

Assessing the Greens/EFA 2030 Climate and Energy targets

An assessment paper



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Assessment report - Confidential

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1 Summary

Based on its Vision Scenario for 2030 and beyond (published in 2011), the Greens/EFA group in the European Parliament has revised its 2030 Climate and Energy targets. Greens/EFA aim at 40% primary energy savings (compared to 2010), a 45% share of final energy demand and 60% greenhouse gas (GHG) emissions reductions (compared to 1990) by 2030. The new targets have been based on new insights and were intended to bring about further discussion about the 2030 targets in the European Council, the European Commission and the European Parliament.

The Greens/EFA group has commissioned Ecofys to investigate these targets and check their feasibility, their consistency with each other and their consistency with the EU 2050 targets. This paper presents the outcome of this investigation.

Ecofys concludes that the Greens/EFA targets are within the ranges of the different sets of scenarios on 2030 climate and energy efforts, and close to the most ambitious ones, especially with regard to energy efficiency. The targets are also within the range of potentials, both for energy efficiency and renewable energy. The targets therefore are ambitious but feasible.

The targets are basically consistent with each other. In other words, the targets for energy savings and renewable energy shares add up to a total of 60% greenhouse gas emissions reductions. Also, the 2030 targets of the Greens/EFA group prepare for achieving the 2050 targets as formulated by the EU, namely an 80 to 95% reduction of GHG emissions. No abrupt acceleration in efficiency improvement or in the growth of renewables will be necessary.

2 Background

2.1 Context

On 22 January 2014, the European Commission presented its 2030 policy framework for climate and energy. The framework includes the following key proposals:

- Reducing greenhouse gas emissions by 40% below 1990 levels by 2030. To achieve the overall 40% target, the sectors covered by the EU emissions trading system (EU ETS) would have to reduce their emissions by 43% compared to 2005. Emissions from sectors outside the EU ETS would need to be cut by 30% below the 2005 level. This effort would be shared equitably between the Member States.
- Increasing the share of renewable energy to at least 27% of the EU's energy consumption by 2030. In contrast to the 2020 target for renewable energy, this target is only binding at the EU-level and will not be translated into national (binding) targets. The Commission also expresses the need for a new governance system based on national plans for competitive, secure and sustainable energy.
- The role of energy efficiency in the 2030 framework will be further considered in a review of the Energy Efficiency Directive due to be concluded later in 2014.

Apart from these three key elements, the framework includes a proposal for a reform of the EU ETS by establishing a market stability reserve to tackle structural imbalances between demand and supply.

As next steps, the Commission invites the Council and the European Parliament to endorse its approach and the EU-level greenhouse gas and renewables targets. The European Council is expected to consider the framework at its Spring Meeting on 20-21 March 2014.

2.2 Objective

The Greens/EFA group in the European Parliament has put forward alternative targets (40% energy efficiency, 45% renewable energy, 60% greenhouse gas emissions reduction compared to 1990; further referred to as the Greens/EFA targets) which are more progressive than those proposed by the Commission.

The Greens/EFA group has asked Ecofys to provide input for the Spring Meeting. More specifically, this project should meet the objective of assessing the achievability and consistency of the targets that are aspired by the Greens/EFA group.

3 Consistency and achievability of the Greens/EFA 2030 Climate and Energy targets

In 2011 the Vision Scenario was developed and modelled for the Greens/EFA¹, summarized by the following targets:

- 38% reduction in primary energy demand compared to 2005 levels;
- 37% renewables in primary energy supply (or 34% renewables in final energy demand);
- 57% greenhouse gas (GHG) emissions reduction compared to 1990 levels.

For the purpose of the 2030 targets debate that is now ongoing in the EU, the Greens/EFA revised its targets and adjusted them into² :

- 40% primary energy savings compared to 2010;
- 45% of the final energy demand in 2030 will be produced from renewable sources;
- 60% domestic GHG emissions reductions compared to 1990 levels.

Ecofys checked the consistency of the targets with each other by applying the Ecofys 2030 Target Tool. This tool is designed to develop targets for energy savings, renewable energy and GHG emissions that are consistent. This consistency is not straightforward, as is proven by the internal inconsistency of the 20-20-20 energy and climate targets for 2020 that are now applicable on EU policies. As Ecofys previously calculated, adding up the 2020 targets for renewables (20% share) and efficiency (20% less than 1990) would add up to almost 30% greenhouse gas emissions reductions by 2020, instead of 20%³.

Also, the consistency of targets depends on how these targets are drafted in more detail, because there are many issues involved. For instance: in addition to energy efficiency and renewable energy, also other factors may vary while affecting the emissions, such as non-energy emissions, fuel shift (e.g. replacing coal by natural gas) and assumptions about carbon capture and storage (CCS). The sections below list the key implications of the targets and detail the conditions that apply to achieving consistency of the targets.

3.1 Energy efficiency and renewable energy targets for 2030

Figure 1 depicts the indicative evolution of the primary energy consumption, final energy consumption and gross renewable energy consumption. Next to these, the 2013 baseline

¹ Oko-Institut/The Greens-EFA (2011) The Vision Scenario for the European Union 2011 Update for the EU-27

² There were some slight inconsistencies in the energy framework we received from Greens/EFA: The ratio between primary and final renewable energy consumption is the same as between primary and final energy consumption. This is not correct, because renewable energy production will have a higher efficiency (in case of a low share in biomass in electricity).

³ "Consistency of policy instruments - How the EU could move to a -30% greenhouse gas reduction target", <http://www.ecofys.com/files/files/ecofysreportconsistencypolicyinstruments20110413.pdf>

development of the primary energy consumption, as well as the 2020 targets and the 2030 targets as proposed by the European Commission are included. The EC's primary energy (savings) target is indicative, because the EC energy and climate framework does not contain an official target on savings.

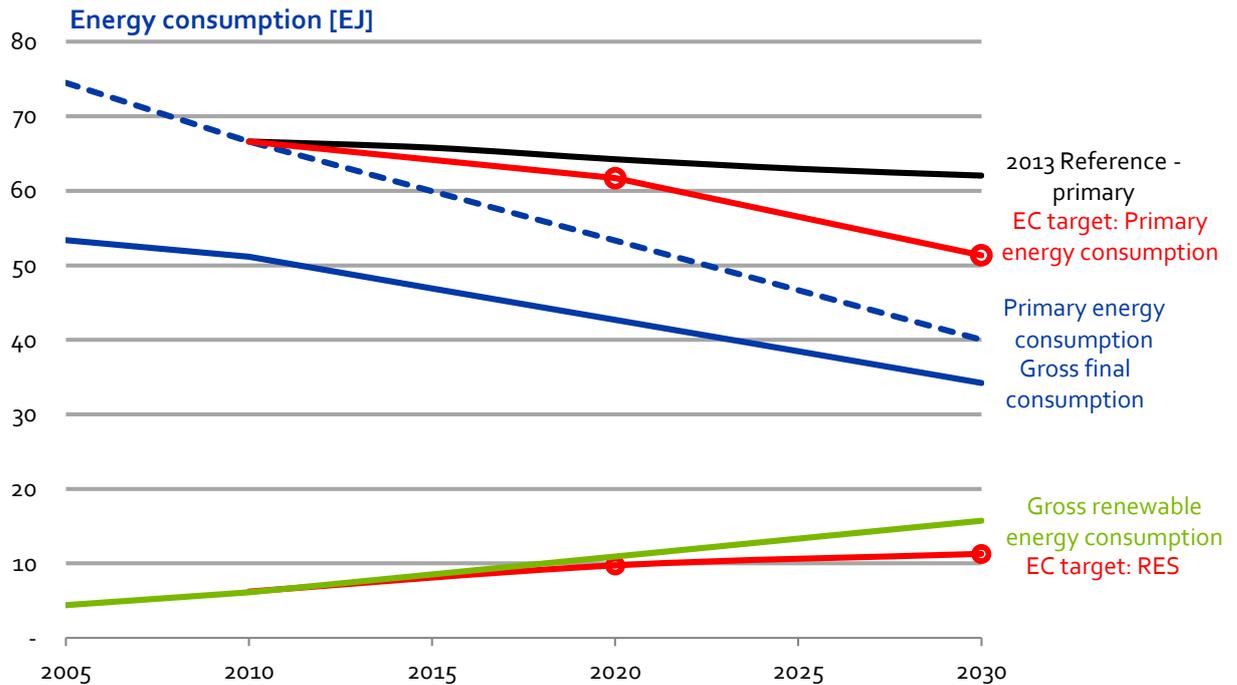


Figure 1 Indicative development of energy consumption until 2030. The red lines indicate the 2020, respectively 2030 targets in the EC framework. The blue line indicates the primary (dashed) and gross final energy consumption (solid) as aimed at by Greens/EFA.

Final energy consumption indicates the energy that is consumed by the end-user (for example by households). Gross final energy consumption includes heat and electricity that is used in electricity and heat production as well as distribution losses. Primary energy consumption includes the energy that is used in the conversion processes (for example from coal and gas to electricity). Non-energy consumption of fuels is not included in these numbers.

The graph shows:

- The Greens/EFA targets are a continuation of present growth in renewable energy. The EC targets suggest a discontinuity in the development of renewable energy.
- The difference in 2030 primary energy consumption between the EC framework and the Greens/EFA target is about 11 EJ (270 Mtoe), which is equal to the annual primary energy consumption of France. There is some uncertainty, as the EE target of the EC framework is not clearly set.⁴

⁴ The European Commission mentions 25% savings, but is not set and also not clear with respect to what baseline. We estimate that a 27% renewable energy target, combined with a 40% emissions reductions target would require 25% primary energy savings with respect to the 2009 reference (35% with respect to 2007 primary energy baseline). See

- We assumed a share of 14% biomass in renewable electricity production in 2030. This share is the same as indicated in the 2011 Vision scenario. If the contribution of biomass to renewable electricity were to increase, the final energy savings (now 30% with respect to 2010) also have to increase to reach the same levels. This is because the conversion efficiency of biomass is lower than wind and solar PV (which is at 100%), so more primary energy is needed to produce the same amount of electricity.

3.2 Emission targets 2030

Figure 2 shows an indicative emission pathway until 2030 along the Greens/EFA targets. Figure 3 shows how EC and Greens/EFA targets for 2030 relate to the overall EU target for 2050, namely 80 to 95% reductions in greenhouse gas emissions.

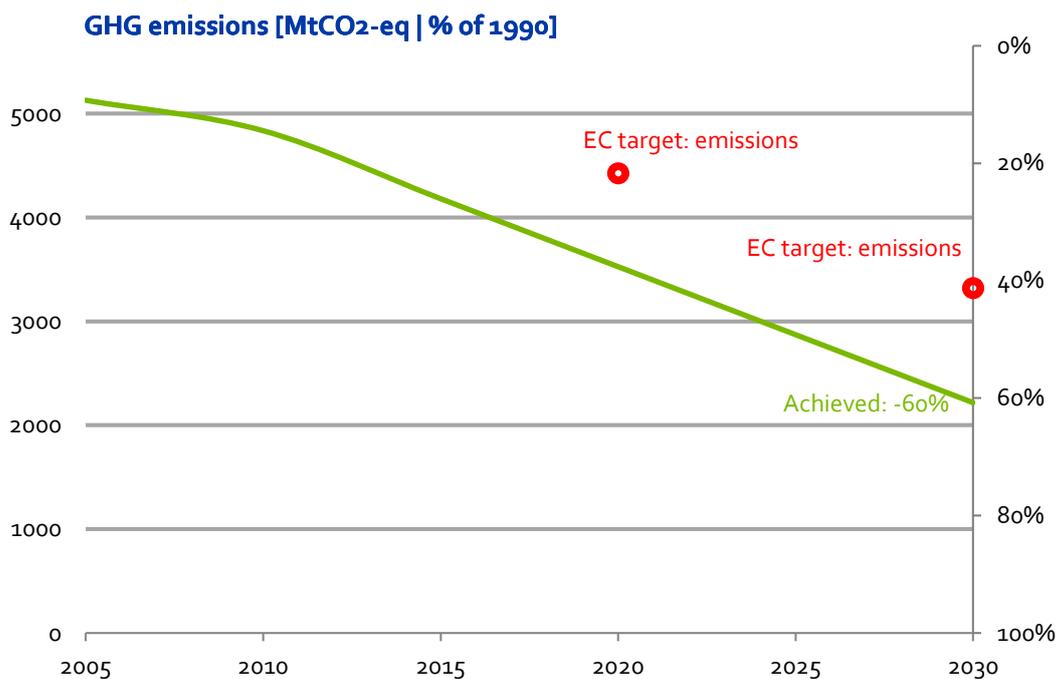


Figure 2. Indicative emission pathway if the Greens/EFA targets are realised.

European Commission (2010). EU energy trends to 2030 — UPDATE 2009. Available online: http://ec.europa.eu/clima/policies/package/docs/trends_to_2030_update_2009_en.pdf

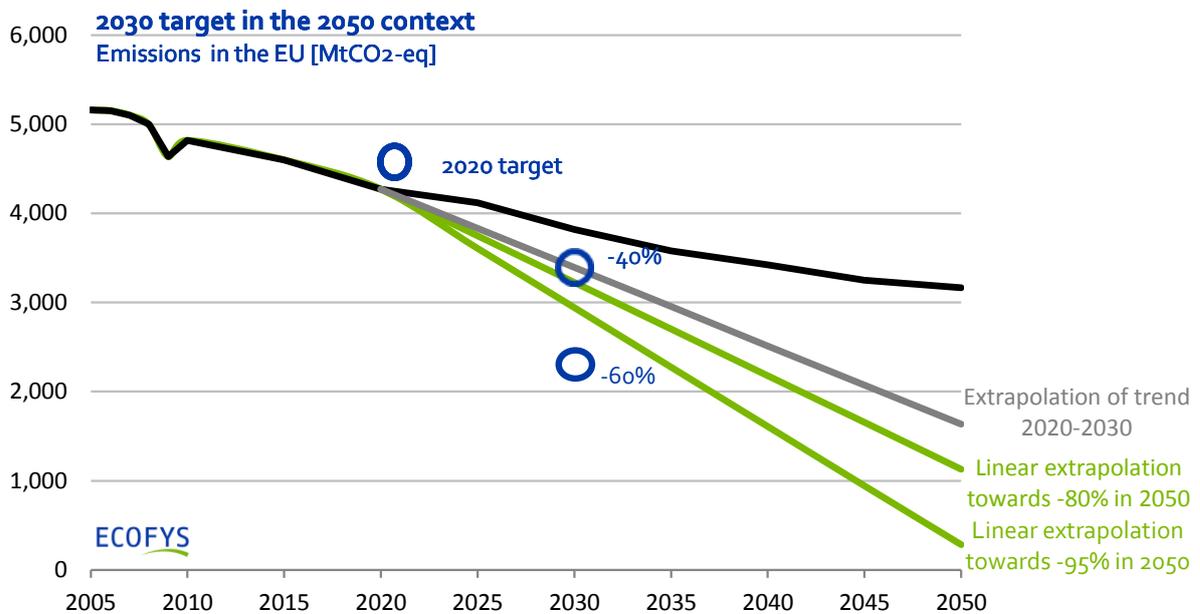


Figure 3 Emission pathways towards 2050, including the EU target for 2020 and the 40% (European Commission) and 60% targets (Greens/EFA) for 2030.

From these graphs and our calculations we conclude:

- 60% emissions reductions can be achieved with 40% energy efficiency improvements, respectively 45% renewable energy. We assumed 55% emissions reduction in non-energy emissions (relative to 1990). If higher reductions in this sector are achieved, the 60% target can even be exceeded.
- Fuel shift from coal to gas is needed. If no fuel shift takes place by 2030 (relative, because both coal and gas demand decrease), we calculate 58% emissions reductions. However, a difference of 2 percentage points is not really significant.
- If by 2030 an emissions reduction target of 60% is achieved, no further acceleration of emissions reductions after 2030 is required. Such an acceleration is required if by 2030 40% emissions reduction is realised.

3.3 The Greens/EFA targets in perspective

Figure 4 compares the Greens/EFA targets for energy efficiency (as a % of 2010 final energy consumption) and renewable energy (share in final energy consumption) with different important scenarios.

- Because of the high energy savings, the *absolute* amount of final renewable energy consumption in the Greens/EFA targets is not extremely high: about 350 Mtoe. For example, the IEA's World Energy Outlook (WEO) 2013 450ppm scenario has a total about 300 Mtoe of final renewable energy production, while the WEO 2013 New Policies Scenario has about 250 Mtoe in 2030. This underlines the positive impact of higher energy savings on the achievability of higher RES targets.
- In absolute numbers, the EREC scenario is much more positive on the growth of renewable energy, rather than on energy savings. The EREC numbers are based on feasibility estimations from the European renewable energy sector. This scenario envisages 570 Mtoe of final renewable energy by 2030, which is 50% higher than the absolute amount that the Greens/EFA framework would need.
- The changes in energy demand do not only reflect improvements in efficiency, but also changes in activity. Many scenarios (e.g. the Green-X SNP scenario) were developed with higher activity data (based on the 2007 baseline study) than presently assumed. This explains partly the limited changes in energy demand. This is also visible if we compare the PRIMES 2009 reference with the PRIMES 2013 reference: the decreased energy consumption is mainly caused by a decrease in projected activity, next to a slight improvement in energy efficiency (compared to 2009). In the SNP scenario, the absolute amount of final renewable energy consumption is comparable to that in the Greens/EFA framework. The RES share in the SNP scenario is lower, because here the final energy demand is assumed to be higher.
- If in the next years the GDP increase develops slower than assumed in the PRIMES 2013 baseline, energy consumption will be lower and the 40% energy savings target of the Greens/EFA will be easier to achieve. If the GDP increase is higher, energy consumption increases and the savings target will need more effort.

3.4 Growth of individual renewable options

How does the envisaged growth in renewable energy until 2030 relate to present growth rates? The table below shows the average annual growth of specific renewable energy options between 2000 and 2030. For the period 2020-2030 the growth rate in the Greens/EFA framework is shown. The table shows that especially geothermal energy deployment has to accelerate after 2020. For all technologies, expected growth rates are below the rates realised in the period 2000-2010, except for geothermal energy. This technology needs growth rates similar to solar PV in the last decade.

Table 1 Growth rates between 2020 (in the 2013 reference scenario) and 2030 for specific renewable energy technologies.⁶

Technology	2000-2010	2010-2020	Average growth rate 2020-2030
Hydro power	0%	0%	0%
Biomass	7%	2%	2%

⁶ Based on primary production from: European Commission (2013). EU Energy, Transport and GHG Emissions. Trends to 2050. Reference Scenario 2013. Available online: http://ec.europa.eu/energy/observatory/trends_2030/doc/trends_to_2050_update_2013.pdf



Wind	21%	13%	6%
Solar	24%	20%	6%
Geothermal	2%	5%	19%

3.5 Conclusions

- The Greens/EFA 2030 targets are consistent with each other. Next to 40% energy savings and a 45% renewable energy share, a fuel shift from coal to natural gas supports in achieving 60% emissions reductions by 2030.
- The Greens/EFA target for renewable energy is in line with historic developments in renewables.
- The 2030 Greens/EFA targets are consistent with the EU targets for 2050. If achieved, the 2030 Greens/EFA targets prevent the need for acceleration in emissions reductions after 2030.
- The Greens/EFA targets are feasible. A high amount of energy savings allows for achieving a high share in renewable energy with a fair amount of RES in absolute terms. The absolute amount of renewable energy production in the Greens/EFA scenario is in line with the Green-X SNP scenario, as well as the WWF 2030 scenario, and much lower than the industry's own scenarios from EREC. Moreover, according to potential studies, sufficient renewable energy is available. Geothermal energy requires growing fast in the period 2020-2030.

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