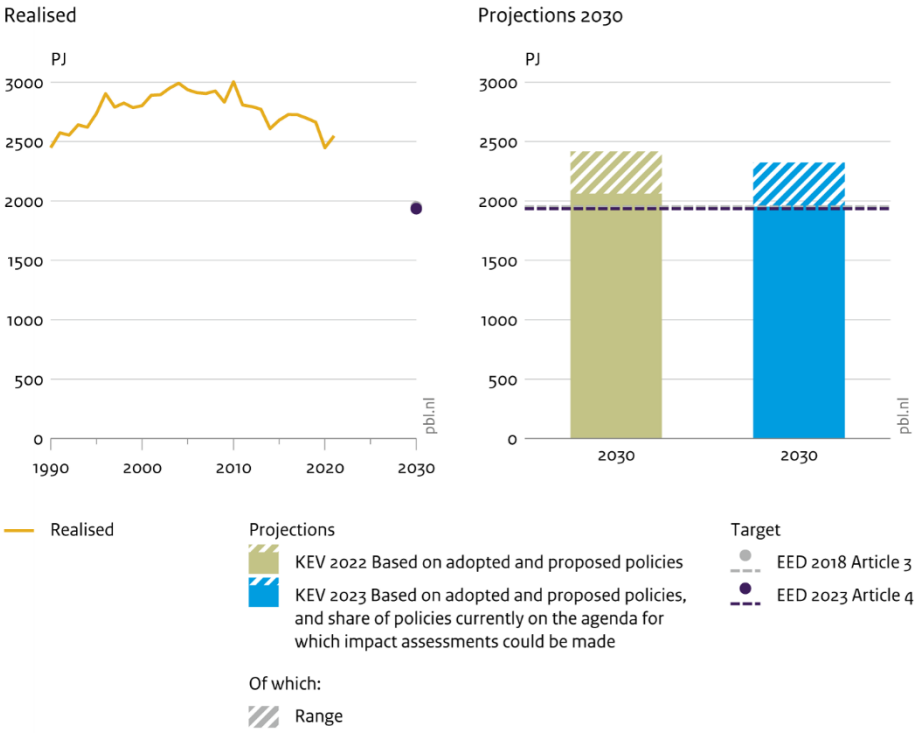
9) More stringent target for reduction in primary energy consumption still out of reach

In addition to tightening the European savings target for final energy consumption, the recast EED also makes the savings target for primary energy consumption more stringent. In the directive, *primary energy consumption* is defined as final energy consumption plus the energy sector's own consumption and its transformation and distribution losses. The energy sector consists of central and decentralised electricity generation, refineries, blast furnaces, water utilities and waste management, oil and natural gas extraction and district heating.

The recast EED requires Member States to reduce primary energy consumption by 11.7% relative to an EU reference scenario with projections for energy consumption in 2030. At the end of this year, the scenario will be revised; the calculations in this report are based on the reference scenario created in 2020. They translate into an upper limit for primary energy consumption in the Netherlands of 1,935 petajoules. At the European level, this goal is indicative, but Member States are expected to set a target value to contribute to the goal.

In 2021 primary energy consumption stood at 2,547 petajoules. Figures for 2022 are not yet available. This report foresees primary energy consumption by 2030 to be in the range of 1,951 to 2,323 petajoules (Figure 4). This means that the stricter target for primary energy consumption is out of the range. The climate plans from the Spring Package contribute to savings on final energy consumption, as described in point 8 of the Findings. However, the expected transformation losses in the energy sector are not lower than in the KEV 2022 estimate for 2030. Due to the climate plans, electricity demand is projected to grow faster, and the growth in renewable electricity generation cannot keep up. As a result, the use of natural gas in power plants increases compared to the KEV 2022 estimate.

Figure 4
Primary-energy consumption according to Energy Efficiency Directive (EED) target definition



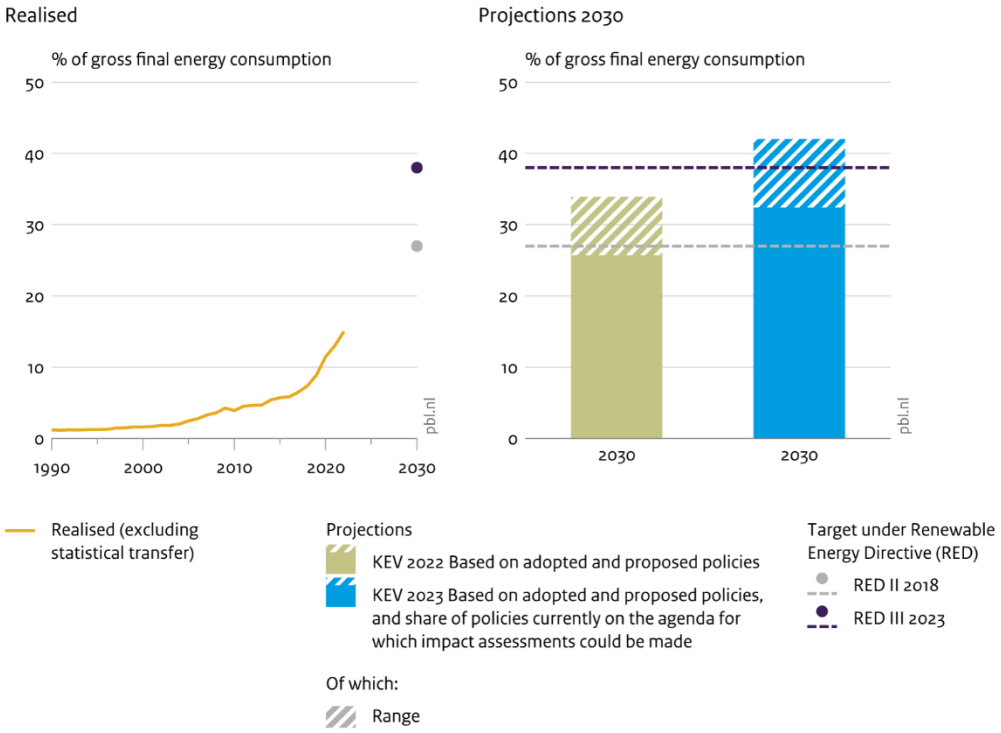
Source: Eurostat (realised); Climate and Energy Outlook 2022 and 2023 projections

10) *More stringent target for renewable energy share attainable under climate plans*

The revision of the Renewable Energy Directive (RED III) was approved by the European Council on 9 October 2023. It includes an agreement to increase the share of renewable energy in the EU's overall energy consumption to 42.5% by 2030, with the possibility of a voluntary additional 2.5 percentage points to reach 45%. The contributions of various Member States to this European target have yet to be determined. The Dutch contribution is expected to be a renewable energy share of around 38% by 2030.

The 2022 KEV report, considering adopted and proposed policies, expected that the share of renewable energy could rise to 30.7% within a range of 25.7% to 33.9%. The 2023 KEV estimate, which also takes in the policy changes for which an impact assessment can be made, moves the range up to 32% to 42% (Figure 5). The largest contribution is expected to come from the additional use of biofuels resulting from the implementation of RED III and the Spring Package measure to use more biofuels in road traffic. A lower level of final energy consumption also contributes to a higher share of renewable energy. The expected Dutch target of 38% falls within the range of the current estimate, which allows us to conclude that under the policies calculated in this KEV 2023 report, it is attainable. This is, however, with the proviso that the climate plans are developed and implemented as envisaged and that uncontrollable factors, such as energy prices and the weather, remain favourable to the share of renewable energy.

Figure 5
Share of renewable energy



Source: CBS – Statistics Netherlands (realised); Climate and Energy Outlook 2022 and 2023 projections

11) *Secondary targets for share renewable energy require additional attention*

RED III also introduces and tightens secondary targets for the industry, mobility, built environment and heat sectors. The goal is to promote the use of renewable energy in sectors where application is still troublesome. For secondary targets of specific sectors, the calculation method of the related indicators can be interpreted in several ways. The conclusions on target attainment are therefore indicative.

Annual increase of 1.6 percentage points in share renewable energy not achieved in industry

The first secondary target for industry is an indicative annual increase of 1.6 percentage points in the share of energy from renewable sources in final energy and final non-energy consumption in industry. In 2020, the share of renewables in industry was 5%. In the KEV 2023 projection for 2030 it falls in the range of 10% to 17%, which implies annual increases of 0.6 to 1.3 percentage points. This means the secondary target of a 1.6 percentage points annual increase is not achieved. The largest part of the increase is due to the overall growth of renewable electricity generation in the Netherlands and its transmission to industry through the power grid.

Uncertainty remains on attainment target renewable fuels of non-biological origin in industry

The second secondary target for industry concerns the use of renewable fuels of non-biological origin (RFNBOs) for final energy and final non-energy consumption. It states that at least 42% of hydrogen consumption in industry should come from RFNBOs by 2030, and 60% by 2035. It is estimated that total hydrogen use in industry and refining in 2020 amounted to around 180 petajoules. A share of this is not subject to the obligation because it concerns hydrogen that is a by-product or produced from waste gases. As for refineries, only hydrogen used in the production of building blocks for the chemical industry is counted; hydrogen used for the production of motor

fuels is excluded. RED III contains a separate secondary target for the use of RFNBOs in the mobility sector. The hydrogen use in industry and refining that must be included in the calculation of the 42% share totals about 81 petajoules.

In the KEV 2023 projection, 27 to 40 petajoules of green hydrogen from electrolysis will be used in the industry and refining sector as a whole in 2030. The lower boundary of the estimate is based on the availability of subsidies and the upper is based on the assumption that the RFNBO requirements are met through a purchase obligation scheme. If the use of green hydrogen in refining to meet the transport target is kept to a minimum, availability from domestic production will be large enough to meet the industry target. But if a larger share of green hydrogen goes to refining, the industry target will not be met. To meet the RFNBO target in industry, much needs to be done in the next few years. The policy on implementing the hydrogen obligation in the Netherlands still needs to be worked out and the industry still needs to build the electrolyser plants.

Secondary target renewable energy in mobility requires substantial upscaling of biofuel use

RED III extends the scope of the obligation to use renewable energy in the mobility sector to the overall supply of fuels to transport, including bunker fuels for international aviation and shipping. Member States can choose between a binding target of a 14.5% reduction in greenhouse gas intensity in the transport sector stemming from the use of renewable energy by 2030, or a binding share of at least 29% of renewable energy in final energy consumption in the transport sector by 2030. The Rutte IV government has taken the first option, through an obligation on fuel suppliers to provide fuels with a lower greenhouse gas intensity.

Besides an overall target for greenhouse gas intensity or total renewable energy, there are additional secondary targets: advanced biofuels and RFNBOs combined are to account for at least 5.5% of the energy supplied to the transport sector in 2030. Of this, at least 1 percentage point should come from to RFNBOs. To rapidly start the fuel shift in maritime shipping, Member States with seaports should strive for the share of RFNBOs in the energy supplied to maritime shipping to be at least 1.2% from 2030 onwards.

The total demand for renewable energy in mobility to meet RED III requirements is projected at around 160 petajoules. Of this total, biofuels are estimated to contribute 130 petajoules, renewable electricity 24 petajoules and RFNBOs 5 petajoules. In addition to implementing RED III measures, the Rutte IV government has planned to use a further 20 petajoules of biofuels in road transport. This brings total renewable energy in mobility up to around 180 petajoules by 2030. Meeting this secondary target will require a massive scaling-up of biofuel use. In 2022, total biofuel consumption for international transport and road traffic amounted to 45 petajoules. It should be noted that production capacity and availability of sufficient raw material might be obstacles to scaling up biofuel use.

Secondary target renewable energy in built environment maybe just within reach

Within RED III, agreement has been reached on an indicative secondary target to increase the share of renewables in energy consumption in the built environment in the European Union to 49% by 2030. Member States are allowed to set their own national contribution to this target, provided it is consistent with achieving the overall EU target. Consumption of renewable energy in the built environment comprises the use of ambient heat through heat pumps, solar heat from solar boilers, wood in fireplaces and stoves, and biogas, as well as the supply of renewable heat through district heating, and the supply of green gas and renewable electricity.

In 2021 the share of renewable energy in the built environment totalled 17%. With the policy changes discussed in the KEV 2023 report, the share increases to the range of 41% to 49% by 2030. The largest contribution comes from the supply of renewable electricity, but the projected increase is also particularly due to an increase in the use of heat pumps resulting from the standardisation of heating installations. The indicative secondary target, at 49%, is exactly at the upper limit of the range calculated in this report. At the same time, the calculation method is still uncertain. It is unclear what share of renewable electricity production in the Netherlands may be attributed to the built environment.

Binding secondary target for increase in renewable heat within reach, but target including indicative top-up not yet

Under the RED III directive, the target for annual increases in the share of renewable energy for heat has been adjusted and is now no longer indicative but binding. It aims for increases of at least 0.8 percentage points per year in the period 2021 to 2025 and of at least 1.1 percentage points in the period 2026 to 2030. In addition to that, there are country-specific indicative top-up targets. For the Netherlands, these are 1.1 percentage points per year in the period 2021 to 2025 and 0.8 percentage points in the period 2026 to 2030. The binding and top-up targets combined result in a target for growth in renewable heat of 1.9 percentage points per year over the entire 2021–2030 period.

The share of renewable heat was 8.1% in 2020 and remained at a comparable level in 2021. In 2022, the share of renewable heat was 8.8%. The projections of this KEV 2023 report see the share of renewable heat increasing to the range of 17% to 24% by 2030, which implies a growth of 0.9 to 1.6 percentage points per year over the period 2021 to 2030. The range is determined by uncertainty around the successful implementation of climate plans. An important point at issue is the increase in the number of heat pumps resulting from the standardisation of heating installations. Savings on energy consumption for heat also contribute to an increase in the share. When considering the additional climate plans discussed in this report, the secondary target for increasing the share of renewable heat over the period 2021 to 2030 is not within reach: the binding component — around 0.95 percentage points per year on average — is attainable, but the target figure including the indicative top-up amounts to 1.9 percentage points per year and is not yet in reach.

The RED III directive also states as a secondary target that Member States should aim to increase the share of energy from renewable sources and residual heat in district heating by an indicative figure of at least 2.2 percentage points per year in the period 2021 to 2030 relative to 2020. Heat network sustainability reports from large heat networks show that in 2020, the share of renewables in total heat production was 36.5% and the share of residual heat was 8%, together adding up to 44.5%. In the KEV 2022 projections, the share of renewable heat in district heating increased to 51% by 2030 and the share of residual heat to 13%, together adding up to 64% — an average increase of 2 percentage points per year. The 2023 KEV report does not make new projections of the shares. In addition, the European definition of district heating includes steam supply within the industry sector, and for this no projections have been made either.

Main Tables Climate and Energy Outlook 2023

Main Table 1
Total realised greenhouse gas emissions[1] in Mt CO_2 eq

	1990	2000	2010	2019	2020	2021	2022*	Reduction 1990–2022 (%)
Electricity	39.6	48.4	52.0	41.5	32.5	32.4	30.7	22.5
Industry	87.0	74.6	59.7	55.0	53.7	54.0	49.8	42.8
Built environment[2]	29.7	29.6	34.0	23.2	21.7	24.3	19.6	34.0
Mobility	33.3	39.0	39.8	34.3	29.9	29.8	29.6	11.1
Agriculture (including greenhouse horticulture)[2]	33.0	28.4	29.2	27.4	27.0	27.0	24.4	26.1
Land use	6.2	5.7	5.1	4.2	4.1	4.3	4.4	29.0
Total	228.9	225.7	219.8	185.6	168.9	172.0	158.4	30.8
Reduction since 1990 (%)	-	1.4	4.0	18.9	26.2	24.9	30.8	

[1)] The calculation of emissions listed here is based on GWP values from the IPCC *Fifth Assessment Report* (AR5).

[2)] The Pollutant Release and Transfer Register (PRTR) has included emissions stemming from the keeping of hobby animals in the figures for the built environment. In this table, those emissions are included in the figures for agriculture, because as of next year the PRTR will group them in that sector again.

* Provisional emission figures (National Institute for Public Health and the Environment (RIVM)/ Pollutant Release and Transfer Register (PRTR), 2023).

Main Table 2

Total projected greenhouse gas emissions [1,2] for 2030 and sectoral residual emissions in Mt CO_2 eq based on measures for which an impact assessment could be made

	KEV 2022: 2030 projection based on adopted and proposed policies	KEV 2022: 2030 projection based on adopted, proposed and still to be discussed policies	KEV 2023: 2030 projection based on adopted, proposed and still to be discussed policies	Indicative residual emissions from Spring Package
Electricity	7–21	10–25	9–23	13.0
Industry	32–47	28–43	27–42	29.6
Built environment	15–21	13–19	12–18	13.2
Mobility	26–31	25–30	18–25	21.0
Agriculture (including greenhouse horticulture)	21–24	21–24	19–22	17.9
Land use	3.0–4.2	1.8–3.1	2.5–3.7	1.8
Total[3]	114–139	108–133	97–123	93*
Reduction since 1990 (%)[4]	39–50	41–52	46–57	59

[1)] The calculation of emissions listed here is based on GWP values from the IPCC *Fifth Assessment Report* (AR5).

[2)] The residual emissions are listed in the spring package; this is explained in the Spring Climate Decision (EZK, 2023a).

[3)] In this KEV report, the sectoral ranges do not add up to the total national range for 2030 because the national figure takes into account interactions in uncertainties between sectors and because the green gas blending requirement has been included in the projections as a cross-sector factor.

[4)] The 1990–2030 reduction percentages from the KEV 2022 report were determined on the basis of 1990 emissions as recorded in statistics available in early 2022 (227 Mt CO2 eq). In 2023, the 1990 emissions were revised upwards as explained elsewhere in this report.

* The calculation of the total of 93 Mt of residual emissions also includes a reduction of 3.2 Mt stemming from cross-sectoral policy instruments (EZK, 2023c). The KEV projections attribute all policy changes to sectors, except for the additional impact of the green gas blending requirement, which is only included in the national total. In practice, the PRTR will associate the impact of the blending requirement to each sector in proportion to their natural gas consumption.