# National Energy Outlook 2017

Summary

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# Summary

The National Energy Outlook 2017 (NEO 2017) provides an insight into developments in the Dutch energy system in an international context. Before examining the developments since the NEO 2016, we would like to make three general observations.

The first observation is that developments in surrounding countries have a major impact on the Netherlands. Accordingly, it is important to place developments in the Netherlands within the context of North West Europe, for example in the area of greenhouse gas emissions. For companies operating at an international level this interconnectedness is self-evident, but the electricity market developments outlined in this NEO also provide a clear illustration of this observation. For the past few years, the Netherlands has been a net importer of electricity. The greenhouse gas emissions from the production of imported electricity occur abroad. The NEO anticipates that the importing of electricity will decrease, and from 2023 onwards the Netherlands will be a net exporter. But this projection assumes certain developments in other countries, which may not happen as expected. The future of the energy system in Belgium is uncertain, and Germany is expected to make new decisions after the elections. Based on two alternative scenarios for developments in surrounding countries, it is clear that in these circumstances the export of electricity from the Netherlands will be higher in 2030 than anticipated in the reference scenario including proposed policy measures described in this NEO. Because this exported energy will be partially made up of electricity produced from fossil fuels, the decrease in Dutch greenhouse gas emissions will be smaller. This illustrates the fact that a coherent picture that takes account of developments in neighbouring countries is more meaningful than a national approach. This is all the more applicable to the Netherlands because of the developing natural gas market. By approximately 2025, the NEO projects that we will be a net importer in this market. Without energy savings, this will be the case much sooner. We cannot take it for granted that our own natural gas supplies will last forever.

The second observation concerns the increasing importance of regional partnerships between provincial and municipal authorities. This means that provincial and municipal authorities are having to deal with the consequences of the energy transition on land use, which falls under their responsibility. Solar panels and wind turbines take up more space than conventional power plants, and according to this NEO their numbers are increasing significantly. In 2023 for example, half of the installed electricity capacity in the Netherlands will consist of solar panels and wind turbines, based on proposed policy measures. Panels and turbines can be placed anywhere in the country, meaning that the use of land for energy production need not be solely the responsibility of those local and regional authorities that have become accustomed to it over the past few decades, but can be shared by all authorities in the Netherlands. That requires coordination, involving the central government as well. In addition, tasks and responsibilities relating to the transition from energy consumption for heating in – amongst others – the built environment also lie with local and regional authorities. They, however, depend on clarity around the delineation of responsibilities, appropriate funding, and suitable laws and regulations to be

able to properly perform their roles. This, too, requires coordination with the central government.

The third observation relates to the major importance of the decreasing consumption of energy. This aspect is frequently overlooked as a result of public discussions about the desirable energy mix, such as wind turbines, solar panels, nuclear power plants or smart forms of biomass. The NEO shows that due to policy measures and greater efforts by businesses and households, the rate of energy savings is increasing. If the proposed policy measures are implemented, final energy consumption in 2020 will be more than 4 per cent lower than in 2016, and in 2030 it will be nearly 8 per cent lower. With lower energy consumption, we will also achieve a higher proportion of renewable energy and delay the point at which we become a net gas importer.

The table below shows the key figures from the NEO 2017.

**Table of Key Figures from the National Energy Outlook 2017** *(based on established and proposed policy measures).*

| | 2000 | 2010 | 2016 | 2020 | 2030 | 2035 |
|---|---|---|---|---|---|---|
| GDP (index 2016=100) | 83 | 94 | 100 | 108 | 128 | 137 |
| Oil price (US$ per barrel)[a] | 41 | 88 | 44 | 53 | 111 | 118 |
| Gas price (euro cents per $m^3$)[a] | 16 | 20 | 15 | 17 | 31 | 33 |
| Coal price (euros per ton)[a] | 45 | 76 | 46 | 52 | 67 | 68 |
| $CO_2$ price (euros/ton)[a] | - | 15 | 5 | 7 | 16 | 25 |
| Wholesale price of electricity (euros per megawatt hour)[a] | 58 | 53 | 34 | 32 | 44 | 48 |
| | | | | | | |
| Gross final energy consumption (petajoules) | 2141 | 2352 | 2090 | 2000 (2023:1979) | 1933 | 1871 |
| Renewable energy (petajoules) (EU Directive calculation method) | 35 | 92 | 125 | 248 (2023:331) | 462 | 517 |
| Share of renewable energy (percentage) (EU Directive calculation method) | 1.6 | 3.9 | 6.0 | 12.4 (16.7 in 2023) | 23.9 | 27.6 |

| | 2000 | 2010 | 2016 | 2020 | 2030 | 2035 |
|---|---|---|---|---|---|---|
| Share of renewable energy (percentage) ('actual production' calculation method) | | | | 13.0 (17.3 in 2023) | | |
| Rate of energy savings (percentage per year) | - | 1.1[b] | - | 1.7[c] | 0.9[d] | - |
| Energy savings according to the EU Energy Efficiency Directive (cumulative petajoules 2014-2020) | - | - | - | 721 | - | - |
| Energy savings due to measures from the Energy Agreement (petajoules) | - | - | - | 75 | - | - |
| | | | | | | |
| Total greenhouse gas emissions (megatons of $CO_2$ equivalents) | 220 | 214 | 197 | 170 | 154 | 146 |
| Greenhouse gas reduction from 1990 levels (percentage) | 1 | 3 | 11 | 23 | 31 | 34 |
| Greenhouse gas emissions in non-ETS sectors (megatons of $CO_2$ equivalents) | - | 129 | 103 | 94 | 86 | 84 |
| | | | | | | |
| Gas extraction (billion $m^3$)[e] | 69 | 84 | 48 | 43 | 17 | 14 |
| Gas demand (billion $m^3$)[e] | 48 | 49 | 38 | 32 | 25 | 24 |
| | | | | | | |
| Net additional employment due to the Energy Agreement, cumulative over the period 2014-2020 (x 1,000 working years) | - | - | - | 76 | - | - |
| Investment in energy (billion euros, current prices) | 6 | 10 | 13 | 15 | - | - |

a Constant prices 2016.
b Average 2000-2010.
c Average 2013-2020.
d Average 2021-2030.
e Gas demand is a temperature-corrected value. Where actual gas demand deviated in the past because certain years were warmer or colder than normal, it is assumed that this resulted in an decrease or increase in gas extraction quantities in the Netherlands.

**Reference scenario, policy alternatives and uncertainties**
The NEO uses a single reference scenario which incorporates external factors such as the economy, demographics, and fuel and $CO_2$ prices, and which is based on specific technological developments and assumptions about human behaviour. The reference scenario was formulated with two policy alternatives:

- Established policy measures, which have been implemented and are legally binding as of 1 May 2017.
- Proposed policy measures, which include proposed arrangements and schemes alongside those that are already in place.

The text of the NEO describes the expectations if the proposed policy measures alternative is implemented, unless otherwise indicated. Uncertainties are linked to both the development of external factors and the effects of the policy measures themselves. Accordingly, the NEO uses ranges which reflect uncertainty around the middle value – which is, in our judgement, the most plausible future situation. In this summary, these ranges are shown in square brackets [] after the projected values. Another alternative which paints a different policy picture for renewable energy and includes a sensitivity analysis for electricity supply developments in other countries shows the sensitivity of the results to specific assumptions.

## Developments since the NEO 2016

**In this 'gap year', policy makers start looking at the longer term**
With elections in the Netherlands, the United Kingdom, France and Germany, 2017 can be considered a gap year in terms of policymaking. The Netherlands has used this year to focus on longer-term policy frameworks, in which the '$CO_2$-driven' energy transition occupies a central place, in accordance with the Energy Agenda published in late 2016. The review of the Energy Agreement showed that the importance of the Standing Committee of the Energy Agreement as a platform and a monitoring tool will remain high in the coming years. In Europe, too, the policymaking focus has shifted to the long term. In November 2016, under the slogan 'Clean Energy for all Europeans', the European Commission published a package of policy proposals which, together with the proposals that were already underway, will largely form the European policy framework for the period 2021-2030. Negotiations on this package between the European Commission, member state governments and the European Parliament are expected to be completed sometime in 2018.

**Prices for oil, coal, gas and $CO_2$ will remain low untill 2020**
As a general rule, prices for energy carriers are volatile, and are to a large extent determined by global developments. The prices recorded on the markets in 2016 were lower than the low levels in 2015. It is expected that energy prices will remain relatively low until 2020. Over the longer term price increases are likely, although there is a great deal of uncertainty around this point. For long-term prices, the NEO follows the estimates of the International Energy Agency. For the first time in years, the IEA has adjusted the estimated 2030 oil and gas prices upwards slightly, while adjusting the projected coal price downwards. In this NEO, the projected $CO_2$ price has also been adjusted downwards.

**The wholesale electricity price remains under pressure**
Over the next few years the wholesale price for electricity is also expected to stay low. As in the NEO 2016, the expected price in 2020 is slightly above 30 euros per megawatt hour. This is much lower than in the period 2000-2015 when the price fluctuated between 40 and 60 euros, with outliers even higher than that. The low prices for coal, gas and $CO_2$, an over-capacity of conventional generating capacity and the growing proportion of renewable electricity in electricity production, both in the Netherlands and in neighbouring countries, underpin these projections. After 2020 the electricity price is expected to increase less sharply than indicated in the previous NEO due to stronger growth in the production of renewable electricity combined with slightly lower demand.

**Final energy consumption continuing to fall**
Gross final energy consumption fell steeply in the Netherlands between 2005 and 2016. Driven by continuing energy savings and the effect of established and proposed policy measures it is expected that consumption will continue to decline, to 2,000 petajoules in 2020 and 1,933 petajoules in 2030. The projection for 2030 is several percentage points lower than in the NEO 2016. Consumption in the built environment in particular is expected to be significantly lower. Statistics from the past few years show that the drop in energy consumption in the built environment has been faster than previously expected, and as a result, projections of future consumption in this sector have also been adjusted downwards. Extra efforts to save energy have also contributed to achieving the drop in energy consumption.

**The energy mix is gradually changing**
The primary energy consumption picture has not changed much from the one described in the NEO 2016. In 2015, primary consumption was 3,085 petajoules. If proposed and established policy measures are implemented, it is expected that this figure will fall to 2,981 petajoules in 2020 and 2,829 petajoules in 2030. Natural gas consumption is expected to fall further, while consumption from renewable sources will increase. The opening of three new coal-fired power plants resulted in a coal consumption peak in 2015. Despite the closure of five power plants from the 1980s, for the next few years coal consumption is expected to be above pre-peak levels. For the time being, oil is maintaining its dominant role in transport and as a raw material in the chemical industry. Oil consumption has remained broadly the same since 2005; as a result, in the next few years oil is expected to take over from natural gas as the largest energy carrier in the energy mix.

**Strong renewable energy growth, the 2020 target is out of reach, but the 2023 target is expected to be met**
In 2016, the proportion of renewable energy was 6 per cent. This proportion is expected to grow to 12.4 [11-13] per cent in 2020 and to 16.7 [14-18] per cent in 2023, according to the European Unions calculation method. This means that in just four years, this proportion will have risen more than over the entire period 2000-2016, when an increase of 4.4 percentage points was achieved. The projection for 2020 is similar to that in the NEO 2016. The development of wind energy is progressing more slowly than projected. In contrast, solar power has been developing much faster,

and there has been higher consumption of biofuels and lower total gross final energy consumption. The proportion of renewable energy based on the 'actual production' calculation method is projected to be 13 per cent in 2020 and 17.3 per cent in 2023.

For onshore wind energy, limited public support is slowing down growth in the short term and long-term projections have been adjusted downwards. The target of 6,000 megawatts of installed capacity will not be achieved, with a projection of around 4,750 megawatts by 2020. It is expected that extra efforts will be required to achieve that target after 2020. In terms of offshore wind energy, the NEO 2016 assumed that a 'catch-up' would occur after the delay in the implementation of the Power Act, but this has not materialised. As a result, the estimated contribution of offshore wind energy in 2020 has been adjusted downwards.

In 2016, more than 60 per cent of renewable energy came from biomass. In 2023, this is expected to drop to just under 50 per cent. The importance of biomass is often underestimated: by burning wood in wood heaters and open fireplaces, households make a much greater contribution to the consumption of renewable energy than through the harnessing of solar energy with solar panels and solar boilers.

**Sharp tender bids for offshore wind energy offer both opportunities and risks**

In addition to the tenders for offshore wind energy agreed in the Energy Agreement, the government announced in the Energy Agenda that it wants to expand the roll-out of offshore wind farms by 1 gigawatt per year to 2030. The cost of offshore wind energy has decreased significantly in recent years and there is strong price competition in tender bids. The resulting price drop makes a further roll-out possible within the maximum expenditure ceiling of the SDE+ scheme. Nevertheless, the strong price competition in tenders, combined with the downwards adjustment in the NEO's future electricity price projection, will lead to greater risks in the business case for offshore wind energy. If the in the bids anticipated cost price drops or returns do not eventuate in practice, the roll-out may be delayed. By contrast, learning effects and increases in scale may contribute to reducing the lead time for building offshore wind farms. On balance, under these developments the target of 4,450 megawatts of offshore wind energy by 2023 will be achieved, with a range of 3,050 to 5,450 megawatts.

**Offshore wind energy growth will quickly make electricity production more sustainable**

The announced additional roll-out of offshore wind over the period 2023-2030 and the continued increase in the contribution of solar power will lead to strong growth in the proportion of renewable electricity in national electricity production. By 2025 this proportion will have increased to around half, and it will be close to two-thirds by 2030. Conventional production from gas, and later also from coal, will come under pressure. In these circumstances, the Netherlands will increasingly become a net power exporter.

**Volume Dutch electricity production depends on developments in neighbouring countries**

The position of Dutch coal and gas-fired power plants within the North-West European market is such that huge variations in their operation can be caused by developments beyond the Netherlands' borders. As a result, greenhouse gas emissions from this sector can also vary markedly from year to year. This variability was investigated in this NEO with a sensitivity analysis. That analysis confirmed this picture of big variations in operation and in the associated emissions. The exceptional situation in the electricity market in 2016 perfectly illustrates this sensitivity. Reduced production at several nuclear power plants in France due to inspections, combined with a low gas price, meant that for several months the Netherlands exported more power than it imported, in contrast to the usual situation in which it is a net importer. National electricity production increased, as did $CO_2$ emissions.

**Improving energy savings**

In this Energy Outlook, the expected rate of energy savings in primary energy consumption in the period 2013-2020 is around 1.7 [1.6-1.8] per cent per year. Without the measures in the 2013 Energy Agreement, the savings would be only 1.2 per cent per year, approximately the same as in the period 2000-2010. Out of this increase of 0.5 percentage point per year, around 0.4 percentage point is due to additional savings in the final consumption sectors (built environment, industry, agriculture and transport) flowing from measures in the Energy Agreement. Close to 0.1 percentage point comes from the closure of older, less efficient coal-fired power plants. Because we do not yet know what new policy measures may be implemented after 2020, between 2020 and 2030 the rate of savings is estimated to fall to 0.9 per cent per year.

The rate of savings is slightly higher than in the NEO 2016. This is partially due to a higher rate of final savings: the Energy Agreement measures have been expanded and strengthened and are therefore having a greater effect. Electricity generation also appears to be slightly more efficient, since power plants and co-generation plants can be operated more advantageously, but these are extremely volatile effects that could quickly change in response to changes in energy prices or market conditions.

Finally, our understanding of the rate of savings in the past has been adjusted slightly: monitoring data for recent years indicates a slightly higher rate of savings in the services sector than was previously supposed.

**Pluses and minuses of the savings effect of Energy Agreement measures**

The savings effect resulting from the measures in the Energy Agreement has been adjusted upwards from the NEO 2016 to 75 [41-102] petajoules. It means that the 100-petajoule target will almost certainly not be achieved. It is expected that the savings agreement for energy-intensive industry, the agreed-targets agreement for households and the proposed mandatory label improvement in the social housing sector will collectively result in extra savings of 22 petajoules over the NEO 2016 figures. However, the expected

effect of certain other measures in the Energy Agreement has been adjusted downwards by 15 petajoules, so that the total overall savings are only 7 petajoules higher than in the NEO 2016.

Out of the downwards adjustment of 15 petajoules, around 10 petajoules can be ascribed to disappointing results from policies. For instance, it is now expected that the Energy Savings System for greenhouse horticulture will not be up and running before 2020. The stepping up of enforcement of the Environmental Management Act has also been delayed, which means that fewer businesses will have been reached by 2020. There are also factors unrelated to policy implementation. These contributed around 5 petajoules to the downwards adjustment. One such factor is the drop in energy consumption observed in the services sector in recent years. The figures show that savings measures have probably already been implemented in the recent past, which means there is less potential remaining for stronger enforcement of the Environmental Management Act. As a result, stronger enforcement is expected to have less of an effect in the coming years. The downwards adjustment of the expected policy effect due to a reassessment of the statistics does not mean that less energy saving is occurring.

**The European Energy Efficiency Directive target will be comfortably met**

At 721 [693-754] petajoules, the expected cumulative savings according to the European Energy Efficiency Directive (EED) are significantly higher than in the previous NEO. It is therefore expected that the target of 482 petajoules will be comfortably met. By far the most significant increase since the NEO 2016 came from an analysis of 2014 and 2015 monitoring data, which showed higher EED savings than had been expected based on the projections, particularly in the industrial sector. Article 7 is clear about the level of the target, but leaves room for member states to apply their own interpretation to the definition and calculation of the savings, and to what part of the savings counts towards the target. As a result, differences have arisen in the Netherlands between savings estimated on the basis of monitoring and those based on projections. Until a process is established to reconcile these differences, the NEO is using existing savings monitoring and the projections will be added to that.

**A greenhouse gas reduction of 23 per cent in 2020 is still not enough to comply with the court ruling in the Urgenda case ...**

Based on preliminary figures, in 2016 national greenhouse gas emissions amounted to 197 megatons of $CO_2$ equivalents, which is 11 per cent lower than in 1990. Proposed policy measures will result in emissions dropping steeply to 170 [161-179] megatons of $CO_2$ equivalents by 2020. The expected reduction from 1990 levels will therefore be 23 [19-27] per cent. This means that, as in the NEO 2016, emissions are expected to exceed by approximately 4 megatons the level imposed on the Dutch State by the court in the Urgenda case. The State has appealed the court's decision and that appeal is still pending. The government has indicated that it will implement the ruling in the meantime.

By far the biggest percentage of the expected reduction in greenhouse gas emissions in the next few years will occur in the

energy sector. The consumption of fossil fuels is falling due to the impact of the decrease in coal and gas capacity, the increase in renewable energy production and the growth of interconnection capacity. Greenhouse gas emissions are also expected to fall by 2020 in the built environment and in the transport and agricultural sectors.

**... but nothing is certain, mainly due to variability in electricity generation**

The emissions reduction range specified above of between 19 and 27 per cent is indicative of the high level of uncertainty, which can only be partly controlled through proposed policy measures at the national level. For instance, the growth in the proportion of renewable energy is a domestic issue, but emissions in the energy sector are also closely linked to developments abroad. Emissions by final consumers depend on both the energy savings achieved and on external factors such as economic growth and the weather.

**The Netherlands is expected to easily meet the non-ETS target for greenhouse gases by 2020**

Based on emissions for non-ETS sectors since 2013 and projections for 2020, it is expected that the Netherlands will easily meet its European obligation to reduce non-ETS greenhouse gas emissions between 2013 and 2020. The maximum permitted cumulative emissions for the Netherlands in the period 2013-2020 is 920 megatons of $CO_2$ equivalents. Based on proposed policy measures, the cumulative emissions for that period will be 798 megatons of $CO_2$ equivalents.

**By 2030, greenhouse gas emissions will be 31 per cent lower than 1990 levels**

The expected drop in energy consumption in final consumption sectors and the growth of renewable energy will continue after 2020. This is expected to result in a further reduction of greenhouse gas emissions to 154 [136-179] megatons of $CO_2$ equivalents by 2030. That corresponds to a reduction of 31 [19-38] per cent from 1990 levels. Due to other expectations about the development of the electricity market this projection deviates significantly from the one in the NEO 2016, in which it was expected that emissions in 2030 would not be much lower than in 2020. The stronger growth in offshore wind energy in the Netherlands and an increase in the generation of renewable electricity abroad, in combination with changes in the price situation for coal, gas and $CO_2$, will lead to 15 megatons fewer greenhouse gas emissions in 2030 than was stated in the NEO 2016. However, there is still considerable uncertainty surrounding the emissions situation between 2020 and 2030, which depends to a large degree on developments in the domestic and foreign electricity markets.

**EU proposal for non-ETS emissions 2021-2030 means a further policy challenge**

The European Union is currently discussing the recent proposal from the European Commission for national targets for emissions outside the ETS between 2021 and 2030. Based on the proposal, the maximum permitted cumulative emissions for the Netherlands in that period would be 882 megatons of $CO_2$ equivalents. Based on non-ETS emissions projections up to 2030, if the established

and proposed policy measures are implemented the cumulative shortfall of 12 megatons of $CO_2$ equivalents over the period 2021-2030 presents an additional policy challenge. The spectrum of uncertainty around the estimated non-ETS emissions in this period is significantly greater than this shortfall.

**Emissions from international air and maritime transport are substantial and increasing**

If established and proposed policy measures are implemented, $CO_2$ emissions produced by the Dutch sale of bunker fuels to the international shipping and aviation industries are projected to increase from 52 megatons of $CO_2$ equivalents in 2015 to 58 megatons of $CO_2$ equivalents in 2030. Bunker fuels therefore constitute a substantial source of emissions. Politically speaking, these emissions are not attributed to any one country. Maritime bunkers are the highest by volume and represent nearly 80 per cent of these bunker emissions.

**The Netherlands will be a net importer of gas by around 2025**

Due to the earthquake issue, gas extraction at the Groningen gas field has been reduced by almost half between 2013 and 2017. The further reduction in extraction that has been announced means that by about 2025 the Netherlands will no longer be a net exporter of gas. Without a reduction in gas consumption, this change will occur much sooner. Since in addition to the reduced extraction the price of natural gas on the market has also declined considerably, and compensation for earthquake damage will be deducted from profit sharing, in three years' time natural gas revenues for the Dutch Treasury have dropped from a record high of 15 billion euros in 2013 to 2.8 billion euros in 2016.

**The contribution of energy to the Dutch economy has fallen sharply**

With reduced gas extraction and stagnation in the conventional energy sector, the contribution of this sector to the gross domestic product dropped to 2.4 per cent in 2016. In the period 2008-2014 it was around 4 per cent on average. The contribution is expected to fall further to 1.4 per cent by 2020. The contribution of activities around renewable energy and energy savings rose over the same period from 0.6 per cent in 2008 to 0.8 per cent in 2016. Investment in renewable energy will increase significantly in the coming years, but it is unclear whether between 2010 and 2020 that will lead to the four-fold increase in the added value of Dutch businesses agreed upon in the Energy Agreement. There is no clear picture of the growth potential, profitability and international competitive position to support such an increase.

**By 2020, sustainable energy will be providing more jobs than conventional energy**

Employment in conventional energy has decreased in recent years from around 83 thousand working years in 2014 to approximately 73 thousand working years in 2016. The expectation is that by 2020 this number will have fallen still further to around 62 thousand working years. Meanwhile, employment in activities related to sustainable energy has risen, from around 46 thousand working years in 2014 to 52 thousand working years in 2016 and an estimated 64 thousand

working years by 2020. This primarily relates to activities arising from investment in renewable energy and energy savings. The expected growth in employment in sustainable energy-related activities will therefore eventually make up for the decline in conventional energy activities.

**Revision of Energy Agreement employment estimates results in lower expected effect**

New insights into the knock-on effect of spending in the Dutch economy have resulted in a significant adjustment to the employment estimates in the Energy Agreement. It is expected that the measures in the Energy Agreement will result in around 76 thousand net additional working years. In the NEO 2016 that number was 91 thousand. The Energy Agreement includes a target that the actions should lead to 15 thousand net additional working years in the Netherlands each year, or 90 thousand net additional working years in the period 2014-2020.

The main contribution to the revision was an adjustment to assumptions about the outflow of indirect spending to other countries and to operating surpluses. These assumptions were adjusted following recent research. Investment was also 7 per cent lower than in the NEO 2016. However the work intensity of this spending was higher, which means the downwards adjustment was relatively small. Changes in labour costs per full-time equivalent position and displacement effects of spending elsewhere in the economy have both resulted in a small adjustment to the net employment estimate. It should also be noted that there is considerable uncertainty around the expected value of 76 thousand net additional working years, with a margin of error of 40 per cent on either side.

Employment arising from Energy Agreement actions primarily relates to short-term investment. Although the picture has changed significantly since the NEO 2016, this will not lead to big changes in the overall investment effect. In particular, the adjusted expectation with regard to the growth in onshore wind energy and the savings effects in the services sector will lead to downwards effects, but these will be offset by effects from the implementation of heat pumps and additional energy savings by households and industry.

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