PBL Netherlands Environmental Assessment Agency

EU TARGETS FOR AIR QUALITY, CLIMATE AND ENERGY, FOR 2030

Consequences for the economy and emissions

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EU targets for air quality, climate and energy, for 2030; consequences for the economy and emissions

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Summary to the Dutch report: 'Europese doelen voor lucht, klimaat en energie in 2030: gevolgen voor economie en emissies'

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Summary and Main Findings

Introduction

In 2016, agreements were made within the European Union about further reducing the emission of air pollutants. These agreements were formalised in reduction targets for each Member State, for 2030, compared to 2005 levels (*revised NEC Directive*). In addition, new, more stringent policy on climate and energy is currently being drafted for the 2021–2030 period. The European Commission submitted several proposals in 2015 and 2016 to revise EU climate and energy policies; these are currently being negotiated. Under the proposals, the EU's 40% greenhouse gas reduction target for 2030 is translated into the following reduction targets (compared to 2005 emission levels): 43% reduction for sectors under the EU Emissions Trading System (EU ETS) and 30% for the remaining (non-ETS) sectors (see Figure 3). Additional targets are proposed for renewable energy (a 27% share by 2030) and energy saving (a saving of 30% from the estimated energy use in 2030, according to projections made in 2007).

During the policy discussion on revision of the NEC Directive, the Dutch Ministry of Infrastructure and the Environment requested PBL Netherlands Environmental Assessment Agency to investigate the possible economic consequences related to the agreed reduction targets for air pollutants for 2030. Stakeholders from industry called for the study to also include the proposals for more stringent climate and energy policy after 2020. This would provide insight into the cumulative effect of all policies, on the economy.

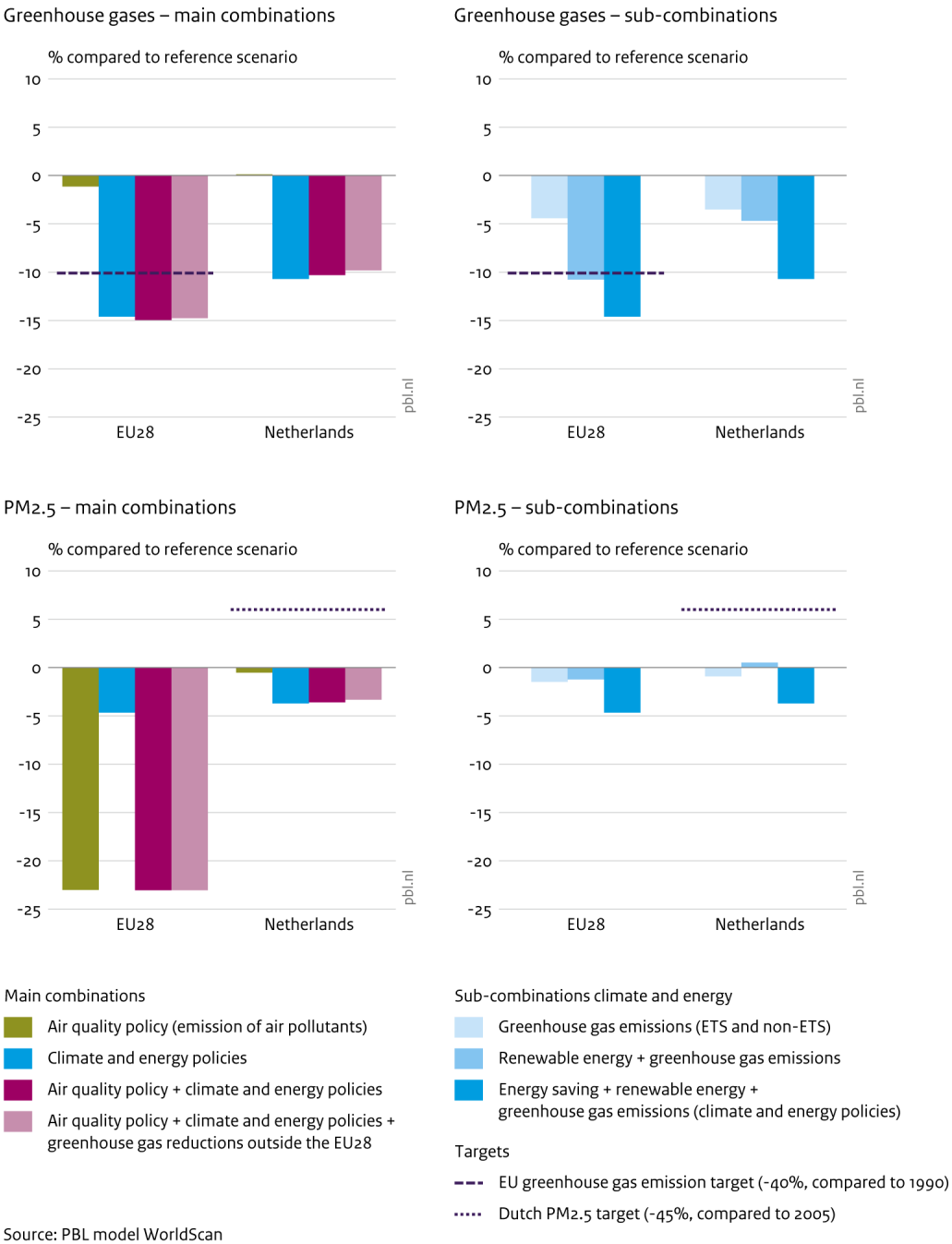
This study, thus, investigates the possible economic consequences by 2030, as well as the impact on emissions of the proposed EU policy on air quality, climate and energy. It analyses six combinations of targets for air quality, climate and energy. These variants each take one target or a certain combination of targets into account. In this way, it provides insight, not only into the total impact, but also into the differences in costs between the various policy targets. The effects on the economy and emissions were calculated for the European Union as a whole and for the Netherlands, using the WorldScan general equilibrium model, and comparing them against a reference scenario that only contained already implemented policy. WorldScan is a macroeconomic model that can be used for analysing the impact of policy on the global economy, per country and economic sector.

EU air, climate and energy policies 2030 lead to reductions in greenhouse gases and air pollutants …

Achieving the targets would require energy saving measures, a transition towards renewable energy and technical air quality measures, such as the use of catalytic converters and low-emission manure application techniques. All measures combined would bring EU greenhouse gas emissions down by 15%, by 2030, in comparison with those under the reference scenario — which would be 43% below 1990 levels. This would ensure the European Union is able to comply with its reduction pledge for 2030 under the Paris Agreement (-40%, compared to 1990 levels) (Figure 1). Already implemented policies under the reference scenario bring EU greenhouse gas emissions down by 33%, by 2030, compared to 1990 levels.

Figure 1

Emission effects of EU policy targets on air pollutants, climate and energy, for various combinations of targets, 2030

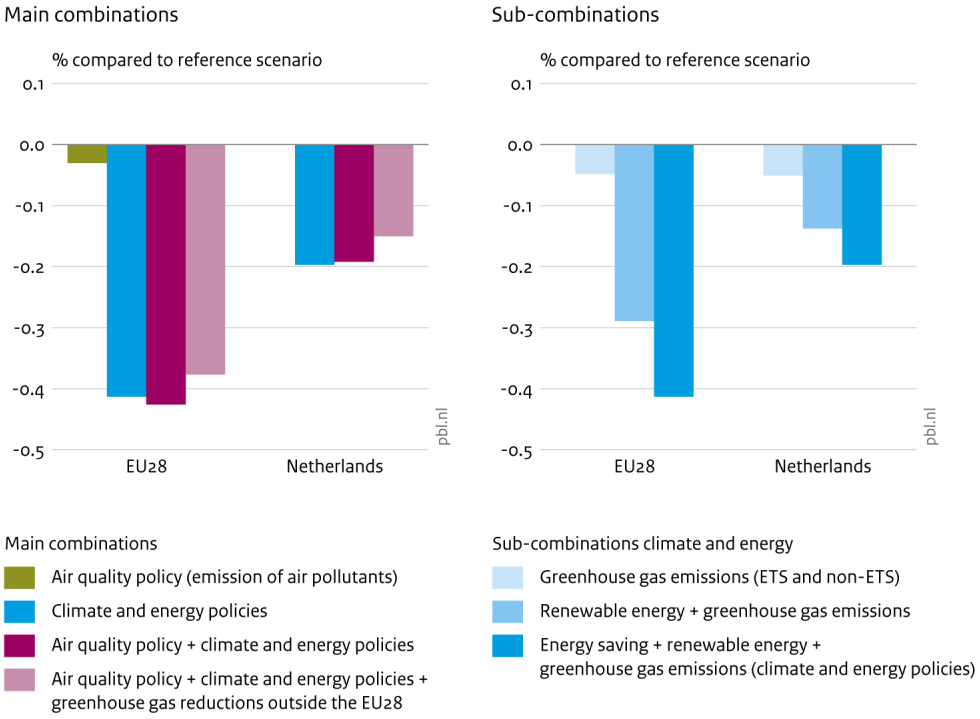


Source: PBL model WorldScan

Compared to the reference scenario, the emission of air pollutants, by 2030, will have decreased within the European Union by 24% for particulate matter ($PM_{2.5}$), 24% for sulfur dioxide (SO_2), 13% for nitrogen oxides (NO_x), 11% for ammonia (NH_3) and 3% for non-methane volatile organic compounds (NMVOCs) (Figure 1). For the model calculations, we assumed that additional measures will be taken until the targets are achieved. Thus, with the proposed EU policies on air quality, climate and energy, reductions in air pollutants would at least be in line with the EU emission targets for 2030. For nitrogen oxides, in most countries, the proposed climate and energy policies would lead to a reduction that would exceed the level required to achieve the agreed reduction targets.

Figure 2

Income effects of EU policy targets for air pollutants, climate and energy, for various combinations of targets, 2030



Source: PBL model WorldScan

... but also involve costs; around 0.4% of EU household income in 2030

Implementation of the proposed EU policies on air quality, climate and energy would also involve costs. This study estimates EU household income losses of 0.4% by 2030, compared to the reference scenario (Figure 2). These losses are largely related to the climate and energy targets, as costs to achieve these more stringent targets are 10 times those of more stringent emission reduction targets for air pollutants. The latter could largely be achieved through relatively inexpensive technical measures. In the Netherlands, the costs related to proposed policies on air quality, climate and energy are below the EU average
The projected 0.2% loss of national income in the Netherlands by 2030 is less than the EU average of 0.4%. This is particularly due to the fact that the Dutch economy is relatively strongly export-oriented. This means that for the Netherlands, in contrast to most other EU Member States, the additional costs can be transposed to other countries. By 2030, greenhouse gas emissions in the Netherlands will have decreased by 10%, compared to the situation under the reference scenario.

The loss in national income that would result from more stringent policy targets for air pollutants only would be close to zero, in the Netherlands. The reason is that the Netherlands, compared to other countries, would hardly need to make an additional effort to ensure its reduction targets for 2030 are being achieved. This, in turn, would lead to a competitive advantage for Dutch companies, and particularly would benefit the agricultural sector.

Greenhouse gas reductions and costs related to proposed EU policies on climate and energy are mainly due to targets for renewable energy and energy saving

The greenhouse gas emission reductions that would be achieved by 2030 through EU climate and energy policies would mainly result from the targets proposed for renewable energy and energy saving, and much less from those for greenhouse gases (Figure 1). The proposed targets for greenhouse gas reduction in ETS and non-ETS sectors, by themselves, will reduce EU greenhouse gas emissions by 4%, by 2030, compared to the reference scenario level. This reduction would be achieved, primarily, by shifting from coal to natural gas in the power sector, non-CO_2 emission reductions and energy saving. Adding a target for renewable energy will lead to a shift in power generation, from the use of fossil fuels to that of wind, solar and biomass.
The inclusion of a target for energy saving will lead to further energy saving. Both these energy targets would cause greenhouse gas reductions to increase to 15% (Figure 1). Energy targets, thus, will further the energy transition by more than could be achieved through greenhouse gas reduction targets alone.

Looking at the costs, the picture is similar to that of emission reductions, as they are also mainly related to the targets for renewable energy and energy saving, and much less to those for greenhouse gas reduction (Figure 2). Making only the EU targets for greenhouse gas reduction more stringent would lead to a 0.05% loss of household income within the European Union. Also including a more stringent EU target for renewable energy would increase this loss to 0.3%. If, in addition to these targets, also the EU objective for total final energy use would be included, income losses would increase further, to 0.4%. The model analysis shows that costs are increased substantially by the proposed targets for renewable energy and energy saving, but that this cost increase will coincide with substantial extra emission reductions by 2030.

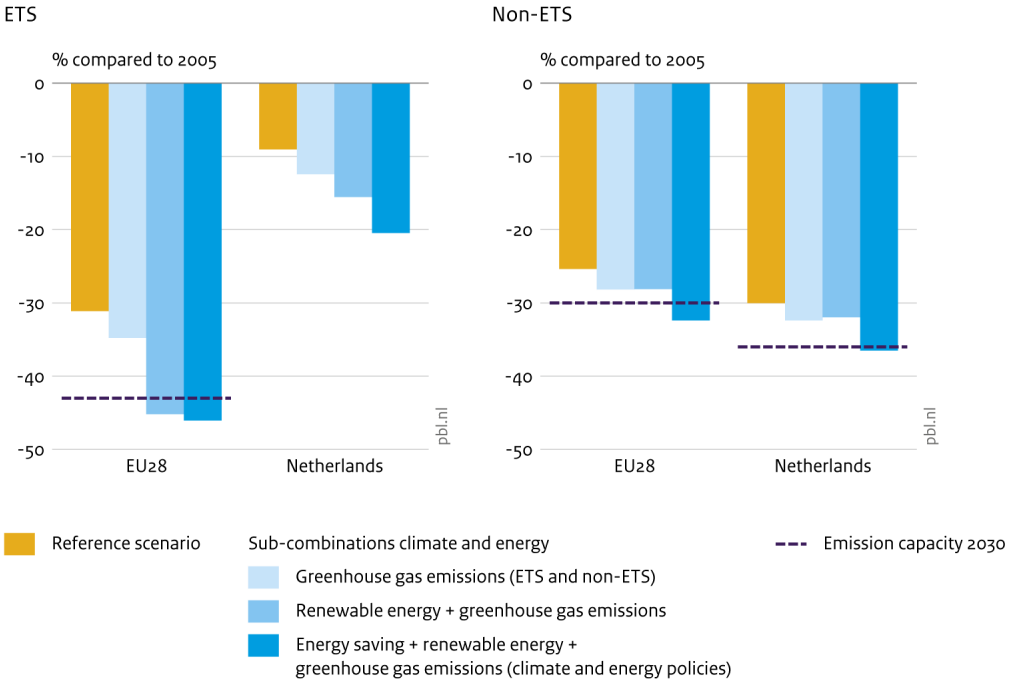
Without policy targets for renewable energy and energy saving for 2030, EU greenhouse gas reduction will be below the proposed ETS and non-ETS reduction targets for 2030

Model calculations show that the proposed greenhouse gas reduction targets for ETS and non-ETS sectors, by themselves, would result in a 36% reduction in greenhouse gas emissions by 2030, compared to 1990 levels. This appears to be below the agreed European 40% reduction target (Figure 1). However, because the proposals for ETS and non-ETS sectors do not limit the emissions to the 2030 target year, but do so for the emission capacity within the entire budget period, the emission amounts can be distributed over time. Due to the economic crisis, in the 2008–2013 period, emissions under the EU ETS were below the annual targets, resulting in a large oversupply of emission permits. These unused permits can be utilised in later years. For non-ETS sectors, emissions at the start of the budget period are also projected to be below the annual targets, and this emission capacity may also be used in later years. Therefore, for both ETS and non-ETS sectors, emissions in 2030 may be reduced by less than the reduction target for that particular year, resulting in a calculated overall reduction of 36%. If the targets for renewable energy and energy saving also would be implemented, the reduction level would increase to 43%, compared to 1990 levels.

The explanation above shows that, without the targets for renewable energy and energy saving, reductions in the year 2030, in both ETS and non-ETS sectors, will be lower than projected on the basis of the targets proposed by the European Commission for that specific year. Emission reductions within the ETS-sectors will reduce greenhouse gas emissions in Europe by 35% by 2030, compared to 2005 levels (Figure 3). In the non-ETS sectors, a 28% reduction will be achieved.

Figure 3

Change in greenhouse gas emissions under EU policy targets for climate and energy, 2005 – 2030



Source: PBL model WorldScan

The renewable energy target, in addition to those for greenhouse gases, would increase emission reductions among EU ETS sectors to a reduction level of 45%, by 2030, compared to 2005 levels. This would result in emissions from the ETS sectors by 2030 being below the target for that year (Figure 3). The demand for ETS emission credits would decrease, which would cause a lower carbon price in Europe.

The result of the energy saving target would be that, both in the European Union and in the Netherlands, greenhouse gas emissions from non-ETS sectors over the 2021–2030 period clearly stay well within the emission capacity level proposed by the European Commission for these sectors. The energy saving target would cause the emission reductions in non-ETS sectors to increase to 32%, by 2030, compared to 2005 levels (Figure 3). In the Netherlands, reductions achieved as a result of the energy saving target would increase to 37%, by 2030, compared to 2005 levels, under a proposed reduction target of 36% for non-ETS sectors.

Climate and energy policies contribute to the achievement of targets for air pollutants, halving related policy costs for the European Union

Because of changes in energy use, climate and energy policies would contribute to the achievement of targets for air pollutants. Achieving those targets requires fewer technical air pollution abatement measures. For example, the reduction target for nitrogen oxides would be achieved in nearly all EU Member States by only the proposed climate and energy policies. In these countries, no further technical abatement measures would be required for nitrogen oxides.

For sulfur dioxide and volatile organic compounds, the proposed climate and energy policy would close the gap between the emission level under the reference scenario and the national emission ceilings, on average, by 60%, whereas for particulate matter and

ammonia, this would be about 20%. The remaining gap would be closed through relatively inexpensive technical measures.
If the policy targets for air pollutants, climate and energy would be implemented simultaneously, climate and energy policies would not lead to additional reductions for these pollutants. Because fewer technical air pollution abatement measures would be required to bring the targets within reach, the costs for air quality policy in the European Union would be halved.

In the Netherlands, emission reduction targets for air pollutants will be achieved under current policy, while climate and energy policies will lead to further improvements in air quality

In the Netherlands, targets for sulfur dioxide, particulate matter, ammonia and VOC emission levels for 2030 will already be achieved through current national air quality policy that is taken into account in the reference scenario. The proposed climate and energy targets would cause the emission of these substances in the Netherlands to decrease further, resulting in emission levels below the EU reduction targets for air pollutants. Seeing that health damage from air pollution already occurs at emission levels under the agreed national emission ceilings, a further reduction in air polluting emissions due to climate and energy policies, thus, would contribute to a further decrease in health damage among the Dutch population.

The health benefits from climate and energy policies may be increased further, when the benefits of cleaner air are also taken into account. It is important to realise that not all climate and energy measures help to reduce the emission of air pollutants. For example, replacing natural gas with biomass in smaller combustion plants and within the built environment would increase air pollution rather than decrease it.

Lower production levels in polluting sectors, due to air quality, climate and energy policies

The consequences of the proposed air quality, climate and energy policies would vary strongly, for various sectors within the European Union. Companies are likely to pass the costs of policy on to their customers. This would cause price increases, particularly, for the products from energy-intensive sectors that produce large amounts of emissions. The demand for those types of products, therefore, would decline, causing less-polluting products to become more attractive. Import numbers would also grow for products from countries outside the European Union, where companies have fewer or even no costs related to environmental policy.

In the European Union, production would decrease by 5% in the power sector and the transport sector, and by 3% in the agricultural sector and the energy-intensive industry. In contrast, the services sector is expected to increase production, as it operates relatively cleanly, and its prices would increase by less due to the proposed policies, compared to the prices of many other types of products.

Employment will move from polluting to less-polluting production

Changes in production would also change employment in the sectors. The proposed policies would cause jobs to shift from industry, the transport sector and agriculture towards the services sector and the power sector. Model calculations show that the proposed climate and energy targets, by themselves, would not lead to a large-scale electrification of the European transport sector, industry and the built environment up to 2030. Although the share of electricity in total energy consumption would increase due to the proposed policies, the target for energy saving would lead to an overall decrease in the demand for electricity. Nevertheless, the number of jobs in the power sector in the European Union would increase,

because renewable energy generation is more labour intensive than power generated by coal- and natural-gas-fired power plants.

This shift in employment is projected to amount to 0.1% to 0.2% of total employment, representing a few hundred thousand jobs, on a total of 215 million full-time jobs in the European Union. In the Netherlands, ten thousand jobs would be affected, on a total of eight million full-time jobs. These changes would involve certain adjustment costs. In the short term, it would mean that people lose their jobs and need to look for alternative employment. Employees would also need to be retrained, in order to find work elsewhere in the economy.

If non-EU countries honour their reduction pledges in the Paris Agreement for 2030, costs for the European Union will go down

The competitive disadvantage of EU companies will decrease, if countries elsewhere in the world implement their Paris Agreement greenhouse gas reduction pledges for 2030. In the EU, this would cause household income losses related to air quality, climate and energy policies to be around 10% lower than if those countries would not implement their pledges (Figure 2). As the Dutch economy is relatively strongly oriented on exports, the Netherlands benefits from international agreements on climate policy to a larger degree than the other Member States (Figure 2).

Comments related to this model analysis

A few comments need to be made in relation to the model analysis. The first being that WorldScan is a macroeconomic model that lacks sufficient detail to be able to analyse the implementation of specific technical measures, nor could it identify specific sectoral activities from which the sectors involved could profit, under the new policies. The model calculations also do not take into account the dynamics of technological developments, such as learning effects that, over time, would reduce the costs of certain measures. For more detailed technical analyses, PBL and ECN generally use sectoral energy models and lists of detailed technological measures.

The second comment concerns the fact that this PBL study only presents the costs related to the policy targets for the year 2030 as presented by the European Commission. It analyses the interaction between those targets up to 2030, rather than how they contribute to the long-term energy transition towards a greenhouse gas emission reduction of 80% to 95%, by 2050.

The final comment is that the economic effects and emission reductions calculated by the WorldScan model are surrounded by a considerable amount of uncertainty, related to the model parameters and macroeconomic developments in the reference scenario. The model results, therefore, must be viewed as an indication of the order of magnitude of the impact on the economy and the emissions.

The WorldScan model is very suitable for making analyses in which economic interactions play an important role, such as in this study. The model presents an integrally consistent picture of the expected economic consequences of policy measures, because it takes into account the various changes in supply and demand, prices, wages and financial costs. It also includes the policy impact on international trade. This makes WorldScan very suitable for the purpose of this study, which was to analyse the impact of the policy targets for air pollutants, climate and energy, as proposed by the EU, on sectors and countries, in order to show not only the interaction between the various policy targets, but also the effects on greenhouse gas and air polluting emissions.