ECOFYS

sustainable energy for everyone

Higher EU energy efficiency and renewable energy targets enable greenhouse gas emissions reductions of more than 50% in 2030

An assessment of greenhouse gas emissions in 2030 associated with a 30% renewable energy target and 30-40% energy efficiency targets

By Wouter Terlouw, Pieter van Breevoort and Kornelis Blok

April 2016

The EU has put forward a greenhouse gas (GHG) emissions reduction target of 'at least' 40% by 2030, compared to 1990 emissions levels. Current plans[1] are to achieve this by reducing energy demand by at least 27%[2] and achieving a renewable energy share of at least 27% in gross final energy consumption.[3] However, the agreement reached at the COP21 in Paris stressed the importance of achieving deeper emissions cuts in order to keep global temperature increases below 1.5 °C, whereas the EU's 40% target is in line with 2 – 2.4 °C.[4] The European Commission is currently preparing proposals for the revision of greenhouse gas, energy efficiency and renewables legislation. Ecofys – commissioned by Friends of the Earth Europe – has calculated the impacts of higher energy efficiency and renewable energy targets. We show it is feasible to achieve emissions cuts of more than 50%, especially by aiming for higher energy efficiency targets.

Higher energy efficiency targets will enable emissions reductions of up to 50%

As part of its preparation for the review of the energy efficiency and renewable energy directives, the European Commission is investigating the impact of higher efficiency and renewables targets for 2030. The Commission is modelling scenarios in the 30 – 40% range for energy efficiency and 30-33% for renewables. Our analysis shows that by implementing a strong energy efficiency target, GHG emissions reductions of up to 50% are feasible.

We analysed the impact of energy efficiency and renewable energy by using the 2030 Target Tool developed by Ecofys. This tool is designed to assess consistent energy efficiency, renewable energy and GHG emissions reduction targets.[5] The outcome of this analysis can be used to inform stakeholders on possibilities to increase the EU's GHG emissions reduction target in line with what was agreed at the COP21.

In this paper we use a 30% renewable energy target and three energy efficiency targets (30%, 35% and 40%) as input and calculate the associated emissions reductions.[6] By doing so we provide estimates of how much the EU can translate the European

---

[1] As agreed by the European Council in October 2014. By contrast the European Parliament is calling for an energy efficiency target of 40% and a renewable energy target of 30%.

[2] The energy efficiency target is defined relative to the baseline from European Commission (2007). European Commission (2007). European Energy and Transport. Trends to 2030 – update 2007.

[3] European Commission (2014). 2030 Climate and Energy Package. Available at: http://ec.europa.eu/clima/policies/strategies/2030/index_en.htm

[4] The GHG reduction target of 40% in 2030 originates from the Commission's 2050 low carbon roadmap that aims at 80% GHG reduction in 2050. In the IPCC Fourth Assessment Report: Climate Change (2007) it was showed that in order to achieve the 450 ppm scenario, to keep temperature rise between 2 – 2.4 °C, industrialized countries will need to reduce emissions by 80 – 95%.

[5] Ecofys (2014). The EU Parliament's resolution on 2030 climate and energy targets could exceed the 40% emissions reduction target by 5-14%pts: An assessment of the greenhouse gas emissions in 2030 associated with the 30/40 Resolution of the European Parliament. Available at: http://www.ecofys.com/files/files/ecofys-2014-ghg-emissions-2030-in-view-of-ep-30-40-target.pdf.

[6] In its impacts assessments, the European Commission starts its modelling with certain constraints (e.g. overall emissions reductions) and the associated renewable energy and energy efficiency levels are the outcomes of runs of the PRIMES model.

Council's 'at least' 40% by 2030 greenhouse gas emissions target into higher domestic emissions cuts. This differs from the Commission's work in 2013 and 2014 on the 2030 targets. At the time the Commission sought to ensure that the energy efficiency and renewables targets matched 40% emissions cuts and did not lead to higher emissions reductions.[7] Figure 1 below shows both the absolute and relative impact on GHG emissions of a 30% renewable energy target and three energy efficiency scenarios (30%, 35% and 40%).

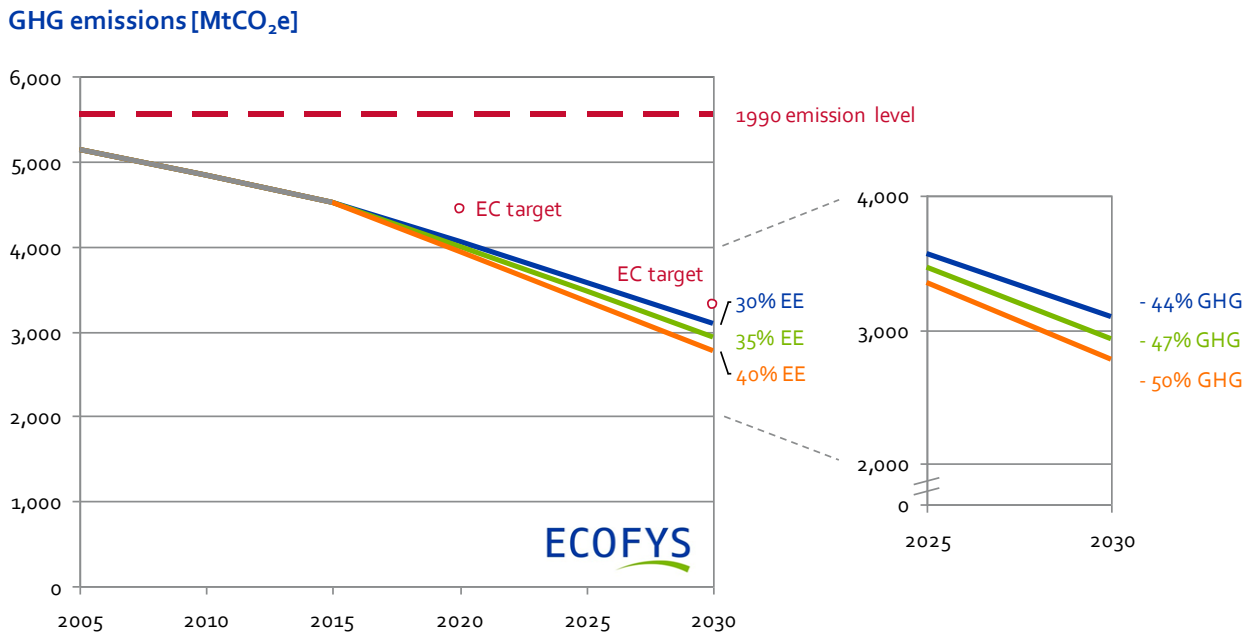

Figure 1. Emissions reduction pathways with a 30% renewable energy target and 30%, 35% and 40% energy efficiency targets.

The renewable energy target is defined as the percentage of the gross final consumption. The energy efficiency targets are defined with respect to the PRIMES 2007 baseline.[8] The higher targets for energy efficiency are feasible: a study on the energy savings potential by Fraunhofer ISI, estimated a total potential of over 40%, relative to the final energy consumption in the 2009 PRIMES baseline, which already outlines lower energy consumption levels than the 2007 baseline.[9]

[7] The Commission argued that higher renewables and efficiency scenarios would lead to excessive emissions cuts: "Several scenarios including RES shares above 35% were also analysed but not in full as such scenarios would result in GHG reductions of more than 45% in a 2030 perspective, or would need (…) increased coal use, etc. to stay consistent with the GHG reduction range." European Commission (2014). Impact Assessment: A policy framework for climate and energy in the period from 2020 up to 2030, p. 47. Available at: http://ec.europa.eu/smart-regulation/impact/ia_carried_out/docs/ia_2014/swd_2014_0015_en.pdf.

[8] The energy savings targets of the EU have historically been defined relative to the primary energy consumption in a baseline scenario (2007) and a new reference scenarios have been published in 2009 and 2013. In the paper discussion the EU Parliament's resolution, the energy savings target was assumed to be relative to the 2009 or 2013 reference scenarios, while the targets discussed here are set relative to the 2007 baseline. This partly explains the difference in results. European Commission (2010). EU energy trends to 2030 — UPDATE 2009. Available online. European Commission (2013). EU Energy, Transport and GHG Emissions. Trends to 2050. Reference Scenario 2013.

[9] Fraunhofer ISI (2012). Concrete Paths of the European Union to the 2°C Scenario: Achieving the Climate Protection Targets of the EU by 2050 through Structural Change, Energy Savings and Energy Efficiency Technologies. Accompanying scientific report.

Developments of the non-energy emissions[10] are based on the Commission's impact assessment on the policy framework for climate and energy in the period from 2020 up to 2030 and amount up to -64% compared to 1990 values.[11] We assume that electricity and heat savings and renewable energy deployment are at the expense of coal consumption[12] and a low level of electrification of transport (3%), which is in line with the PRIMES scenario.[13]

Figure 1 shows that if a renewable energy target of 30% and an energy efficiency target of 30% are implemented, the emissions cuts increases to around 44% by 2030. Aiming for higher energy efficiency targets will make it feasible to achieve emission cuts of at least 50%.

A renewable energy target of 33% and an energy efficiency target of 40% can lead to 51% emissions reductions. Increasing electrification in transport and heating can increase the GHG reductions even further. Further phase out of coal will also enable stronger emission reductions.

[10] Emissions from e.g. agricultural activity and waste.
[11] The non-energy emissions amount to 539-604 MtCO2e in 2030, compared to approximately 1500 MtCO2e in 1990. The non-energy emissions reduction is based on the GHG40, GHG40EE, GHG40EERES30 and the GHG45EERES35 scenarios in EC (2014). Impact Assessment: A policy framework for climate and energy in the period from 2020 up to 2030. Non-energy related emissions were already reduced with 27% in 2010, compared to 1990. In the Ecofys (2014) publication on the EU Parliament's 2030 resolution, different non-energy emissions were assumed (30-50%). If the reduction of non-energy emissions amounts to only 59% instead of 64%, the GHG emission cuts fall by 1% point.
[12] In the model, we include a fuel shift from coal to natural gas of 50% in the power and central heat production and industry, which means that we assume that all electricity and heat savings and renewable energy deployment are at the expense of coal consumption, while natural gas consumption in 2030 remains at levels similar to consumption in the 2013 baseline. Primary energy consumption of coal will reduce with 57 – 63% in the scenarios studied.
[13] Electrification of transport is calculated based on the increase in electricity share in transport in the PRIMES scenario.

For further information, please contact:
Wouter Terlouw (w.terlouw@ecofys.com)