Impact assessment of EU 2030 energy efficiency targets in the context of the Energy Union & Energy Efficiency First

Towards a cost benefit analysis

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The Coalition for ENERGY SAVINGS

Abstract

The European Commission's impact assessment of 2030 energy efficiency targets currently only takes a private and short term perspective to assess the financial impacts. This does not take into account the role of public policy making in reducing market barriers and changing market designs.

Such an approach is not compatible with appraising energy efficiency ambition levels for 2030 within the Energy Union context, which makes energy efficiency and demand reduction a top priority. A societal perspective should be taken, represented by applying a societal interest rate in assessing and comparing costs and benefits.

Therefore, and as set out in the Commission internal Better Regulation policy, a cost-benefit analysis is the appropriate way forward.

An example of a cost-benefit analysis, using the Commission's available data, shows that energy bill savings resulting from energy efficiency targets of up to 40% could exceed the costs of upfront investment.

March 2016

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The Coalition for Energy Savings (AISBL) strives to make energy efficiency and savings the first consideration of energy policies and the driving force towards a secure, sustainable and competitive European Union. Its membership unites businesses, professionals, local authorities, trade unions, consumer and civil society organisations in pursuit of this goal. The Coalition calls on the EU to commit itself to a 40% energy saving target by 2030, and to step up policies, measures and investments in order to stop energy waste and tap the considerable energy savings potentials. Coalition members represent: more than 500 associations and 200 companies, 15 million supporters and more than 2 million employees, and 2,500 cities and towns in 30 countries in Europe.

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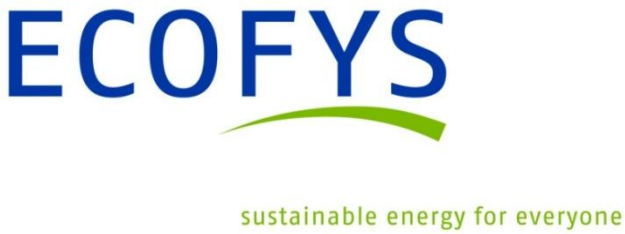

Abbreviations/acronyms

CBA	Cost benefit analysis
EE	Energy efficiency
EED	Energy Efficiency Directive
EC	European Commission
EPBD	Energy Performance of Buildings Directive
IA	Impact assessment
MS	Member State

1. The imperative to move toward cost-benefit analysis (CBA)

The European Union institutions have set out different visions for 2030 EU energy efficiency (EE) policies. The European Council[1] called for a target of at least 27% EE improvements compared to the 2007 reference scenario[2], the European Commission[3] suggested an EE target of "30% at least" and the European Parliament[4] called for a binding 40% EE target.

The difference between the various target levels in terms of savings is significant, around 250 Mtoe primary energy per annum - this is roughly the gross annual energy consumption of France. These savings would secure additional investment in the European economy worth around €500 billion until 2030.

From least cost to best economic outcome

Both the European Council and Parliament justify the target level as the optimum from an energy system cost perspective. The first, the Council's justification, relies on the Commission's impact assessment[5] (IA 2014), which shows that energy system costs are lowest at a 27% EE target. The latter, the Parliament's justification, relates to research for DG Energy about cost-effective EE potentials per sector[6] (DG ENER 2014), which shows that overall level of 40% EE can be reached by interventions that deliver net financial benefits for the individual investor. Both assessment approaches look at costs and benefits from a private perspective, but make fundamentally different assumptions about whether or not barriers to energy efficiency investments, such as split incentives, lack of information and lack of capital, are removed.

Under the Commission's impact assessment, market barriers are not removed beyond what is happening under existing policies. This means that even if energy efficiency is increasing, the impact on costs of new policies is not considered, and the discount rates (or more appropriately called interest rates, as they represent the interest of the investments), which are used to estimate costs for overcoming barriers, are maintained for each sector at the standard, high, level[7]. Such an approach is suited to identifying the least-cost EE level without additional EE policies and measures in place,

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[1] Conclusions by the European Council from 24 October 2014

[2] EU Energy, Transport and GHG emissions – Trends to 2050 – Reference Scenario 2013.

[3] Communication from the European Commission from 13 July 2014

[4] Resolution from the European Parliament from 5 February 2014 and later resolutions (14 October and 15 December 2015)

[5] IA 2014: European Commission Impact Assessment accompanying the Communication: Energy Efficiency and its contribution to energy security and the 2030 Framework for climate and energy policy; 23/07/2014

[6] DG ENER 2014: Study evaluating the current energy efficiency policy framework in the EU and providing orientation on policy options for realising the cost-effective energy efficiency/saving potential until 2020 and beyond; Report on behalf of DG ENER; 19/09/2014

[7] In practice this means that investments are translated into annual costs, using high interest rates, for example 17.5% for the residential sector.

rather than for searching the optimal target level to drive EE policies and measures to realise investments that make economic sense. The result is a 'worst case' assessment of what the level of EE targets should be without considering the impact of supporting policies. This is at odds with the concept that policy targets are used to trigger and measure policy actions.

The impact assessment also provides information about the impacts of reducing energy consumption in higher EE scenarios, on energy security, GDP and employment. Given the largely positive impacts, the European Commission justified, in 2015, setting a target higher (30%) than the least-cost option (27%), based on a qualitative comparison only.

Several studies[8] have criticised the use of high interest rates in assessing the costs of efficiency scenarios. The study for DG Energy showing that up to 40% EE (DG ENER 2014) is cost-effective, i.e. delivering net benefits if market barriers are removed[9], essentially assesses the financial impacts on the energy system of improving the energy efficiency market in the context of increasing target levels.

Both approaches, DG ENER 2014 and IA 2014, have in common that they look at impacts from a private investor perspective, though they use different assumptions about market barriers. As a result, private profit expectations (also a short-term perspective) determine the scope and impact of public policy making.

This contradiction can be overcome by applying a societal interest rate to the cost-benefit analysis (CBA), as recommended in the European Commission Better Regulation toolboxes. Such a rate reflects the fact that the role of public policy and regulators goes beyond reducing market barriers, by also setting market conditions. For example, regulators can set minimum requirements for products and services, in the light of public policy objectives, such as saving energy. This means that a societal, long-term, perspective is being taken when deciding on such regulations.

In conclusion, the important difference between taking a private or societal perspective in assessing impacts is whether the assessment includes the role of policy making in setting market rules. Given that energy markets are highly regulated markets it would be inconsistent to exclude that role in the case of energy efficiency policies.

[8] BPIE 2015; ECEEE 2015; ECOFYS 2015

[9] This means that discount rates used to calculate net present values of energy efficiency investments are lowered and reach levels recommended to be used in cost-benefit analysis, as outlined in the European Commission Better regulation Toolbox – see Tool 54

The wider energy efficiency picture

Beyond the issues with the current assessment of EE targets, there are several additional reasons to move from a least cost analysis to apply a CBA to assess the impacts of EE targets for the review of the Energy Efficiency Directive in the context of the Energy Union:

1. Application of the Energy Efficiency First principle

With the Energy Union framework strategy, the European Commission has increased the importance of energy efficiency and called for treating it 'as an energy source in its own right' and for giving it 'primary consideration in [Member States'] policies', while the European Parliament called for applying the 'energy efficiency first' principle[10]. This should be reflected in the problem definition of the Impact Assessments concerning energy efficiency.

This means that the impacts of EE target levels must be assessed in their own right and in the context of strengthening EE policies and measures, rather than being constraint by market failures. EE target levels determine EU and national policies and measures, as set out in the Energy Efficiency Directive. It would be incomprehensible to ignore this relation and reduce the target ambition question to an optimisation issue under the current climate target without looking into the energy savings potential, which can be delivered by supportive policies and measures.

2. A tool suited for appraisal stages

A CBA is a powerful tool for comparing policy options and especially recommended for the policy appraisal phase of policy development, rather than a least–cost analysis, which could be justified when refining more specific policy measures under a given target[11]. Given the wide range of EE target levels to be assessed it is difficult to argue that the EU is not in an appraisal phase.

3. A tool justified by the available information

A CBA is the recommended method in particular if[12]:

- Direct costs and benefits can be monetised - This is very much the case regarding energy system costs, but also for several other impacts such as air pollution;
- The magnitude of impacts justifies the effort and time needed to carry out a full-fledged CBA for the different options - The impacts of increasing energy efficiency have been proven to be large, for example, the investment impacts are in the range of several billion Euro per year; and
- Distributional impacts can be substantial, in which case a breakdown per affected sector is required.

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[10] Resolution from the European Parliament from 15 December 2015

[11] European Commission Better regulation Toolbox Tool 54

[12] European Commission Better regulation Toolbox Tool 55

The consequences of applying a CBA for assessing the impacts of different EE targets within the context of the EED review are manifold. Most notably, it will be necessary to establish a complete list of impacts, including the multiple benefits of EE, and to consider the use of a societal interest rate when comparing overall societal costs and benefits.

In conclusion, a least cost-analysis for 2030 EE target levels, as currently used by the European Commission, is at odds with the EU's priorities under the Energy Union and the Energy Efficiency First principle. Cost-benefit analysis is the appropriate tool and applicable given data availability for energy system costs. It is also more suited for comparing different policy option packages at a highly aggregated level and appraisal phase, such as overall energy efficiency targets.

2. An example of a CBA of energy system costs

In the following assessment, the information of annual system costs from the Impact Assessment (IA 2014) is translated into a CBA for the different energy efficiency 2030 scenarios that reflect the use of a societal interest rate and also looks into the impact of different assumptions on lifetimes of energy efficiency measures.

In the European Commission impact assessment [13](IA 2014), six decarbonisation scenarios were assessed, reflecting an energy efficiency target in 2030 of 27%, 28%, 29%, 30%, 35% and 40% compared to baseline. The scenario reflecting a 27% efficiency target was found to represent the lowest system costs.

Approach

The results of the impact assessment on capital costs and direct energy efficiency investments are provided in annuitized figures. Annuitized costs are a product of the Investment costs (I) and the Capital Recovery Factor (CRF):

$$Annuitized\ costs = I{*}CRF$$

in which the CRF is calculated from a discount (interest) rate (d) and a lifetime (L):

$$CRF = \frac{d(1+d)^L}{(1+d)^L - 1}$$

In the original impact assessment, the following values are used for d and L:

Discount (Interest) rate	**Source**
Industry 12%	IA
Households 17.5%	IA
Tertiary 12%	IA
Transport 15%	Assumption based on discount rates for transport subsectors from IA

Lifetimes	**Source**
Capital costs: 15 years	Assumption based on interview with PRIMES team
Direct efficiency investment costs: 20 years	Assumption based on interview with PRIMES team

[13] European Commission Impact Assessment accompanying the Communication: Energy Efficiency and its contribution to energy security and the 2030 Framework for climate and energy policy; 23/07/2014

With the annuitized costs and the above interest rates and lifetimes the Investment costs I can be determined for each sector in the different scenarios. To calculate annuitised costs under different assumptions on interest rate and lifetimes, the *CRF*'s are calculated with the respective new rates and lifetimes and are multiplied by I to recalculate the annuitized costs.

Two scenarios are considered for the CBA:

- a scenario using a societal interest rate for all sectors (i.e. 4%, following the recommendations of the better regulation guideline) and
- a scenario where the lifetime of direct energy efficiency investment costs is changed to 30 years (which reflects a realistic average lifetime of energy efficiency measures), while keeping the lifetime of capital costs at 15 years and applying a societal interest rate to all sectors.

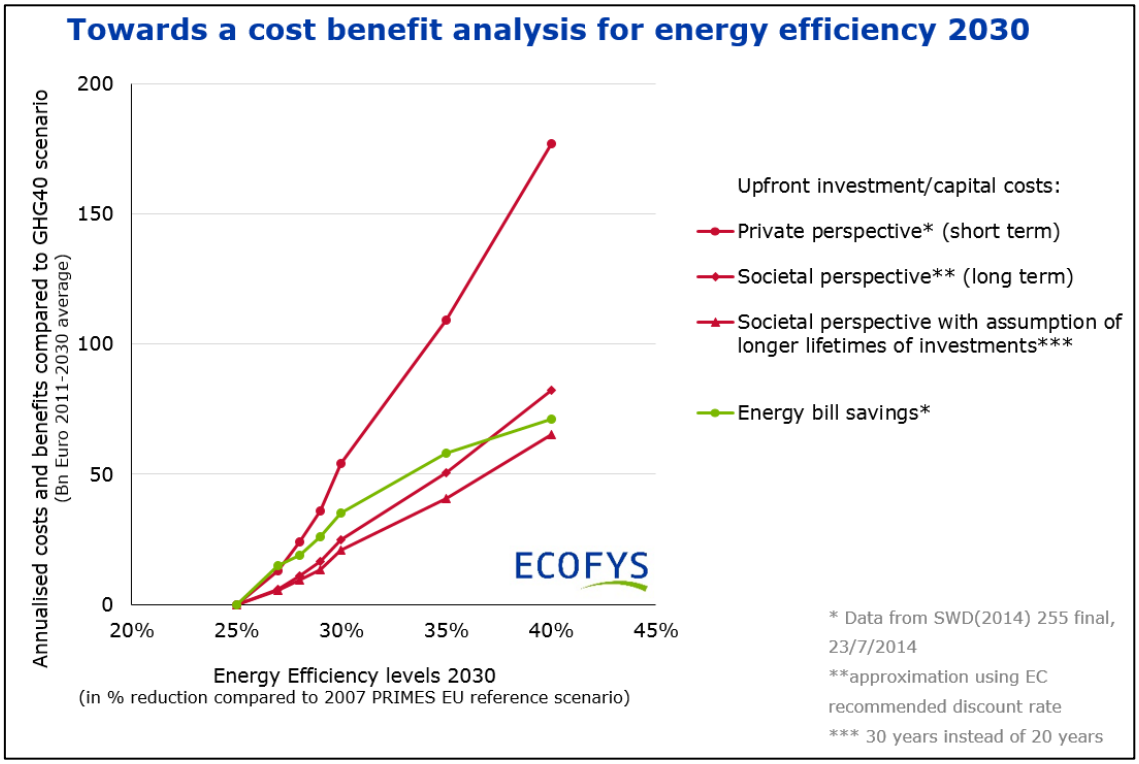
It should be noted that the use of a societal interest rate represents an approximation of a societal perspective. For a full societal perspective, all taxes need to be subtracted (from investments, as well as, from energy purchase costs and related bill savings) and, for example, costs of avoided greenhouse gases need to be taken into account (see also methodology on cost optimal performance levels under the EPBD).

Analogous to the original impact assessment results, the results are displayed as the difference compared to the GHG40 scenario.

The aggregated outcomes of the cost benefit analysis (i.e. the total costs and total benefits of all sectors) are plotted with the 2030 energy efficiency target (in % primary energy demand savings compared to the PRIMES 2007 EU reference scenario) on the x-axis.

Results

The results of the assessment are visualised in the following graph.



The results show that with the input parameters used in the original Impact Assessment, the benefits (green line) exceed the costs only in the EE27 scenario.

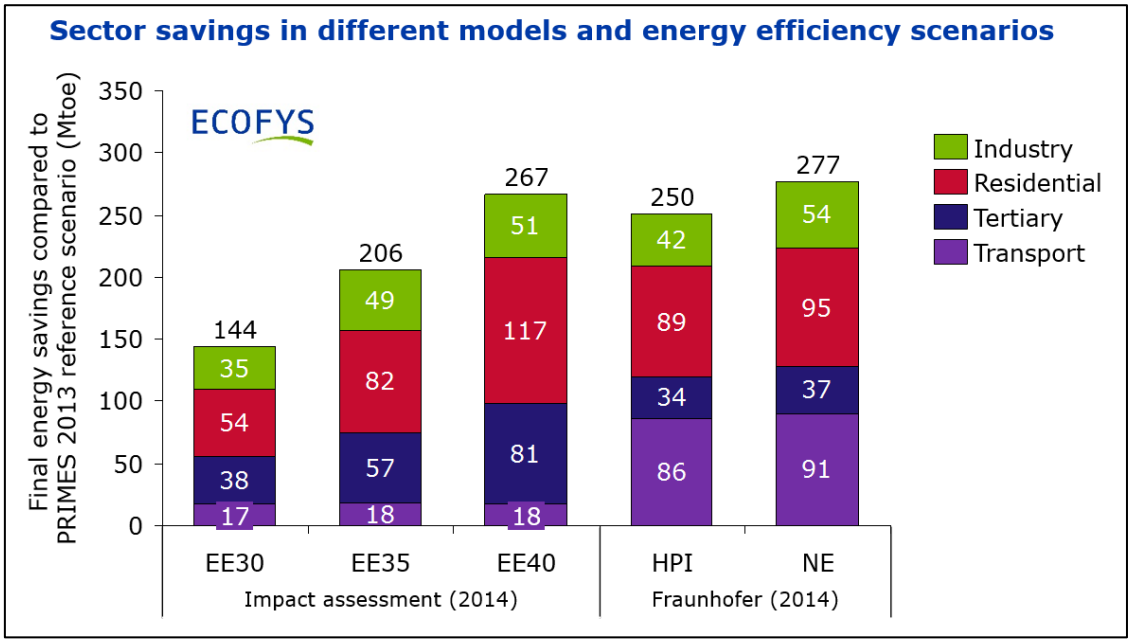
When applying a societal interest rate, the benefits exceed the costs also for the scenarios reflecting energy efficiency targets of 28%, 29%, 30% and 35%.

When considering in addition lifetimes of energy efficiency measure of 30 years, the benefits exceed the costs also in the 40% energy efficiency scenario.

3. Comparison of sector saving potentials in different models

According to a study from Fraunhofer ISI for DG Energy (DG ENER 2014), the EU could reduce its energy consumption by around 40% by 2030, compared to the 2007 reference scenario[14], with cost-effective measures across sectors. This would mean that all energy efficiency improvement measures are realised, which are commercially available, deliver net financial benefits due to reduced energy bills and are within the usual investment cycles. This will only happen if current market barriers, such as access to information and capital and split incentives are removed. This is the high policy intensity (HPI) scenario, which reaches 38% demand reduction. In addition the study provides a scenario including some measures which only deliver a net financial benefits if subsidised or result from minimum performance standards (the near economic scenario (NE) which achieves a 40% demand reduction).

The following figure gives an overview of the final energy savings of the different scenarios compared to the PRIMES 2013 reference scenario.



Comparing the result of this bottom up assessment of economic potentials from Fraunhofer ISI with the results from the 2014 impact assessment scenarios reveals significant differences. While in the bottom up approach residential and transport sectors both contribute around 1/3 to the total savings, in the comparable PRIMES scenario (EE40) the residential sector delivers about 1/2 of the total and transport falls to below 1/10. The PRIMES model also shows that with growing overall energy efficiency the transport efficiency potential remains stable.

[14] EU Energy, Transport and GHG emissions – Trends to 2050 – Reference Scenario 2013.

Due to this very different behaviour it would be necessary to undertake a detailed sectoral analysis before comparing modelling results.

In conclusion, the Commission's 2014 IA has built up efficiency scenarios mainly with savings in the residential and tertiary sector. Taking into account transport energy efficiency potentials would increase the overall outcome.

4. Going beyond financial impacts

Beyond financial aspects, the many other benefits of energy efficiency must be considered when evaluating different 2030 EE target scenarios. The International Energy Agency[15] provides a guide to how the multiple benefits can be more robustly integrated throughout the energy efficiency policy process and various studies have valued these benefits, including:

- Jobs - The potential for job creation ranges from 8 to 27 job years per €1million invested in energy efficiency measures [16];
- GDP - GDP could increase to 4.4% by improving energy efficiency by 40% by 2030[17];
- Energy imports - Gas imports can be reduced by 2.6% for every 1% of energy saved[18];
- Air pollution – air pollution control costs could be reduced by €7billion by improving energy efficiency by 35% by 2030[19]; and
- Health - Realised health improvements generate downstream social and economic impacts, including lower public health spending. Health improvements through improved indoor air quality through energy efficiency measures could save the EU's economy as much as €190 billion annually[20].

[15] IEA, Capturing the multiple benefits of energy efficiency, 2014.

[16] IEA, Capturing the multiple benefits of energy efficiency, 2014.

[17] European Commission Impact Assessment accompanying the Communication: Energy Efficiency and its contribution to energy security and the 2030 Framework for climate and energy policy; 23/07/2014.

[18] European Commission Impact Assessment accompanying the Communication: Energy Efficiency and its contribution to energy security and the 2030 Framework for climate and energy policy; 23/07/2014.

[19] European Commission, Impact Assessment Accompanying the document: Communication from the Commission to the European Parliament and the Council. A policy framework for climate and energy in the period from 2020 up to 2030 (SWD(2014) 15 final).

[20] IEA, Capturing the multiple benefits of energy efficiency, 2014.

5. Conclusions

Moving from a least cost approach towards a cost-benefit analysis for assessing impacts of 2030 target levels is required to adequately support decision-making in line with the EU's priorities under the Energy Union and the Energy Efficiency First principle.

This means that the financial analysis of different policy options should take into account the positive environment created by additional energy efficiency policies. Further to a private perspective that can help identify barriers and split incentives, the analysis should be done from a societal perspective to ensure that policies are shaped with a view to maximize benefits at a societal level.

The assessment of impacts of the use of a societal interest rate and of longer (but realistic) lifetimes of measures thereby revealed significant potential to achieve higher energy efficiency targets. When applying a societal interest rate, the benefits exceed the costs also for the scenarios reflecting energy efficiency targets of 28%, 29%, 30% and 35%. When considering in addition lifetimes of energy efficiency measure of 30 years, the benefits also exceed the costs in the 40% energy efficiency scenario.

Higher efficiency targets are also supported by the findings of the study for DG Energy (DG ENER 2014), while significant differences in assumptions and outcomes for the different sectors require deeper analysis to allow for a full comparison. The Commission's 2014 IA has built up efficiency scenarios mainly with savings in the residential and tertiary sector. Taking into account transport energy efficiency potentials would increase the overall outcome.