Stefan Scheuer
Environmental &
Energy Policies
EU Affairs

EU energy modelling and projections - Putting energy efficiency first?

An evaluation of the EU Reference Scenario 2016: Energy, transport and GHG emissions. Trends to 2050, from an energy efficiency perspective

Background

- Modelling the EU's energy system, its demand, supply and investments, plays an important role in informing policy makers, in particular to assess impacts of policies and their interactions and to set climate and energy targets.
- Since 2005 the European Commission has been using a specific set of models, including the central energy system model PRIMES, a partial equilibrium modelling system which simulates energy consumption and the energy supply. The model has long been criticized[1] for lacking transparency and being biased against energy efficiency, as it tends to underestimate energy efficiency improvements and overestimate its costs. As a consequence policy makers are pushed to set low targets for energy efficiency and to focus their efforts on supply side policies.
- Has the latest update of the model by the Commission in July 2016 (EU Reference Scenario)[2] been improved in view of the upcoming legislative work to put in place the 2030 energy efficiency target and policy framework? Does it respond to the critique?

Evaluation of methodology and assumptions

Discount rates are used in the EU Reference Scenario modelling for different purposes: to compare and report costs and benefits that arise at different times and to approximate decision making behaviour of private investors. The new modelling provides detailed information and justification on the use and choice of discount rates, in response to the critique concerning the lack of transparency and the risk of 'misuse' of private discount rates for assessing costs and benefits of public policies. This is a first step as limitations have become clearer, but no substantial changes to the model and the assumptions were made.

No impact assessment of public policy making is possible

The model applies a flat discount rate of 10% to assess the system costs (i.e. to compare and report costs and benefits of investments) across all scenarios, which is significantly above a social discount rate of around 4% typically applied by the European Commission and national governments for assessing public policies. Thus, the model

[1] The European Council for an Energy Efficient Economy (eceee) & Ecofys 2015: Evaluating Our Future. The crucial role of discount rates in European Commission energy system modelling.

Oskar Krabbe & Kornelis Blok 2015: Costs and Benefits of Energy Efficiency Targets. An Ecofys study commissioned by Friends of the Earth.

Ecofys & Coalition for Energy Savings 2016: Impact assessment of EU 2030 energy efficiency targets in the context of the Energy Union & Energy Efficiency First. Towards a cost benefit analysis.

[2] European Commission 2016: EU Reference Scenario 2016. Energy, transport and GHG emissions trends to 2050.

assesses costs of energy efficiency investments from a short term, private perspective, including opportunity costs (i.e. people might prefer to spend their money for a holiday than to renovate their house). Further to that the discount rate does not change even if energy efficiency policies, which reduce the private investment costs (i.e. lowering capital borrowing costs), are put in place. This means that scenarios with higher energy efficiency will automatically lead to increased energy system costs. As a result, the information value of such a modelling of system costs is questionable. The EU Reference Scenario states that comparability across scenarios is of key importance and requires a flat discount rate, but does not provide more explanation the comparison criteria. Clearly the criteria cannot be related to policy scenarios, because of applying a flat discount rate.

In conclusion, the EU Reference Scenario model does not allow for the assessment of public policies, it can only model the impact of different energy prices for private energy users.

Behavioural discount rates slightly reduced but not for building renovation

The discount rates to model private decision making were reduced for all sectors, also for demand side because of the impact of energy efficiency policies, except for building renovation[3]. For private cars the rate drops from 17.5 in the previous model to 11%; for investments in higher efficient appliances, from 12 to 9.5%. But the rate remains high at 12% for households investing in building renovations, the same level as used in the 2013 model update. No detailed explanation is provided on how the values were derived. The discount rate used for the energy supply sectors has been reduced to around 8% compared to 2013.

Investment lifetimes unclear, but expected to be underestimated

The assumptions about the lifetime of energy efficiency investments have large effects on the model outcome. With shorter expected lifetimes, fewer investments will take place, a similar effect to that of high discount rates. According to a recent study it is likely that the model has significantly underestimated lifetimes in the past[4]. The publication for the updated model does not present the assumptions despite their huge importance.

- ⇨ Some efforts have been undertaken to better explain and justify the EU Reference Scenario model assumptions, but some important assumptions are still missing.
- ⇨ The EU Reference Scenario remains rooted in an idealised and outdated energy view, where energy demand and supply are determined by prices, suppliers are driven by free market competition, and energy users are passive consumers.
- ⇨ The EU Reference Scenario provides systematically for a high demand which should not be used on its own as reference or benchmark for policies.
- ⇨ The EU Reference Scenario cannot be used for assessing the impact of public policies on energy system costs, due to the specific approach chosen in the model[5].

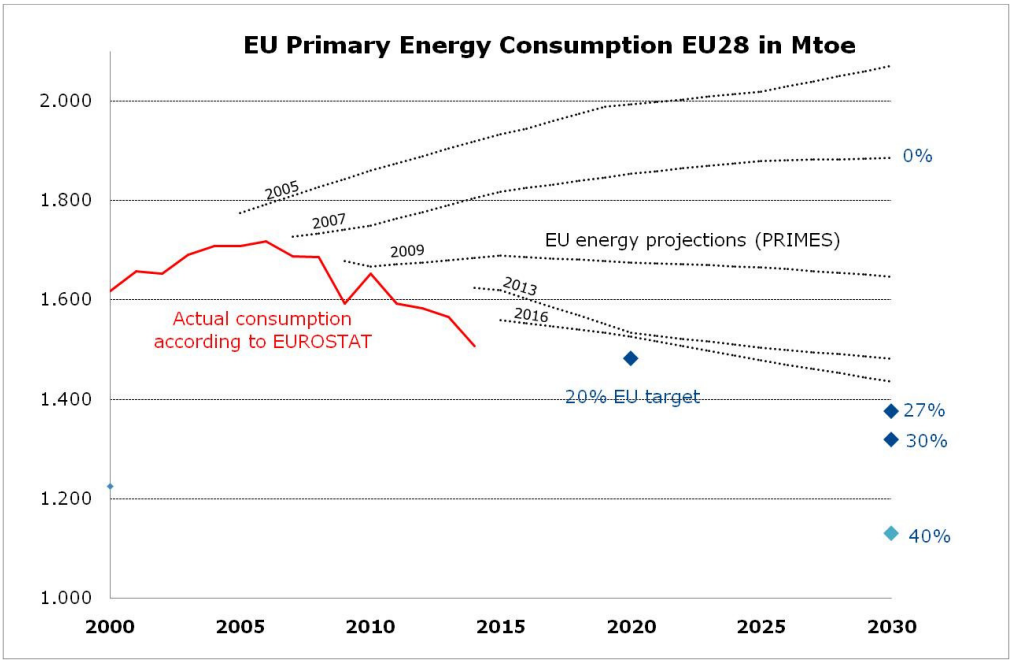
[3] The higher the discount rate the lower the investment levels and vice versa.

[4] Ecofys & Coalition for Energy Savings 2016: Impact assessment of EU 2030 energy efficiency targets in the context of the Energy Union & Energy Efficiency First. Towards a cost benefit analysis.

[5] See EU Reference Scenario 2016 page 115: *"This approach [the flat 10% discount rate] has the drawback that high perceived discount rates may be the result of market failures (such as lack of information, split incentives) which are accounted for as a cost even if addressed by policies."*

Are the new projections catching up with reality?

Since 2005 EU's future energy demand projections are persistently above real demand developments, as shown by the graph below.

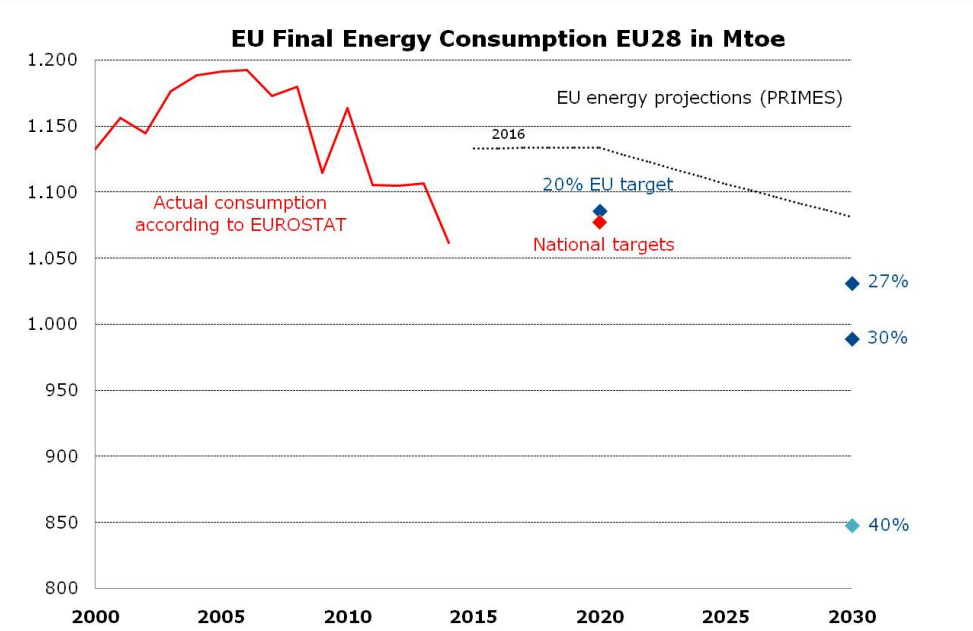


GDP assumptions, which are usually rather optimistic, play an important role but cannot explain this systematic bias. For example the projections are calibrated using the RES and GHG targets for 2020, assuming that they will be achieved, even overachieved. But the EU Reference Scenario has chosen to downplay the energy efficiency target and policies for 2020, arguing that it is not binding. While this is a valid point it ignores that

- Article 7 of the Energy Efficiency Directive provides for a minimum amount of savings to be delivered between 2014 and 2020;
- Several studies have shown[6] that the target is likely to be achieved or even overachieved; and
- National indicative energy efficiency targets which have been set for 2020 would already overachieve the EU's 20% target for final energy efficiency (the EU Reference Scenario for final energy 2020 is far off the national targets - see figure below).

[6] See Fraunhofer et al 2014, Report on behalf of DG ENER, which concludes "*that the 2020 primary energy target is just about to be reached after having adjusted for incomplete measure implementation, while the final energy targets under the EED may likely to be missed by 0.6 percentage points (referring to the original 20% gap) with the presently introduced policies. [..] IF the measures would be implemented as originally expected by the EU Member States, both targets may be exceeded.*"

EEA report 2/2015 which states that the "*EU is currently on course to achieve its target of improving energy efficiency by 20% by 2020.*"



- ⇨ While the latest projections seem to further follow the pattern change in EU's actual energy demand, the projected energy demand levels remain elevated and above actual consumption and the targets already set.
- ⇨ The projections are in contradiction to DG Energy policy assessments and trend assessments by the European Environment Agency.

EU's energy modelling and projections are not fit for purpose

For the implementation of Energy Union policies, which aim at putting energy efficiency first and at achieving the transition to a consumer centric model, the EU urgently needs a more suitable model for its energy projections and assessment of policies.

As a consequence, the European Commission impact assessments for the energy efficiency package in 2016, which will build on the EU Reference Scenario, should be considered with caution, as they are likely to underestimate progress towards 2020 and cannot provide meaningful numbers regarding the impact of energy efficiency policies on energy system costs.