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A binding target for sustainable energy demand: Why and how?

A discussion paper

Prepared by Jean-Sébastien Broc for the European Council for an Energy Efficient Economy (eceee) with support from Energifonden.

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eceee SECRETARIAT
SVEAVÄGEN 98 IV
SE-113 50 STOCKHOLM
SWEDEN

www.eceee.org
eceee@eceee.org

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eceee, the European Council for an Energy Efficient Economy, is the largest non-profit, membership-based energy efficiency NGO in Europe. The goal of eceee is to promote energy efficiency through co-operation and information exchange.

To facilitate this, eceee provides evidence-based knowledge, analysis and information. eceee provides an information service through its web site and news service, arranges conferences and workshops and takes active part in the European energy efficiency policy discussions.

One of eceee's principal events is the five-day Summer Study held in June every odd year which attracts more than 450 participants from governments, industry, research institutes and citizen organisations. Since 2012, eceee arranges a three-day Industrial Summer Study held in June every even year.

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Executive summary

On January 22nd, 2014, the European Commission published its proposal for a *policy framework for climate and energy in the period from 2020 to 2030*[1]. The current paper complements the eceee comment[2] on this proposal by discussing the following issues:

- what targets are, and their main pros & cons;
- why a binding target for sustainable energy demand is needed;
- the various options to set and monitor this target.

In this paper, we speak of a ***target for sustainable energy demand,*** which is meant to encompass the different possibilities of targets expressed in terms of energy efficiency improvements, energy savings or maximum level of energy consumption. The term "sustainable" is used to highlight that the roadmap towards 2050 means that the objectives of reducing the GHG emissions by 75 to 80% (compared to 1990) cannot be achieved in a sustainable way without reducing the energy demand. The 2050 roadmap mentions a level of consumption 30% lower than 2005.

Why a binding target for sustainable energy demand is needed

The conclusions from the 5th Assessment of the IPCC have confirmed that energy efficiency should be the core of any climate & energy strategy:

> *Near-term reductions in energy demand are an important element of cost-effective mitigation strategies, provide more flexibility for reducing carbon intensity in the energy supply sector, hedge against related supply-side risks, avoid lock-in to carbon-intensive infrastructures, and are associated with important co-benefits (robust evidence, high agreement).* (Contribution of Working Group III to the Fifth Assessment Report of the IPCC, Summary for Policy Makers, 12 April 2014, p.21)

This is confirmed by the scenarios tested in the Impact Assessment[3] (European Commission, 2014b) that all lead to a reduction of the primary and final energy consumption. Energy efficiency makes it indeed possible to tackle all climate & energy objectives simultaneously:

Objective: Affordable energy prices and industrial competitiveness

> *The importance of energy efficiency as a competitiveness factor is growing over time with globalisation. Energy prices and energy intensity are the two drivers of real unit energy costs. Increasing energy efficiency provides the means for economic actors to partially counterbalance the impact of increasing energy prices.* (European Commission, 2014, Energy prices and costs report. 17 March 2014, p.199)

> *The positive reducing impact on electricity prices from ambitious energy efficiency policies – both in a 2030 and 2050 perspective is noticeable.* (Impact Assessment[3], p.80)

Objective: Security of supply

> *Efforts to reduce Europe's high gas energy dependency rates should be intensified, especially for the most dependent Member States. Moderating energy demand through enhanced energy efficiency should be the first step which will also contribute to other energy and climate objectives.* (Conclusions from the European Council of 20-21 March 2014, EUCO 7/1/14, p.10)

In addition, European energy infrastructures need to be upgraded, but should not be

1 See http://ec.europa.eu/energy/2030_en.htm

2 See http://www.eceee.org/all-news/press/2014/00commissions-new-climate-and-energy-policy-framework-lacks-ambition

3 Impact Assessment accompanying the Communication. A policy framework for climate and energy in the period from 2020 up to 2030. (European Commission Staff Working Document, SWD(2014)15)

oversized. Once the investments are made, they have to be made profitable. Oversized infrastructures are a push for higher consumption. Energy efficiency limits the need for new infrastructures and increases the flexibility of the energy systems, hence reducing the global costs.

Objective: Achievement of the climate and environmental goals

The scenarios tested in the Impact Assessment have shown that more ambitious energy efficiency policies make it possible to cost-effectively achieve higher reductions of GHG emissions, also increasing other environmental benefits such as improved air quality and higher resource efficiency. In addition, Renewable Energy Sources (RES) and other options for decarbonising the energy system become more cost-effective and relevant when managing first the energy demand. Beyond climate & energy, energy efficiency helps as well *meeting general objectives such as employment.*

All these arguments are widely shared by the decision makers and stakeholders. So, one may not understand why energy efficiency is not given the top priority. Analyses by financial institutions[4] have shown that the investments needed would not be committed, unless a strong target gives a *clear signal to stakeholders.* The development of RES after adopting a binding target in the Directive 2009/28/EC has proven this effect.

Past achievements have proven that only a small share of the cost-effective energy savings potentials is tapped "naturally". A *policy framework is required* to overcome the various *barriers* creating a *gap* between potentials and achievements. A binding target is the *key overarching instrument,* acting as a driver and complement to sectoral measures, and favouring *comprehensive strategies.*

Why a framework based on a single target for GHG emissions only would be misleading

1) Would it reduce the complexity of the framework and the risk of inconsistencies?
→ having a single GHG target will not solve by itself the lack of integration between policies for energy efficiency, RES and GHG emissions
→ Impact Assessment's results show that the issue is not to oppose the types of targets, but to choose an appropriate level of ambition (and that a single GHG target would lead to extra costs overall for 2020-2050)

2) Would including a target for sustainable energy demand reduce the flexibility for Member States?
→ a lower energy demand means a lower pressure on the energy system, hence higher flexibility
→ energy efficiency improvements can be achieved in all sectors (various strategies possible)

3) Would a single GHG target be a sufficient signal to stimulate the most cost-effective investments?
→ a single target would tend to favour fuel switching, meaning increased energy imports and dependency
→ the high uncertainties about the carbon price would not create the conditions for a clear level playing field
→ options on the supply-side are preferred to options on the demand-side, because easier to implement, despite being more costly overall and less beneficial to the whole society

> *a single GHG target without more ambitious RES and energy efficiency targets is expected to result in lower positive impacts on the EU's negative trade balance (net energy imports) in a 2030 perspective and beyond. It is also expected to result in lower GDP and employment compared to a Framework based on more ambitious targets for also renewables and energy efficiency.* (Impact Assessment[3], p.134)

[4] http://ec.europa.eu/energy/efficiency/studies/doc/2014_fig_how_drive_finance_for_economy.pdf

Proposal for a binding target system for sustainable energy demand

There are enough studies and experience feedback already available, so that the European institutions can define a global binding target for sustainable energy demand at the EU level within the 2030 framework. There is no reason why the principle of this target could not be endorsed now.

The detailed definition of the target requires however more time for discussion. In particular, *the level and type of target should not be set without defining simultaneously the monitoring and verification rules.*

This process is not contradictory with the binding target of 40% cut in greenhouse gas emissions proposed by the European Commission. A research[5] has already proven that building the Climate and Energy framework on a target for sustainable energy demand will actually *lead to a higher ambition on GHG emissions,* which would be a positive message for the COP21 in Paris in 2015.

This paper reviews the pros and cons of the main possible options for a binding target system. Two options appear to get the best balance, especially when combined together. This proposal is made by the author, and do not necessarily represent the views of the European Council for an Energy Efficient Economy.

Option 1: pursuing the framework set by the article 7 of the Energy Efficiency Directive

The Energy Efficiency Directive (2012/27/EU, article 7) has defined a target over the period 2014-2020 of new annual energy savings amounting to 1.5 % of the average annual energy sales for 2010-2012. These energy savings should be achieved within an energy efficiency obligation scheme set up at the national level by each Member State or by implementing alternative policy measures.

The first option *is to set a target that would ensure the continuation of the EED article 7 beyond 2020.* The target could be expressed the same way, as an annual energy savings rate defined from the average annual final energy consumption for 2017-2019. The energy savings resulting from the implementation of other directives should be accounted for this target (which would be set at a higher level). This would encourage a higher ambition and stronger implementation of these directives.

Most of the monitoring and verification schemes needed are already in place. Their continuation would increase the related experience and know-how, while providing a *direct feedback on energy efficiency policies through bottom-up evaluations.*

Option 2: updating the target of maximum primary energy consumption level at the EU level

The second option is based on the approach used to define national objectives of energy consumption level for 2020, as required by Energy Efficiency Directive's article 3. One of the main issues to make this target binding is to define transparent rules for possible adjustments (for monitoring) as well as for sharing the EU target among Member States. Restricting the possibility of adjustments to situations above given thresholds would limit the related uncertainties, while enabling flexibility in case of significant unforeseen changes.

It would be useful to complement the monitoring of the primary energy consumption with the monitoring of *energy efficiency indicators* (see for ex. ODYSSEE-indicators). This would help analyse the trends and their main causes, and therefore *where additional measures are needed the most.*

[5] http://energycoalition.eu/sites/default/files/Fraunhofer%20ISI_ReferenceTargetSystemReport.pdf

Combining options 1 and 2 in order to harness the advantages of both

Option 2 includes changes non-related to energy savings or energy efficiency. But it reflects the real level of consumption, directly connected to GHG emissions. A combination with Option 1 would ensure energy savings on the demand side. *Option 1* would provide the *signal for energy efficiency markets,* while *Option 2* would ensure *consistency with the long-term objectives.*

This choice of combining both options would ensure the continuity with the current European framework for energy efficiency, hence increasing the visibility for stakeholders. Making them binding would strengthen the framework, as well as the signal for investors.

Moreover, whatever the targets defined, setting targets cannot deliver results alone. This should come with *accompanying measures and intermediate indicators.*

From a burden to an opportunity sharing

In both cases *(Options 1 and 2),* the level of the targets should be defined taking into account a shared diagnosis of energy savings potentials and the long-term objectives. This diagnosis should be used to assess the investments needed and the benefits expected, including direct co-benefits. The Impact Assessment has shown that the scenarios with ambitious energy efficiency policies lead to higher overall benefits for the society.

This would change the picture from a burden to an opportunity sharing. The rules for sharing the targets among countries could take into account criteria such as GDP per capita, potentials/relative effort needed (as for the GHG and/or the RES target for 2020), previous energy efficiency trends, effective investment capacities and maturity of energy efficiency markets. EU Cohesion Policy could be used to help Member States in a less favourable situation.

The paper provides further details, explanations and references about the issues mentioned in this summary, as well as an analysis of the indicative energy consumption targets for 2020 reported by Member States in their 2013 annual reports (see annex C of the paper).

This discussion paper does not pretend to be exhaustive about these issues. Comments are welcome! (mailto: brocjs-at-yahoo.fr)

Introduction

On January 22nd (2014), the European Commission published its proposal for a policy framework for climate and energy in the period from 2020 to 2030 (European Commission, 2014a), together with the related Impact Assessment (European Commission, 2014b).

This framework is meant as the continuation of the current policy framework with a set of targets for 2020[6] (European Council, 2008), on the road towards the long-term objective to reduce EU's greenhouse gas (GHG) emissions by 80-95% below 1990 levels by 2050 (European Council, 2011).

This discussion paper complements the eceee feedback on the proposal for 2030 by providing *clarifications about key issues raised when proposing binding targets for sustainable energy demand* [7] (see below the distinction between "energy efficiency" and "energy savings"). It is meant for all stakeholders interested in the current debates around the process for defining the 2030 policy framework.[8]

The introduction briefly reminds key definitions from the Energy Efficiency Directive and what targets are (in terms of policy instruments). The paper then discusses why a binding target for sustainable energy demand should be the cornerstone of the 2030 policy framework for climate and energy. After which, the different options to set and monitor a binding target for energy demand are analysed.

Annex A presents a summary of the 2020 policy framework (including current state of progress), while annex B gives an overview of the process to define the 2030 policy framework. Then annex C analyses existing targets for sustainable energy demand, especially the ones reported by the Member States in their 2013 annual reports. Finally, annex D includes a discussion of misleading arguments promoted by some stakeholders.

It should be noted that the scope of this paper is *focused primarily on the analysis of the different possible options for setting a target* for sustainable energy demand. The rationale for such a target is discussed beforehand to remind the main points of the debate about the 2030 policy framework. However, this paper has not the objective to enter in the detailed discussions of this debate. Instead, references are provided for further explanations.

Sustainable energy demand, encompassing energy efficiency and energy savings

In this paper, we use the terms "energy efficiency" and "energy savings", as defined in the Energy Efficiency Directive (2012/27/EU):

> *(4) '**energy efficiency**' means the ratio of output of performance, service, goods or energy, to input of energy;*
>
> *(5) '**energy savings**' means an amount of saved energy determined by measuring and/or estimating consumption before and after implementation of an energy efficiency improvement measure, whilst ensuring normalisation for external conditions that affect energy consumption;*
> (EED, article 2 – definitions)

Several key differences resulting from these definitions should not be overlooked, and are summarised in ***Table 1*** below.

[6] More details about the 2020 policy framework and the current progress towards the 2020 targets can be found in Annex A.

[7] We use the term "energy demand" as the complement to energy supply, both forming the energy system. The meaning used here for "energy demand" encompasses the energy consumption (energy use over a given period, usually a year) and the load curve (instantaneous energy use).

[8] More details about the on-going process for the definition of the 2030 policy framework can be found in Annex B.

Table 1. Key differences between "energy efficiency" and "energy savings"

	"Energy efficiency"[9]	**"Energy savings"**[10]
type of indicators	**various forms** → the indicators used have to be specified (energy intensity, specific energy consumption,...[11])	**fixed form**, expressed in energy unit (kWh, toe, J, etc.)
basis	**ratio between two absolute quantities**: an output (that may have different forms) and an input (energy consumed)	**comparison between two absolute quantities**: energy savings are quantified compared to a baseline (also called "before" or "without" situation)
sources of variations	**energy efficiency policies or measures, AND other factors** (in particular structural effects[12])	**necessarily due to an action**[13] whose one of the objectives is to improve energy efficiency and/or to reduce energy consumption
typical sources of data	national statistics (mainly top down, when monitored at a country's level)	bottom-up evaluations or monitoring systems[14]

These distinctions between "energy efficiency" and "energy savings" are important to keep in mind when dealing with propositions of targets for sustainable energy demand, as according to the type of target chosen, the political meaning and the monitoring scheme will be different.

Therefore we speak here of a ***target for sustainable energy demand***, which is meant to encompass the different possibilities of targets expressed in terms of energy efficiency improvements, energy savings or maximum level of energy consumption. The term "sustainable" is used to highlight that the roadmap towards 2050 means that the objectives of reducing the GHG emissions by 75 to 80% (compared to 1990) cannot be achieved in a sustainable way without reducing the energy demand. The 2050 roadmap mentions a level of consumption 30% lower than 2005.

9 For more examples and details about energy efficiency indicators, see the ODYSSEE-MURE project: http://www.odyssee-indicators.org/

10 For more examples and details about issues and methods to evaluate energy savings, see the EMEEES project: http://www.evaluate-energy-savings.eu

11 Energy intensity is usually defined as the ratio of the national energy consumption over the GDP. Examples of indicators of specific energy consumption are "kWh/m²/year" for the energy efficiency of a building, or "fuel consumed/km travelled" for the energy efficiency of cars.

12 For example, the energy intensity of a country may be affected by a decreasing share of the industrial sector opposed to an increasing share of the service sector.

A way to isolate the energy efficiency improvements due to energy efficiency policies or measures from other effects is to use disaggregate indicators, for which non-energy efficiency factors can be corrected. For example, when using specific energy consumption for buildings (in kWh/m²/year), changes in weather conditions can be corrected using normalised Heating Degree Days.

13 It should be noted that this action may be induced directly or indirectly by a public policy, or may be implemented outside the frame of any public policy (for example within an energy services contract).

14 See for example the monitoring systems of the energy efficiency obligation or energy audit schemes.

Targets are key policy instruments for objectives to be effectively achieved

A target is a quantitative objective to be met over a given period or at a given date. This implies that the target achievements can be monitored, reported and verified. Targets may be indicative or binding, including penalties or infringement procedures.

Target setting is one of the key policy tools to shift accountability for inputs (*were the budgets spent in an appropriate way?)* to outcomes and results (*were the objectives completed?).* This shift is possible with the development of monitoring and evaluation systems.[15]

One example is the evolution of the energy efficiency obligation scheme for energy suppliers in the UK. The obligations were first defined in terms of inputs: budgets to be invested by the suppliers (EESoP[16] scheme from 1994 to 2002). Then from 2002 on, the obligations were set in terms of results: energy savings or CO2 emissions reductions (see EEC, CERT and now ECO).

> *Governments adopt targets because they can help to motivate, challenge and direct policy. In energy efficiency, targets are often used when a government wants to achieve a defined result (e.g. a level of energy intensity in a sector) and/or to encourage greater effort in energy efficiency.* (Jollands, 2012)

The advantages (or benefits) and drawbacks (or risks) commonly argued about target setting are summarised in ***Table 2*** below.

Table 2. Advantages and drawbacks related to target setting.

Advantages and benefits	Drawbacks and risks
• putting a topic on the policy agenda • creating a level playing field • sending a strong signal to market actors and investors • giving actors freedom in achieving the targets (especially to find the most cost-effective options) • providing a communication tool to involve all actors (including a signal for end-users' behaviours) • monitoring performance levels	• risk of inefficient allocation of effort, in particular if some objectives have targets while others not (success in one area may be achieved at the expense of other fields) • possible difficulties of attributing results to a given actor or group of actors (this may weaken the expected incentives/motivations) • the burden for achieving the target may rest on future politicians or decision-makers

A target can also be a way to make stakeholders report their actions and achievements. This can be very useful if done in a perspective of experience sharing and/or continuous improvement. At the opposite, a reporting process that would imply a too heavy administrative burden could be counterproductive.

[15] For more details about Results-Based Management or Performance Management, see for example (Lester and Neuhoff, 2009)

[16] EESoP: Energy Efficiency Standards of Performance; EEC: Energy Efficiency Commitment; CERT: Carbon Emissions Reduction Target; ECO: Energy Company Obligation. For more details, see for example (Rosenow, 2012).

Why a binding target for sustainable energy demand is needed

eceee contributions to the debates about the 2030 framework can already be found in its response to the stakeholder consultation on the Green Paper on 2030 Climate and Energy Policy, in its feedback to the European Commission proposal made on 22 January 2014 as well as in different columns published on its website [17].

In parallel, the rationale for a binding target for sustainable energy demand at the European level has been argued in many position papers from other organisations (see for example Coalition for Energy Savings, 2013; Holmes and Bergamaschi, 2013) and in scientific papers (see for example Harmsen et al., 2014).

This section summarises and complements these arguments. It also confronts them with conflicting views, known to be the basis of opposite positions by some stakeholders or Member States. As explained in the introduction, the aim of this paper is not to enter into the details of the rationale for a binding target for sustainable energy demand. Further explanations can be found in the references mentioned along the text.

These references form a rich literature, combining scientific and operational analyses, showing that the rationale presented here is based on clear facts, and not on opinions or ideological views.

1) Energy efficiency must be the starting point

Energy efficiency must be the starting point for any framework for Climate and Energy Policy, if physics and economics are objectively taken into account

Developing energy scenarios means first assessing the evolution of the energy demand, and then exploring how this energy demand can be met. The package of targets should therefore be defined accordingly to ensure consistency over time. This is confirmed by the scenarios tested in the Impact Assessment[18] (European Commission, 2014b) that all lead to a reduction of the primary and final energy consumption.

Improved energy efficiency or energy savings are not an outcome of reducing GHG emissions. It is exactly the opposite.[19] Likewise, renewable energy sources (RES) become more cost-effective and relevant when managing first the energy demand.[20] The target for RES is in fact defined as a percentage of the gross energy demand: energy savings reducing the gross energy demand have a direct impact on the RES target.

This is what physics tell us: managing the energy demand should be the starting point of any strategy towards a sustainable energy system. In fact, that is why in the mitigation scenarios analysed by the IPCC for its 4th assessment, "energy efficiency plays a key role across many scenarios for most regions and timescales" (IPCC, 2007 p.16).

Setting first the target for sustainable energy demand (and hence the level of primary and/or final energy consumption not to be overpassed in 2030) would lower the risk of inconsistency over time of the climate & energy package. Putting ahead the target for

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[17] See in particular, the column by Peter Bach: "We need a binding target for energy demand in 2030"

[18] If not precised differently, when mentioning the Impact Assessment, we refer in this report to the Impact Assessment accompanying the Communication. A policy framework for climate and energy in the period from 2020 up to 2030. (Commission staff working document, SWD (2014)15)

[19] We deal here with the GHG emissions resulting from the combustion of fuels used to meet energy needs (including producing electricity): GHG emissions = energy consumption x emission factor

The reduction of GHG emissions is therefore the result of a reduction of energy consumption and/or of a switch to a type of energy source with a smaller emission factor.

[20] For example, a lower energy demand would reduce the need for biomass energy, facilitating its sustainable use. At the opposite, a too high increase in the use of biomass energy would lead to negative impacts on the environment and on the agricultural production, as noted in the Impact Assessment (section 5.1.2.4, pp.62-64).

GHG emissions increases this risk, as observed in the current period for the 2020 framework (for more detailed explanations, see Eichhammer, 2013).

Coming to economics, there seems to be a *critical confusion* among some stakeholders raising the red flags of competitiveness and carbon leakage. The risk for competitiveness is not to be only linked to increasing *energy prices,* but more globally to increasing *energy costs.*

> *While energy prices receive major attention and are the focal point in the discussion about trends in the energy sector, it is energy costs which are more important for households and for industry. Energy costs are determined by both energy price levels and by consumption.* ***Improvements in the energy efficiency*** *and reductions in the sectoral or overall energy intensity of industry* ***can mitigate the overall impact of rising prices*** *on households and industry.*
>
> *The* ***importance of energy efficiency as a competitiveness factor*** *is growing over time with globalisation. Energy prices and energy intensity are the two drivers of real unit energy costs. Increasing energy efficiency provides the means for economic actors to partially counterbalance the impact of increasing energy prices.* (European Commission, 2014c. Energy prices and costs report. 17 March 2014, p.123 and p.199)

For example, the WEO 2013 demonstrated that energy prices could have an impact on energy intensive industries which have anyway left Europe for other reasons (IEA, 2013a).

For a detailed discussion on the competitiveness issue, see (eceee, 2013).

Moreover, expecting lower energy prices by not acting on energy efficiency would be a delusion: part of the energy prices' increase is due to a global increase of the energy demand. In fact, the conclusions from the last European Council highlighted "sustained investment in energy efficiency and demand-side management all along the value chain and at the R&D stage" as one of the key means to moderate the energy costs (European Council, 2014 p.11).

> *The* ***positive reducing impact on electricity prices from ambitious energy efficiency policies*** *[reflecting both efficiency gains in power generation and the impacts from lower demand] – both in a 2030 and 2050 perspective is noticeable. (…)*
>
> *Without ambitious EE policies, the impact of higher RES penetration on electricity prices would be higher, reflecting the need for more RES deployment to ensure a specific share if energy consumption is higher.* (European Commission, 2014b. Impact Assessment accompanying the Communication. A policy framework for climate and energy in the period from 2020 up to 2030. SWD(2014)15, 22 January 2014, p.80)
>
> *Since steady energy intensity improvements have proven to be one of the best assets of the EU industry to maintain their competitiveness, the EU should maintain and perhaps intensify its policy to bolster the EU industry's energy efficiency efforts.* (European Commission, 2014d. Energy Economic Developments in Europe. January 2014, p.41)

This is what economics tell us: energy efficiency is the most cost-effective way to reduce energy costs, to mitigate climate change and to improve energy security. This was for example pinpointed in the early debates about mitigation costs in the 1990's[21], and has been confirmed ever since (see e.g., IEA, 2011; IPCC, 2014a ; Lazard, 2013 and McKinsey & Company, 2009). Cost-effectiveness is meant here as the benefit-to-cost ratio, using NPV (net present values) for both (benefits and costs) over the life-cycle of the options considered. The categories of benefits and costs, and consequently the cost-effectiveness of energy efficiency investments, can be considered according to various

[21] See for example the conclusions in the editorial by Erik Haites about the papers from the special issue (Volume 24, Issues 10–11) of Energy Policy "Energy and Greenhouse Gas Mitigation: the IPCC Report and Beyond" in 1996: "*The papers suggest that limiting global emissions of greenhouse gases to current levels over the next 20 to 40 years would be a very challenging target. Energy efficiency improvement is the most cost-effective means of limiting greenhouse gas emissions over this period*".

points of views or perspectives, therefore referring to distinct definitions or costs/benefits tests (see e.g., NAPEE 2008).

The *societal point of view* is the main perspective considered here, as the 2030 framework is meant to support improvements for the European society as a whole. In this perspective, the benefits are the avoided costs for the energy system (generation and transmission-distribution), the avoided GHG emissions (based on the same carbon value as for the other options). The costs are the marginal investment and operation costs of the energy efficiency options considered, compared to a situation without change or with business-as-usual change (e.g., basic planned refurbishment of a building, without taking into account the energy dimension).

It should be noted that in practice, the societal cost-effectiveness of energy efficiency investments tend to be much higher, due to **other co-benefits,** such as improved air quality, health impact or productivity gains among others (see e.g., IEA, 2012). In other words, energy efficiency investments help governments or other organisations meeting their priorities.

> ***In the options with ambitious EE and RES policies, reductions in health damage are higher****: 12.6 to 29.2 billion €/year for the option with a 40% GHG target, ambitious EE policies and a 30% RES target and by €15 to nearly 35 billion/year for the option with a 45% GHG reduction, ambitious EE policies and a 35% RES target. (*European Commission, 2014b. Impact Assessment accompanying the Communication. A policy framework for climate and energy in the period from 2020 up to 2030. SWD(2014)15, 22 January 2014, p.65)

By acting on energy consumption, energy efficiency is directly helping reducing the GHG emissions and the energy imports (according to the European Commission, in 2012, the *EU's oil and gas import* bill amounted to *more than €400 billion*).

> *Efforts to reduce Europe's high gas* ***energy dependency*** *rates should be intensified, especially for the most dependent Member States.* ***Moderating energy demand through enhanced energy efficiency should be the first step*** *which will also contribute to other energy and climate objectives****.*** (Conclusions from the European Council of 20-21 March 2014, EUCO 7/1/14, p.10)

In addition, improved energy efficiency means a transfer from external expenses (fuel imports) to internal investments (e.g., higher quality buildings), leading to increased economic activity in the EU.

> ***Net imports decrease*** *significantly for all scenarios and* ***in more pronounced manner under the scenarios with ambitious EE policies****.*
>
> *Net energy import decreases translate into* ***savings in the energy fossil fuel imports bill****. Whereas savings (calculated as a cumulative value over a 20 year period) are very limited for scenarios in Reference settings,* ***with enabling settings they range from € 190 billion to € 550 billion in 2030 and from € 3404 billion to € 4425 billion in 2050****. These savings indicate that rather than paying for exports, the EU economy can have these resources invested either in technology development and/or new assets and/or education, all of which* ***contribute to job creation and economic growth.*** (European Commission, 2014b. Impact Assessment accompanying the Communication. A policy framework for climate and energy in the period from 2020 up to 2030. SWD(2014)15, 22 January 2014, p.75 and p.69)

It should be reminded that the scenarios in so-called "Reference settings" are the ones with a sole target on GHG emissions only. The results of the scenarios tested in the Impact Assessment clearly demonstrate the very high added value of scenarios including a high ambition for energy efficiency improvements, compared to scenarios focused on reducing GHG emissions only. Not to mention that a high ambition for energy efficiency improvements make possible to reach higher GHG targets.

Managing the energy demand is moreover a key contributor to the *security of energy supply* and to reduce the EU energy dependency. It also *limits the need for new infrastructures* (both in generation and transmission capacities). Investments in the

European energy infrastructures have got a lot of attention. They certainly need to be upgraded. But they should not be oversized. Once the investments are made, they have to be made profitable. *Oversized generation or transmission capacities are a push for higher consumption* (see for example the development of electric heating in France due to the need to sell the surplus of nuclear electricity).

When new energy infrastructures (for generation, transmission and/or distribution) are built, their total capital costs have to be covered by the corresponding energy sales over their lifetime. If the sales' volumes are lower[22] than forecasted, then the sales' prices have to be increased. This reminds that energy prices can be a misleading indicator (vs. energy costs).

This also shows that *investments should be done first on energy efficiency in order to optimize the future energy system*. This is true at all scales. For example for an existing building, the heating system is to be upgraded after having improved the performance of the building envelope (hence reducing the energy demand). Otherwise, the new boiler will be oversized if the insulation is improved afterwards. These basic principles of energy engineering apply to all sizes of energy systems, from a motor to a country.

As regards the energy networks, the priority should be first on the quality of the infrastructures (for smarter grids). Combining energy efficiency and distributed renewable energy sources would considerably reduce the need for transnational infrastructures, that are very costly to the European budget as well as to the environment.

From a social point of view, energy efficiency is the *most cost-effective and sustainable way to reduce households' vulnerability to energy prices*, and especially to *alleviate fuel poverty* (see e.g., Broc et al. 2011). Meanwhile, investments in energy efficiency *support local employment.* This has been confirmed by the Impact Assessment that has analysed the jobs associated with investments in the power sector and energy efficiency in 2030 compared to 2011 for two scenarios including high ambition for energy efficiency improvements.

> *Under both scenarios employment impacts in the last 5 years up to 2030 are more pronounced with up to **823,000 additional jobs compared to Reference, mainly due to high investments in energy efficiency**.* (European Commission, 2014b. Impact Assessment accompanying the Communication. A policy framework for climate and energy in the period from 2020 up to 2030. SWD(2014)15, 22 January 2014, p.92)

All the above arguments were already *confirmed by the reviews done within the IPCC.*

> *It is often **more cost-effective** to invest in end-use energy efficiency improvement than in increasing energy supply to satisfy demand for energy services. Efficiency improvement has a **positive effect on energy security, local and regional air pollution abatement, and employment**.* (IPCC, 2007. Contribution of Working Group III to the Fourth Assessment Report of the IPCC. p.13)

In addition to the scientific evidence, these arguments are widely shared by most of the decision makers and stakeholders, as shown in the following quotes (the list could be continued by many others).

> *Energy efficiency measures can make a significant contribution to **reversing current trends in energy prices and costs.** (...) Energy efficiency measures and programmes should be promoted at all levels.* (Conclusions from the European Council of 22 May 2013, EUCO 75/1/13, p.5)

> *There is this myth that goes around that we are not doing anything about energy efficiency, whereas in fact we are doing huge amounts. It is something I feel passionately about because **it is the lowest cost and creates lots of jobs.*** (UK Secretary of State for Energy and Climate Change - Ed Davey, interviewed by Euractiv, on 4 March 2014)

[22] It should be reminded that the 2050 roadmap means a significant decrease in the energy consumption.

> ***We believe that energy efficiency is the best way to reconcile economic growth and environmental protection****. The EU and the world must come to grips with major challenges: combating climate change, a secure energy supply, and higher energy costs pushed up by ever stronger demands from emerging countries.* ***The solution is first and foremost to identify more efficient ways of producing and using energy****.* (Statement by Jürgen R. Thumann, former President of BusinessEurope, 22 September 2011.)
>
> *Energy efficiency is the most cost-effective way to make Europe more climate-friendly, energy-secure and competitive.* (Business Europe., 2011. EU Energy Efficiency Policy, Policy briefing, 4 November 2011.)
>
> *A stronger policy on energy efficiency and energy savings is a* ***good answer to the global economic crisis*** *as it creates* ***"non-exportable" jobs*** *and* ***strengthens economic growth*** *in Member States. European Commission, 2013. Energy Efficiency Strategy: progress towards the 2020 EU target and next steps. Communication of the European Commission, August 2013, p.2*
>
> ***Improved energy efficiency makes an essential contribution to all of the major objectives*** *of EU climate and energy policies: improved competitiveness; security of supply; sustainability; and the transition to a low carbon economy.* ***There is broad political consensus about its importance****.* (European Commission, 2014a. A policy framework for climate and energy in the period from 2020 to 2030. COM(2014)15 final, 22 January 2014, p.7)

Therefore one can be surprised to see again the *low political priority given to energy efficiency* in the climate and energy policy framework proposed for 2030 (as no target for a sustainable energy demand is included in the proposal published in January 2014) as well as in the positions in favour of a sole target for GHG emissions only, as defended by several Member States and stakeholders.

From the European Commission's perspective (according to the Impact Assessment), energy efficiency does remain a priority and key pillar for the European energy policies. The decision whether to include or not a target for sustainable energy demand in its proposal was postponed after the review of the progress of the Energy Efficiency Directive's implementation (due by the end of June 2014, or more likely July 2014).

As the decision of the European Council about the 2030 climate and energy policy framework has been postponed to the Council's summit of October 2014*, a proposal about a target for sustainable energy demand can still be taken into account in the Council's discussions.*

The argument of the review of the EED to postpone this proposal does not justify by itself why the principle of a target for sustainable energy demand could not be included in the proposal made in January. The main underlying argument is that there would be too many uncertainties in the field of energy efficiency policies (about current progress and about the most relevant type of target to adopt).

But uncertainties are also significant in the fields of mitigating GHG emissions and of Renewable Energy Sources:

- the previous and current period of the ETS have shown critical problems, leading to consider a significant reform of the scheme ;
- strong variations in the support mechanisms for RES in many countries have raised concern about whether the previous positive trends towards the 2020 target would be pursued for 2014-2020 (as noted in the Impact Assessment).

Setting target is by essence one of the policy instruments to address this kind of uncertainties. This is indeed one of the key recommendations made by the Energy Efficiency Financial Institutions Group (EFFIG, 2014): "Deliver regulatory stability for energy efficiency investing in buildings through the provision of long-term regulatory pathway visibility, with respect of energy efficiency, and specifically in the context of the upcoming 2030 Climate and Energy package".

The results and conclusions from the scenarios analysed in the Impact Assessment support positions in favour of a binding target for sustainable energy demand. The best results (for most of the indicators: reductions of GHG emissions, energy system costs, global GDP,...) are indeed achieved with the scenarios including so-called "explicit ambitious energy efficiency policies". This is analysed in the section 5.8 of the Impact Assessment.

> ***None of the scenarios/policy options*** *presented and analysed in previous Sections* ***will materialise unless there is significant improvement of energy efficiency****, driven inter alia by public policy across the EU economy up to 2030 and beyond.* ***Energy efficiency is therefore fundamental for the transition****.* (European Commission, 2014b. Impact Assessment accompanying the Communication. A policy framework for climate and energy in the period from 2020 up to 2030. SWD(2014)15, 22 January 2014, pp.118-119.)

The report mentions that the modelling used assumes a successful implementation of the energy efficiency policies and measures included in the scenarios. Previous and current analyses of the implementation of the energy efficiency policies have shown that implementation tends to be weaker than planned, leading to miss the 2020 target for energy efficiency, and despite an increasingly comprehensive set of measures (as defined for example in the EED).

A binding target for sustainable energy demand is therefore needed to change these conditions, and support a stronger and effective implementation of the energy efficiency policies and measures, in particular by increasing the level of confidence between the stakeholders (as explained in EFFIG, 2014).

Why a framework based on a sole target for GHG emissions only would be misleading: What does the Impact Assessment tell us?

According to the analysis of the public consultation based on the Green Paper, there is a large consensus about the need for a GHG target in the 2030 climate and energy policy framework, while there are conflicting views about including a RES and/or an energy efficiency target.

The main arguments presented to support a sole target for GHG emissions only are that:

1) it would reduce the complexity of the framework and the risk of inconsistencies

2) it would ensure flexibility (and technological neutrality) and above all let Member States the freedom to choose their energy mix

3) a sole target for GHG emissions only would be a sufficient signal to stimulate the most cost-effective investments in energy efficiency and renewable energy sources.

Discussing argument 1:

Arguing that having three targets make the picture more complex, and even may explain part of the EU ETS failure, is a non-sense: renewables and energy efficiency will still exist, even if no targets support their development. They would develop slower than needed, which would lead to extra costs to meet the long-term objectives (as shown in the Impact Assessment[23]).

The problem raised is not due to the existence of targets, but to the level of the targets (ambition) and the policies implemented to meet the target, and especially to the fact that these policies miss integration.

Setting a target for GHG emissions only will not solve this problem, while sending a wrong signal to market actors about the future of energy efficiency and renewables. The results of the different scenarios tested in the Impact Assessment show clearly that there might be *risks of inconsistencies* between reducing of GHG emissions, improving energy

23 "*While that 2050 target could in principle be reached also with a 35 percent target for 2050, the Commission's current analysis suggests that it would come with additional costs over the entire time period, up to 2050*" (Impact Assessment, p.135)

efficiency and increasing the share of RES *only if the targets have low ambition.* The most *ambitious scenario* tested in the Impact Assessment (-45% GHG, 35% RES and 34% energy savings for 2030) *induces complementarities* between the three components. Moreover, it is also the only scenario[24] where significant reductions of GHG emissions are achieved in both simultaneously, ETS and non-ETS sectors.

This is shown as well by the fact that "*in a 2050 perspective, the differences between different scenarios consistent with the 2050 GHG objective (i.e. those with enabling policies) reduce considerably*" (Impact Assessment, p.60), with the ambitious (and needed) objective of reducing GHG emissions by 75 to 80%.

Therefore, *the issue is not to oppose the types of targets, but to choose an appropriate level of ambition.* One of the main conclusions of the Impact Assessment (p.136) is indeed that the scenario with the highest ambition for energy efficiency delivers the highest benefits:

"a high level of ambition has the potential to better contain the operational energy cost impact of higher energy prices as well as the potential cost impacts of ambitious GHG and renewables targets due to its lowering impact on reducing total energy consumption itself, which is a key concern for certain energy consumers. Moreover, given a certain GHG target to be achieved, health benefits and impacts on the energy trade balance are larger with a higher level of ambition regarding energy efficiency, which is also expected to lead to more positive GDP and employment impacts".

The only drawback pinpointed by the report is the risk of "*short to medium term cost increases that pay off only in the medium to long run*". This barrier of upfront investment is indeed one of the key reasons why strong public policies are needed to support energy efficiency improvements, see proposals made for example in (EEFIG, 2014). Moreover, taking this opportunity will reinforce the advantage of European industries to be leaders of the growing energy efficiency markets (see e.g., IEA, 2013b).

Finally, the debates should not be confused by the problems encountered with the ETS. As noted in the Impact Assessment (p.37):

"*On the one hand, energy efficiency and renewable energy policies interact with the EU ETS. On the other hand, together with policies to reduce non-CO2 emissions, energy efficiency and renewable targets are also the principal tools to effectively reduce emissions in the non-ETS sectors and to respond to some challenges relating to security of supply and competitiveness*".

Discussing argument 2:

A target for sustainable energy demand would not create any constraint on the energy mix chosen by the Member States. At the opposite, **a lower and better managed energy demand means a lower pressure on the energy system**, by facilitating the matching between demand and supply, reducing GHG emissions (at source) as well as the needs for energy imports.

This has been confirmed by the conclusions from the 5th Assessment of the IPCC (2014b, p.21): "***Near-term reductions in energy demand*** *are* ***an important element of cost-effective mitigation strategies****, provide* ***more flexibility*** *for reducing carbon intensity in the energy supply sector,* ***hedge against related supply-side risks, avoid lock-in to carbon-intensive infrastructures, and are associated with important co-benefits*** *(robust evidence, high agreement)*".

Likewise, a target for sustainable energy demand **would not limit the flexibility** Member States may use to meet the 2030 targets. Energy efficiency improvements can be achieved

24 Another scenario also leads to similar (but lower) emission reductions in ETS and non-ETS, this is the scenario assuming a similar carbon values for the non-ETS sectors as in the ETS sectors. In concrete terms, this would very likely mean implementing a carbon tax, as extending the ETS to non-ETS sectors does not seem feasible due to the very large number of consumers to cover, unless adopting an upstream approach similar to energy efficiency obligation schemes (as noted in the section 7.8 of the Impact Assessment).

in all sectors, using various types of measures. Every Member State could therefore define its own priorities, according to its national context and specificities.

Moreover, there is no risk of having a "too ambitious" target for sustainable energy demand. As mentioned above, the Impact Assessment has shown that the higher the ambition for energy efficiency, the higher the benefits for the society. It is a "no regret" option.

At the contrary:

"*a single GHG target without more ambitious RES and energy efficiency targets is expected to result in lower positive impacts on the EU's negative trade balance (net energy imports) in a 2030 perspective and beyond. It is also expected to result in lower GDP and employment compared to a Framework based on more ambitious targets for also renewables and energy efficiency*" (Impact Assessment, p.134).

Discussing argument 3:

The main underlying assumption arguing that a sole target for GHG emissions only leads to EE and RES investments is that the carbon price could be a sufficient driver. This assumption does not resist against analyses of past achievements and future conditions.

A target for GHG emissions only would tend to favour fuel switching (especially from coal and oil to gas plants) and then carbon capture and storage[25], instead of EE and RES. This would reduce the GHG emissions, but would increase the energy imports (hence energy dependency). Moreover, this does not come out as the best option to reduce the energy costs (hence improving competitiveness) as analysed in the Impact Assessment (p.134):
"***this* [a target for GHG emissions only] *may risk to not sufficiently reflect the complexity of energy objectives in a 2030 perspective which in addition to environmental sustainability (including GHG reductions) are competitiveness and security of supply***".

Overall, the results of the Impact Assessment show that a target for GHG emissions and a target for sustainable energy demand are neither "overlapping" nor "redundant", as claimed by some large businesses, energy intensive companies or utilities. Moreover, the same stakeholders also put the emphasis on the competitiveness criteria. Based on the results and conclusions from the Impact Assessment mentioned above, their position in favour of a target for GHG emissions only turns out to be paradoxical, as energy efficiency stands out as a key driver for competitiveness and lowering energy costs (see above explanations and references).

On the other hand, the *high uncertainties about the carbon price* (as observed in the previous and current periods of the ETS) would not create the conditions for a clear level playing field for decision makers and investors[26]. Likewise, if international offsets are allowed, this would also decrease the incentives for EE and RES investments.

In addition, a large number of studies and analyses (see explanations below about the reason 2 for a target for sustainable energy demand) have shown that the *economic agents do not behave in a purely rationale manner* as assumed when considering that the options for reducing GHG emissions would be chosen according to a marginal abatement cost curve. This is usually addressed in the modelling by affecting distinct discounting rates according to the types of actions. In practice, this means that specific policy instruments are required to overcome the corresponding barriers.

In particular, while usually being more cost-effective over a life cycle, the energy efficiency options imply a policy package, ensuring its effective implementation and the

25 Where this technology is implementable (only few sites in Europe)

26 It should be noted that at the opposite, the PRIMES modelling assumed a "*perfect foresight of the carbon price progression in the period 2020-50*" (Impact Assessment footnote 65, p.54).

involvement of numerous stakeholders. This has often led decision makers to *favour options on the supply-side, easier to implement, but less beneficial to the whole society.*

The Impact Assessment (p.31) indeed points out that:

"*there are also other non-economic barriers and market failures e.g. with regard to renewables and energy efficiency. Authorities, regulators, energy system operators, investors and manufacturers of innovative low carbon technology therefore* ***need urgently a clear and coherent climate and energy policy framework that creates predictability and reduced regulatory risk*****".**

2) Policies address individual barriers to deliver collective benefits

Energy efficiency requires policy support for addressing barriers at individual levels in order to deliver collective benefits

By reviewing the above arguments, one may wonder why a target would be needed for sustainable energy demand: if energy efficiency is really the most cost effective and sustainable option to meet climate and energy goals, and that in addition it helps countries addressing their priorities such as economic development, it should happen "naturally".

This would be partially true in a theoretical world, where people (public or private decision makers, individuals, etc.) would always act rationally from a pure economical point of view, taking into account a medium to long-term perspective. However, a lot of research has shown that the real world is far from running like this: see for example the explanations given in (eceee, 2013) and the related references on behavioural economics.

Therefore, while energy efficiency has been recently acknowledged by the IEA[27] as well as by financial institutions (see EEFIG, 2014) to be respectively the *world and the EU economy's first fuel*[28], the untapped energy savings deposit remains large (see e.g., Fraunhofer ISI, 2012 or Worrell et al. 2009).

Market imperfections and several types of *barriers* (upfront cost, default of information, principal-agent or split incentives problems, low priority given to energy compared to other concerns,...) explain this *gap***.** This is reminded in the Impact Assessment and has been analysed in details in the literature (see for example: Cooremans, 2011 ; Jaffe and Stavins, 1994 ; Golove and Eto, 1996 ; IEA and OECD, 2007 ; IPCC, 2014a ; Sanstad and Howarth, 1994 ; World Energy Council, 2013). In particular, one may not forget that in everyday life of households or organisations, energy is only one of so many issues, often lying way behind more obvious considerations, such as well-being or short term profits.

As an example, the more than €400 billion/year paid by the European countries to import oil and gas definitely is a striking number. Member States' energy ministers (and even economy ministers) surely keep that in mind. But most of households or companies likely feel not so concerned about it, as for most of them, energy represents a small share of their expenses. At the opposite, this is an important issue for low income households or energy intensive industries, having a higher budget share passed on energy bills. Likewise, this may become a priority concern for Central and Eastern European countries, in case of a Russian-Ukrainian crisis in Winter time, that may affect the access to gas for heating.

In addition, energy efficiency measures may be often perceived by non-energy experts as too technical. This may be true for some actions, but generation plants and other energy infrastructures require a much higher level of technical expertise. In fact, energy efficiency measures are a much better way to *facilitate the empowerment of energy users*. Another common barrier is that policy makers may be reluctant in getting involved with energy efficiency policies, as the number of stakeholders to have on board may be much higher

27 http://www.iea.org/newsroomandevents/pressreleases/2013/october/name,43788,en.html
and http://www.iea.org/Textbase/nptable/2013/EEMR2013_f3_4.pdf

28 This has also been noted by the European Commission (2011a, p.2): "*In many ways, energy efficiency can be seen as Europe's biggest energy resource*".

than for policies on energy supply, which is a highly concentrated sector. Likewise, one generation plant often equals to a large number of energy efficiency measures to get the same volume of MWh. But this high number of energy efficiency measures needed is also the *reason why energy efficiency policies create more jobs than the power sector* (as mentioned in the Impact Assessment).

The barriers mentioned above often make decision-makers forget that energy efficiency measures are cheaper on a life cycle basis, avoid environmental impacts and help achieving key general objectives (e.g., better health/work conditions, higher economic activity).

The past achievements have proven that only a small share of the energy savings potentials is tapped "naturally": see for example quantitative analyses done in (Ecofys and Fraunhofer ISI, 2010). In most cases, **a policy framework is required** to overcome the various barriers creating a gap between potentials and achievements. This policy framework is indeed essential for the EE measures to be implemented at the individual level in order to deliver collective benefits.

This has also been pointed out by the European Commission.

> *A number of studies have proven that the economic potential for energy savings for 2020 and 2030 cannot fully be realised without additional public intervention because of the market and regulatory failures. A number of policies are adopted at national level but they do not seem sufficient and, moreover, in some cases they could also create concerns for market foreclosure. Therefore, a coordinated EU strategy and an overall EU level framework are needed to achieve the uptake of the economic potentials and the realisation of the other benefits of energy efficiency as well as to ensure consistency with the internal energy market.* (European Commission, 2013. Energy Efficiency Strategy: progress towards the 2020 EU target and next steps. Communication of the European Commission, August 2013, p.2)

3) A global target is a driver and a key complement to sectoral measures

As noted by Harmsen et al. (2014), another common argument against a global binding target for sustainable energy demand is that *binding provisions or measures* are already defined in several European Directives to overcome the aforementioned barriers (see Annex C for a review of these European measures) and should be sufficient drivers.

On the one hand, despite an increasingly comprehensive set of policy measures and regular upgrades, the *implementation* of the European Directives has been overall *too weak.* This led the European Commission to observe in its Energy Efficiency Plan 2011 that the European Union was "on course to achieve only half of the 20% objective" (by 2020). This has indeed been one of the key rationales for proposing the new Energy Efficiency Directive (EED).

The Impact Assessment mentioned that the current trends would lead to achieve only a 17% energy savings by 2020 against the baseline scenario defined in 2007 (compared to the 20% objective). The 2020 energy efficiency target is therefore very likely to be missed, despite the EED.

So far, the global targets set for 2016 (in the Energy Services Directive, ESD) or for 2020 (first in the current energy and climate package defined in 2008, and now updated in the EED) have been indicative. This has not provided the momentum needed first, to negotiate ambitious and clear enough sectoral provisions for energy efficiency, and second, to stimulate an effective implementation of these provisions (see for example the case of provisions for the public sector, as highlighted in the assessment of the first NEEAPs (European Commission, 2009), or the first analyses about the implementation of EED article 7 for energy efficiency obligations (Coalition for Energy Savings, 2014)).

A binding global target for 2030 will change this situation and *create favourable conditions for better negotiations and stronger implementation.* For example, this would encourage Member States having a position for stronger requirements about the minimum

performance standards of the Implementation Measures related to the EcoDesign Directive, about the provisions for existing buildings related to the EPBD, or being more ambitious in the implementation of the EED article 7.

This analysis has been confirmed by information from EurActiv, based on a survey of government officials and advisers. The feedback they gave to EurActiv clearly shows that *many governments are not taking European requirements about energy efficiency seriously enough, as long as the global objectives remain indicative.* Indeed, the services in charge of energy efficiency policies are often given lower priorities compared to others, such as the ones in charge of energy supply.

This results in a significant *political gap* between strong words supporting energy efficiency as a key resource, and moderate decisions that do not translate into concrete acts (about this, see for example the analyses made by the Coalition for Energy Savings).

In addition, it is *easier to achieve an ambitious target through one negotiation for a global target,* compared to many ambitious sectoral targets that would require for each of them its own negotiation. A global target would support a higher consistency in the ambition level among sectoral measures.

On the other hand, a global binding target is also needed as a *complement to sectoral measures.*

Sectoral measures are essential to act on barriers already identified. However, *a combination of sectoral measures does not necessarily provide a comprehensive strategy.* This has been for example highlighted by the review of the second NEEAPs (National Energy Efficiency Action Plans) submitted by the Member States to the European Commission in 2011.

> *An effective implementation of the measures introduced by EU Directives will require a higher degree of harmonisation and integration. Up to now, measures addressing different sectors are often* ***not well aligned with each other*** *or lack a clear design when it comes to their implementation at the Member State level. Moreover, certain end-use areas are still not addressed sufficiently (e.g. modal shift in transport, coherent policy packages for industry including carriage of goods, etc.).* (Conclusions from the IEE-project Energy Efficiency Watch, EEW, 2013, p.3.)

A global binding target will be a clear signal in favour of *more integrated* energy efficiency policies and measures, and will be a key driver for *more effective implementation.* This has also been pointed out by the European Commission.

> *The added value of dealing with energy efficiency issues at EU level lies with a better coordination and a streamlining of often fragmented national policy approaches towards energy savings.* ***Only with this coordination can the full range of benefits attributed to energy efficiency be realised,*** *notably reduction of costs, reduced CO2 emissions, increased energy security through a more efficient use of energy resources, jobs' creation/retention and increased competitiveness.* (European Commission, 2013. Energy Efficiency Strategy: progress towards the 2020 EU target and next steps. Communication of the European Commission, August 2013, p.2)

Sectoral measures also fail to address *structural effects,* as for example urban sprawl. These effects have been responsible for a very significant share of the energy consumption growth, as for example the increase in distance travelled for commuting trips (Ajanovic et al. 2012 ; Sessa and Enei, 2009), or the development of new energy end-uses (for electricity).

Energy usages will always evolve faster than EU regulations. A global target is a strong incentive not to wait for specific regulations before acting on uncovered but significant causes of inefficient energy consumption.

Sectoral measures tend to focus the attention where solutions are well-known, where we know we can act (and how). They are necessary. But another significant amount of energy

consumption to be managed may have other causes. A global binding target is a way *not to "look for his keys under the street light",* and to include in the analyses all the energy end-uses, all the drivers for energy consumption and finally all the possible sources of energy savings and demand-side management.

This is of upmost importance if the objectives for 2050 are to be met. They do imply critical changes not only on technological aspects (as Zero or Positive Energy Buildings, low emissions vehicles) but also on behavioural and *organisational aspects. Structural changes in* the organisation of industries, cities,... cannot be short term actions. They *require time* and they will happen only if they are stimulated from now thanks to a clear perspective, whose a 2030 target is a key milestone.

4) The transition towards a low carbon society needs medium term visibility to happen

The 2030 Climate and Energy framework must be analysed in the perspective of the 2050 roadmap defined by the European Commission (2011b), in line with the European Council's conclusions of 4 February 2011 setting the objective of reducing greenhouse gas emissions by 80-95% by 2050 compared to 1990.

> *The proportionality of the initiative should also* ***consider the long term benefits*** *of the proposed course of action up to 2030 (including the prospects of contributing to energy security, global climate change mitigation and sustainable growth), and* ***not only be based on short to medium term impacts.***
>
> *Greenhouse gas emission reductions in line with the EU's long term climate objective imply* ***structural changes in all sectors*** *of the economy and* ***good coordination*** *of these changes.* (European Commission, 2014b. Impact Assessment accompanying the Communication. A policy framework for climate and energy in the period from 2020 up to 2030. SWD(2014)15, 22 January 2014, p.34 and p.153)

The scenarios analysed by the European Commission assume that the rate of emissions reductions will increase over time, as more and more solutions will become available and cost-effective.

For that to happen, strong signals are needed from now, so that decision makers include this long-term objective in their strategies. This analysis is supported by the European Council's conclusions: *"due consideration should be given to fixing* ***intermediary stages*** *towards reaching the 2050 objective".*

On the one hand, investors, companies and other organisations need medium term visibility (see e.g., EEFIG, 2014). For most of them, what they will do from 2021 is already under discussion, especially as regards strategic choices or investments in infrastructures.

The transition towards a low carbon economy does not only require technological improvements or changes. It implies "out-of-the-box" thinking and preparing for large structural changes. This means for example changing business models, transferring innovation into the markets, training professionals with new skills, promoting new types of services, behaviours or even ways of life.

> *The time up to 2020 is also insufficient for the establishment of business solutions and of markets for energy efficiency and services. Therefore, a long-term and coherent policy framework is needed to reduce the perceived risk amongst the investors and to outline a relatively stable policy environment for investors and consumer alike.* (European Commission, 2013. Energy Efficiency Strategy: progress towards the 2020 EU target and next steps. Communication of the European Commission, August 2013, p.2)

All this does not happen in one day. A medium to long-term perspective is essential to support *market transformation,* as well as the *transition to a resource efficient economy.* A clear message is awaited to shift the focus from considering producing ever more as the top priority whatever the consequences, towards efficiency first, thinking about what the

needs are (see for example the concept of energy sufficiency[29]), and not only about what we are able to produce.

As explained above, efficiency and competitiveness should not be opposed. Efficiency actually reinforces long-term competitiveness (as explained above in the reason 2 for a target for sustainable energy demand). However, subsidising fossil fuels, in a way or another, cannot match with an "efficiency" scenario. It would create a short-term illusion of lower energy prices, make energy efficiency investments less attractive, and above all, it would take a share of the public budget that would not be available anymore to support energy efficiency policies.

Significant changes in the energy mix (including an increasing share achieved through energy efficiency) are needed to meet the low carbon society as defined in the 2050 roadmap. The underlying changes in the balance of power among stakeholders should not be overlooked. Achieving a low carbon society likely means a change in the governance of the energy systems.

On the other hand, the general objectives of energy policies at the European level (security of supply, competitiveness, mitigation of environmental impacts, energy affordability for all) cannot be achieved by an addition of separate national policies:

- what happens in a country has consequences for its neighbours (for example when dealing with transnational freight);
- many products and services already correspond to a European (if not worldwide) market (a country alone has a small weight when talking to manufacturers for example);
- European funds can have a decisive leverage effect (for example by earmarking priorities of investments).

The pros and cons of a binding energy efficiency target are summarised in ***Table 3*** below (see also Bosseboeuf and Broc, 2011).

Table 3. Pros and cons of a binding target for sustainable energy demand.

Pros	Cons
• Current European policies are not sufficient • Existing binding targets are successful • Experience for monitoring has increased either at national or European levels • Mandatory target on GHG emissions do not necessarily deliver more energy efficiency • Positive effects and co-benefits on other objectives of the EU policy (for ex., most certain and cost-effective options for security of energy supply)	• Not all binding targets work (if badly designed, a target may not deliver the expected results) • Setting a target year may create bias: stakeholders may wait for the last moment to act • Energy savings are difficult to evaluate • What penalty system for non compliance? (what juridical basis?) • The most important is policy implementation, not targets (mandatory policies could be a better way)

[29] For more details, see http://www.eceee.org/policy-areas/sufficiency

How can a target be set and monitored?

How to set an appropriate and effective target?

Based on the analysis of available experience feedback (see for example: Lester and Neuhoff, 2008), the key elements to set a target are:

- the process for *negotiating* the target;
- the definition of a *suitable metric;*
- and the *institutional implementation.*

In practice, a target for energy efficiency should be:

Easy to understand:

The basis of the target should be clear, and should not let room for conflicting interpretations. This criterion favours the definition of a target in absolute terms (either an energy consumption level like in the EED article 3, or a given volume of energy savings like in the ESD article 4) against a target that would be compared to a baseline scenario (like the 20% energy efficiency improvement of the 2020 energy and climate policy framework).

Ambitious and achievable:

The level of the target would have a stronger foundation if based on analyses of the energy savings potentials, taking into account technical, economical and social aspects. Insights about national specificities, dynamics for implementation (e.g., investment capacities, skilled workforce) and potential co-benefits would be very useful complementary information, especially in a perspective of opportunity sharing.

Putting the proposed level of target into an open discussion would facilitate the appropriation of the target by the stakeholders, while also giving more confidence that the target is achievable.
In parallel, the decision makers should ensure that the target is ambitious enough to stimulate additional actions, and consistent with longer term objectives (especially the 2050 roadmap).

Based on open and transparent negotiations:

The consultation based on the Green Paper has gathered qualitative arguments from Member States and stakeholders, that are summarised in the Impact Assessment. The European Commission also consulted Member States for the preparation of the Green Paper and along the preparation of the Impact Assessment.
However, it is unclear whether quantitative contributions (e.g., based on national or stakeholders' studies) were brought to the discussions. The Impact Assessment does not mention any contribution of this type. Likewise, it is unclear how the Impact Assessment and the bottom-up study for assessing the energy savings potentials will be combined to examine the possibility of a target for sustainable energy demand.
Meanwhile, the European Parliament has adopted early February 2014 a resolution including a proposal for the 2030 framework with three targets (for GHG emissions, RES and energy efficiency). It is also unclear how this proposal will be taken into account.

The Impact Assessment and the study assessing the energy savings potentials are well-documented. They can therefore be referred to when defining the level of the targets. In parallel, the negotiation process could allow other quantitative contributions from Member States or stakeholders, provided they are documented as well.

Conflicting views could be used to discuss the major barriers and ways to address them.

Transparent to monitor and verify:

The rules for monitoring and verifying the achievements of the target should be defined simultaneously to the target. If done afterwards, this could be equivalent to redefining the

target. This is for example one of the major reasons why the results reported so far by the Member States in their National Energy Efficiency Action Plans were not harmonised and could not be added to give a European overview.

These monitoring and verification rules should clarify beforehand what data will be used, how they will be validated and processed. This is also important to create the *conditions for stability and visibility* needed by stakeholders to define their strategies.

Significant experience has been gained in the evaluation of energy efficiency policies and the monitoring of energy savings or energy efficiency trends[30] . This makes it possible to define a clear framework to monitor and verify energy savings.

The monitoring efforts are not to be perceived as administrative costs and burden only. They provide valuable inputs for a better understanding of past achievements and for the update of further policies. They are also very important for an effective experience sharing.

Consistent with other targets and objectives:

Energy efficiency is one of the key components of the energy policies. An energy efficiency target has therefore strong interactions with other components, such as targets on reductions of GHG emissions and on use of renewable energy sources[31]. *The consistency* between these components *can only be ensured if the respective targets are defined simultaneously.*

Altogether, these criteria are meant to make the target *attractive* for decision-makers and stakeholders. A target is indeed to be used as a communication tool to involve the relevant stakeholders. Its formulation should make it effective to promote. For example, the catch line of 3*20 for 2020 was successful in this respect.

Moreover, whatever the target defined, setting a target cannot deliver results alone. This should come with *accompanying measures and intermediate indicators.*

Main types of targets for energy efficiency: pros & cons

The key aspects when designing a target for sustainable energy demand are summarised in ***Table 4*** below.

Table 4. Key design options for a target for sustainable energy demand.

Features	Possible options
Scope	• *coverage (energy end-uses)*: economy-wide/global or sectoral • *geographical*: EU level or Member States' level
Metric	• final or primary energy
Indicator	• energy savings, level of energy consumption or energy intensity
Reference	• *reference type*: absolute (base year/period) or relative (baseline scenario) • *reference level*: energy consumption or energy performance/efficiency • additionality (or eligibility) criteria
Timeline	• target year, regular milestones or annual basis
Commitment	• binding or indicative

[30] See for example the experience gained with energy efficiency obligation schemes in UK, France, Italy or Denmark, the Intelligent Energy Europe projects EMEEES and ODYSSEE-MURE, and the proceedings of the panel "monitoring and evaluation" of the eceee Summer Studies and of IEPPEC (see the references section).

[31] For detailed explanations, see (Eichhammer, 2013)

Sharing	• uniform or taking into account specificities (among Member States)

The ambition level of the target can be considered on a transparent and fair basis only once these features are clearly defined. It can then be set according to the analysis of the energy savings potentials (see next section), using the same reference system and taking into account the dynamics for implementing actions.

Table 5 below reviews the *previous targets for sustainable energy demand set in European Directives* or for the 2020 framework.

Table 5. Previous targets for sustainable energy demand set in European Directives.

Directive or framework	Features of the targets
2020 framework: 20% energy efficiency improvement by 2020	indicative target at the European level for all sectors, defined as a relative improvement compared to a baseline scenario, then translated into a level of energy consumption not to overpass
Energy Services Directive: 9% energy savings in 2016	indicative target at Member States' level for non-ETS end-use sectors, defined as a volume of energy savings to be achieved in 2016, calculated from a uniform percentage of Member States' annual energy consumption averaged on a three year reference period
Energy Efficiency Directive's article 3: no level defined for Member States, but a reminder of the 2020 European objective	indicative target at the European level for all sectors, defined as levels of primary and final energy consumption for 2020 not to overpass, and based on the target of the 2020 framework
Energy Efficiency Directive's article 7: 1,5% energy savings/year for 2014-2020	mandatory target at Member States' level for all end-use sectors, defined as a volume of annual energy savings over the period 2014-2020, calculated from a uniform percentage of Member States' annual energy consumption averaged on a three year reference period (consumption of transport may be partially or fully excluded)

It should be noted that, except for the target of EED article 7, all targets are indicative. Likewise, all the targets are uniform (same percentage applied to all countries), except for the target of EED article 3, where Member States define their own level of target.

It is also important to keep in mind that the target of 20% energy efficiency improvement by 2020, in addition to be only indicative, has not been officially shared among Member States. No national targets were set from a common decision taken at the European level, until the EED entered into force (see eceee, 2011 and Enerdata, 2011) for a detailed review and analysis of national targets before the EED).

At the opposite, the targets for GHG emissions and renewables are binding, and include a clear sharing among Member States jointly decided at the European level.

Defining the *energy efficiency target* as indicative and *not clarifying the criteria for sharing among Member States* are therefore leading to the first risk with target setting mentioned in ***Table 1*** (p 8.): the framework induces Member States to give a much higher priority to the targets for GHG emissions and renewables compared to the target for energy efficiency. This is one of the *major reasons why the energy efficiency target is likely to be the only one missed out of the 2020 package.*

EED article 3 has now required Member States to set an *indicative national energy efficiency target for 2020.* EED article 3 states that the target shall be expressed in terms of an absolute level of primary energy consumption and final energy consumption in 2020. However, Member States have the flexibility to use their own methodology to set their target, in particular as regards the level of their target, and by allowing defining first the national targets with another indicator (primary or final energy savings, or energy intensity). This led to heterogeneous targets, which makes very difficult to analyse the contribution for the European target planned by each Member State.

Back to the 2030 horizon, the different options for each key aspect of a target are discussed below, mostly based on (Bosseboeuf and Broc, 2011), (Ecofys and Fraunhofer ISI, 2010) and (Harmsen et al., 2014).

Economy-wide/global or sectoral: a need for more integration

The rationale for a global target, complementing the existing sectoral provisions, has been explained (see pp. 19–21). The pros and cons of each option are summarized in ***Table 6*** below.

Table 6. Main pros and cons for the different types of target coverage.

Type of coverage	Pros	Cons
Global	favour more integrated strategies address all sources of energy consumption make the link with long term objectives easy to monitor with available statistics	may be more difficult to relate to actions evolutions due to many factors that may be difficult to separate: (non-)achievement may not be due (partly) to energy efficiency policies and measures
Sectoral	can be set directly in link with energy savings potentials easier to separate changes due to energy efficiency improvements from other factors	may narrow and split the efforts may induce a juxtaposition of fragmented policies instead of comprehensive strategies may focus attention on whatms achievable now than, overlooking long term objectives statistics needed for monitoring may not be available in all Member States

Sectoral measures or provisions are already in place at the European level, for many end-uses. They have already brought significant volumes of energy savings, but not as much as what could be achieved. And not all energy savings potentials are covered.

The priority should therefore be to set a global target, in order to stimulate more ambitious sectoral measures, with a stronger implementation. The relevance of updates or additional sectoral measures has to be analysed taking into account the available energy savings potentials, but also the main factors explaining the energy consumption levels and current trends in energy consumption.

For example, a target for energy savings in existing buildings should not be the starting point of the European energy efficiency strategy for 2030, but the result of the commitment to a global target.

To be consistent with the metric chosen, the global coverage should correspond to all end-use sectors for a final energy target, and to all sectors (including energy generation and transmission) for a primary energy target.

EU or Member States' level: a need for a clear commitment by each Member State

As analysed for the 2020 framework, any target for sustainable energy demand endorsed at the EU level should be clearly shared among Member States.

At the opposite, national targets that would be defined independently from each other would unlikely form a consistent package and add up to the objective needed at the European level (see more details about national targets for 2020 in annex C), in line with the 2050 roadmap. The past has not seen such spontaneous coordination happening[32].

Therefore, the combination of a European target officially shared among countries appears the most relevant option to get a clear commitment from each Member State, while ensuring consistency with long term objectives for Europe. The experience of the strong RES development after the commitment of Member States to the binding 2020 target for renewable strongly supports this argument (see discussion below about binding vs. indicative target).

Final/primary energy: better when combined

A target in *final energy* unit *ensures that improvements are made on the demand-side,* meaning on end-use consumption. It has for example been the choice for the ESD target. In addition, a target in final energy unit avoids the issue of converting electricity (or heat from district heating) savings into primary energy unit, meaning that no discussion is needed about the related conversion factors/efficiencies.

At the opposite, a rule should be adopted to avoid that any substitution from fuels to electricity could count as final energy savings (as not always the case). Accounting of heat pumps and electric vehicles for example should be given a particular attention. A risk with a target in final energy is indeed to give more weight[33] to energy savings from fuel, compared to energy savings from electricity and district heating. A solution can be to weight each type of energy sources according to its average ratio for conversion from primary to final energy. Such conversion factors have been defined in ESD Annex II, and then updated in EED Annex IV.

A target in final energy alone does not provide incentives for efficiency improvements on the supply-side. The EU Emissions Trading Scheme is assumed to induce higher efficiency in the generation of electricity and heat (for plants with a power over 20 MW). More generally, the increasing share of RES leads to higher primary efficiency[34]. But a significant potential or primary energy savings can still be achieved by reducing losses of energy networks and promoting Combined Heat and Power or district heating (or cooling).

These potentials are covered when the target is expressed in *primary energy* unit. But then, conversion efficiencies for electricity and district heating should be defined. This may be politically sensitive and/or may create sources of opacity. An alternative is to use a weighting factor for electricity and district heating constant among Member States and over time, as proposed by (Harmsen et al., 2014).

A target in primary energy alone would though bear the risk of not ensuring final energy savings are achieved.

> *The difference is that a target on final energy consumers will give a higher priority to end-use sectors (i.e. industry, transport and household and services) whereas a target on primary energy consumption will also include savings in the transformation sector, mainly in the power*

[32] Few Member States had a national target for sustainable energy demand before the ESD entered into force. And few Member States had defined a national target for 2020 until the EED article 3 required it. See (eceee, 2011) and (Enerdata, 2011) for more details about pre-EED targets. See Annex C about national targets for 2020.

[33] As regards their contribution to reducing the primary energy consumption, which ultimately reflects the resource use.

[34] As generation from renewable energy sources is accounted with a 100% efficiency.

sector, which may come from various actions, including the use of renewables. (WEC, 2010. Energy Efficiency: A Recipe for Success, p.49)

This might create a situation where energy efficiency and renewable energies may be *competitors, instead of being complementary.* Any target for sustainable energy demand expressed in primary energy has therefore to be set in consistency with the objective set for renewables (meaning with a high ambition level). The results from the Impact Assessment scenarios show that energy efficiency and renewable energies have higher chances to be promoted in a complementary ways if the targets are ambitious enough[35].

In addition, setting a target in primary energy would need to take into account the matching between supply and demand (in terms of load curves), in order to avoid wasting energy from renewables into wasting forms of end use, including suboptimal efficiency and inflated demand of services (e.g., by promoting an increased use of electricity through direct electric resistance space heating in order to find a market for excess renewable electricity over certain periods).

Based on the above review of pros and cons, the choice to combine both indicators, final and primary energy, comes out the most relevant to set the ground for comprehensive efficiency strategies, which would be as well complementary to the target for RES. This has indeed been the choice of the EED (see its article 3).

In parallel, it would be interesting to study the feasibility of an update of the definition for primary energy, in order to take into account the energy embedded in the infrastructure for generating and transporting energy (which is usually not taken into account for RES, while often significant). This would help to better take into account the overall (or life cycle) resource efficiency.

The 2013 annual reports where Member States have reported their indicative primary and final energy consumption targets for 2020 show that the preference for a primary or final energy metric depends on the national context[36]. The diversity in the ways they use to define their targets points out that a political consensus may be difficult to meet. This first experience within the EED framework has nevertheless proven that it is feasible.

Energy intensity is a tricky indicator. The choice between energy savings or level of energy consumption remains an open debate.

The main pros and cons of each type of target indicator are discussed in ***Table 7*** below.

Table 7, Main pros and cons for the different types of target indicator.

Type of indicator	Pros	Cons
Energy savings (ESD, EED art.7)	Not sensitive to structural and activity effects: results directly related to energy efficiency improvements → best indicator to monitor the results from the actions implemented Easier to define from the assessment of actual potentials Attractive (showing benefits) The evaluation of energy savings increases the understanding of the	Relative quantity that requires to set rules for baseline definition (which may be sensitive) Harmonising energy savings calculations among Member States is difficult, but harmonising the documentation of energy savings could be done and may be sufficient Evaluating net or additional energy savings raises complex

[35] The corresponding ambitious scenario tested in the Impact Assessment is the one with 45% reduction of GHG emissions, 35% share of RES and ambitious energy efficiency policies.

[36] Member States had to express their targets in terms of both, primary and final energy consumption. But they could first define the target with another type of indicator (primary or final energy savings, or energy intensity) (see EED article 3, and Annex C of this paper).

	effectiveness and relevance of the actions and policies. Significant experience has been gained in evaluating energy savings: many countries have now a monitoring or accounting system that could serve as basis for a European framework.	issues such as free-rider effects
Level of energy consumption (or cap on energy use) (2020 framework, EED art.3)	Easy to calculate and monitor (statistics easily available) Clear and easy to appropriate (when defined in absolute terms) Directly related to long term objectives	Highly sensitive to structural and activity effects, especially economic cycles: part of the changes in energy consumptions are not due and/or can not be tackled by energy efficiency policies → issue of whether applying corrections (may not be transparent) May be off-putting if perceived as opposed to economic growth or to re-industrialization
Energy intensity	Easy to calculate and monitor (available statistics) Take into account activity effects (not directly sensitive to economic cycles) Attractive (no impression of cap)	Highly sensitive to structural effects[37], corrections needed (and sometimes difficult) to separate energy efficiency improvements from other factors, so may not be transparent → not easy to appropriate Not directly linked to energy savings potentials Not consistent with the long term objectives (except if no economic growth)
Rate of energy efficiency improvements	Significant experience (especially within the ODYSSEE project) Related to concrete possible energy efficiency improvements Relevant when applied on a disaggregate level (sub-sectors or end-uses) Take into account activity effects and most part of the structural effects (when indicators disaggregated enough)	Requires an accurate definition of the indicators Difficult to apply at the national global level (would require weighting rules which may not be transparent, or not be consistent with the actual energy balance) → not appropriate for a global target

It should be noted that an energy intensity target cannot be aligned with the long term objectives related to climate change and resource depletion (including security of supply), unless an extremely ambitious target would be set (that would then be equivalent to an energy consumption target). Moreover, such an energy intensity target would be opposite

[37] e.g., move of the economy from industry to service

to an objective of re-industrialization, as an increase in the activity of energy intensive industries would be opposed to achieve very low energy intensity.

> ***energy intensity*** *depends on many factors other than technical efficiencies (...) and is* ***not an appropriate proxy*** *of actual energy (conversion) efficiency.* (IPCC, 2014a. Contribution of Working Group III to the Fifth Assessment Report of the IPCC, final draft, Chapter 5, p.34)

An alternative can be seen in combining an indicator from sectoral energy intensities. This would reduce partly the sensitivity to structural effects. However this would require disaggregated data that are not available in all Member States (e.g., for splitting transport consumption between freight and passengers, and between fuels). The main remaining issue is that it is still an indicator relative to an economic quantity (usually the value added for industrial sectors for example). Therefore an increase in this economic quantity (e.g., added value) without changing the energy consumption will lead to improved energy intensity, despite no real energy efficiency improvement. Moreover, this may require complex negotiations based on multiple sub-targets (for the sectoral energy intensities).

Therefore, while an energy intensity target may look first attractive to policymakers, it is a tricky indicator that should be avoided.

The choice between an energy savings or an energy consumption target remains an open debate, as both have equally important pros and cons, and no prohibitive drawback.

Reference type: an absolute target provides more clarity, and impedes changes in the target level over time.

A target might be defined in absolute terms, meaning as an absolute quantity (for example based on the energy consumption of a given year, or average on a given period). Or it might be defined in relative terms, meaning as a difference between a baseline (or baseline scenario) and the objective/target (for example, energy savings which are always relative to a baseline, or the target of 20% energy efficiency improvement in 2020 relative to a baseline scenario).

The choice between absolute and relative is directly related to the type of indicator chosen, as shown in ***Table 8*** below.

Table 8. Usual choices between an absolute or relative target according to the type of indicator.

Type of indicator	**Common cases**
Energy savings	Always relative
Level of energy consumption	Can be absolute or relative
Energy intensity	Most often defined as a rate of improvement (in %), so mostly relative (but could be absolute)
Rate of energy efficiency improvements	Can be absolute or relative

The main situation where this choice might be subject for discussions is for an energy consumption target. The main advantage of a relative target would then be that it makes possible to take into account trends not directly related to energy efficiency (as the expected rate of economic growth, demographics, or particular structural changes in the economy).

However, the baseline scenario needed is often difficult to appropriate and to explain, especially because it requires a large set of assumptions and complex modelling. So it might eventually be opaque, and hence not attractive. In addition, the baseline scenario

might be subject to updates or changes in interpretation, which might affect the level of the target over time. This could be a source of uncertainties for stakeholders.

Table 9. Projections of EU27 primary and final energy consumption for 2020.

(all figures in Mtoe, for EU27)	**Primary energy consumption**[38]		**Final energy consumption**	
Scenarios	**Baseline** for 2020	**Target** for 202[39]	**Baseline** for 2020	**Target** for 2020[39]
PRIMES2007 Baseline (Capros et al., 2008)	1842	1474	1348	1078
PRIMES2009 Baseline (Capros et al., 2010)	1705	1364	1229	983
PRIMES2009 Reference[40] (Capros et al., 2010)	1664		1216	
PRIMES2013 Reference[41] **(Capros et al., 2013)**	1534		1130	

Table 9 above shows how the main assumptions of a scenario may influence its results:

- the differences between PRIMES2007 and PRIMES2009 show the influence of the macroeconomic assumptions[42];
- the differences between the baseline and the reference scenarios show the influence of taking into account the expected effects of policies adopted until a given date.

Therefore, it would be preferred to define an energy consumption target in absolute terms. Usually this is made by defining the target compared to a reference year (e.g., 14,5% decrease in final energy consumption by 2030 compared to 2010 level of 1159,8 Mtoe[43], which would mean a target of 991 Mtoe[44]). When doing so, the *choice of the reference year* may have a very significant influence on the target, especially when considering target sharing.

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[38] As defined in the EED article 2: " *'primary energy consumption' means gross inland consumption, excluding non-energy uses*"

[39] Applying a 20% rate of energy savings compared to the baseline. The reference scenarios of the 2009 and 2013 updates include new policies adopted after the 2007 update, which was initially used to define the 2020 targets. Therefore the 20% rate of energy savings cannot be applied to them in a consistent manner. Indeed, the result of the PRIMES2013 Reference scenario is the basis used to assess that 17% primary energy savings will be achieved in 2020 compared to the PRIMES2007 baseline (similarly, the PRIMES2013 scenario gives 16% final energy savings in 2020).

[40] "*The Reference scenario is based on the same macroeconomic, price, technology and policy assumptions as the baseline. In addition to the measures reflected in the baseline, it includes policies adopted between April 2009 and December 2009 and assumes that national targets under the Renewables directive 2009/28/EC and the GHG Effort sharing decision 2009/406/EC are achieved in 2020*" (Capros et al., 2010 p.10).

[41] Based on 2010 statistics, taking into account national and EU policies and measures adopted until spring 2012.

[42] The main difference between both is due to the update of the rates for economic growth, in order to take into account the economic crisis of 2008 (see Eichhammer, 2013 for more analyses about this).

[43] Based on Eurostat data for EU28: http://epp.eurostat.ec.europa.eu/tgm/table.do?tab=table&init=1&language=en&pcode=ten00095&plugin=1

[44] Corresponding to the level reached with the scenario "GHG40EE" of the Impact Assessment (p.73). As another benchmark, the 2013 reference scenario has forecasted a final energy consumption of 1125 Mtoe in 2030 for EU28.

The reference years commonly used are:

- 1990: this is the reference year used for climate negotiations (hence widely used internationally), however this was a particular period for Eastern Europe countries, with very different trends for energy consumption between Eastern and other EU countries since then (which would have to be taken into account for target sharing);
- 2005: this is the first statistical year for the EU25
- using the year with most recent data available (choice made for the 2016 target defined in the ESD, and for the article 7 target of the EED).

Using as reference a given year bears the risk that this year may correspond to particular weather (e.g., colder winter, warmer summer) or economic conditions, with significant differences among countries. Two ways have been used to address this issue:

- using a reference period instead of a sole year, then assuming that the resulting average (e.g., average energy consumption over a 3-year period) is not significantly sensitive to the year-to-year fluctuations (choice made for the 2016 target defined in the ESD, and for the article 7 target of the EED);
- using first scenarios to simulate trends up to the target year (e.g., 2030) and to define the level of the target, and then expressing this target in reference to a given year.

This later option *combines the advantages of both options* (relative and absolute target):

- on the one hand, by *using scenarios,* it makes it possible to *take into account the dynamics* of energy consumption when setting the level of the target (and especially the differences in dynamics among countries, critical point for target sharing);
- on the other hand, by *expressing the target in absolute terms,* it increases the *visibility for the stakeholders* (no uncertainty due to possible diverging interpretations of the scenarios or updates of the scenarios).

This later option has implicitly been the one used for the 2020 target for energy efficiency, which was clarified in the EED article 3. This target is expressed in absolute terms (maximum 2020 level of 1474 Mtoe for primary energy consumption or of 1078 Mtoe for final energy consumption[45]). But its level was defined according to the PRIMES baseline scenario made in 2007 (Capros et al., 2008).

Reference level: the only requirement is to make it clear.

The type of reference level is often directly linked to the type of indicator. However, a given type of reference level might be defined using calculations based on another type.

For example, a reference level expressed as a level of energy consumption might be defined taking into account a given energy performance level.

No particular type has a key advantage compared to the other. The main criterion is to ensure consistency in the target definition, as well as in the monitoring scheme.

However, it should be required to document this reference level. It is often kept implicit, which might lead to misunderstandings.

Additionality: essential when evaluating public policies, but not a must-have for a global target.

The issue of additionality is often a source of confusion and misunderstanding, and is closely linked to the issue of reference/baseline. It has indeed two dimensions:

- *additionality in terms of actions:* criteria might be defined to distinguish new (or additional) actions compared to what was included in the baseline used to set the target;

[45] For the EU27, as the entry of Croatia in the EU was after the vote of the EED.

example: the baseline may include the current renovation rate of buildings → only the renovation actions corresponding to an increase of this rate would be considered additional;

- *additionality in terms of performance:* criteria might be defined to distinguish the additional gain in energy performance compared to what was included in the baseline; *Example:* the baseline may include the average energy performance observed on market sales for appliances → only the gain in performance above this reference level would be considered additional.

Additionality can be addressed in various ways. In practice, two options are more common:

- either defining additionality criteria that works as eligibility criteria, and that are verified ex-ante before accounting (or not) for the expected results of actions;
- or evaluating ex-post the shares of free-rider effect[46] (and sometimes also of free-driver or multiplier effect[47]).

In the language of policy evaluation, additionality makes the difference between gross and net results. For more details about this, see for example (Broc et al., 2009).

Taking into account additionality is indeed of up-most importance when evaluating the effectiveness and efficiency of public policies. The issue should be addressed by governments and public agencies when designing and monitoring their policies and programmes. In fact, most of the energy efficiency schemes do include such criteria or provisions.

This requires to define specific rules, and then to perform verifications and evaluations, ex-ante and/or ex-post. The evaluation efforts induced are most often more than compensated by the *added value in terms of policy efficiency and understanding of what really delivers energy savings.*

This added value is higher when the additionality rules are based on an analysis of the context where the policy or programme is implemented. This means in particular that the *rules for a given country will not necessarily be relevant for another one.* Hence, for example, the differences in the rules of the current national energy efficiency obligation schemes.

Harmonising the way to account for additionality among Member States would be difficult, and may even end as counterproductive. For example, criteria could be used to distinguish between energy savings attributed to European regulations (as the EcoDesign Directive) and energy savings attributed to specifically national policies. But this could create an incentive for Member States to stand for lower ambition of the European regulations. They would have an interest in defending low baseline, so that larger savings could be attributed to national policies.

A particular attention should then be given not to oppose European and national policies.

The relevance of including additionality in the target also depends on the type of indicator. While it might be relevant for an energy savings target, it would make less sense for an energy consumption target. In this latter case, additionality will usually be tackled by taking into account (or not) in the baseline scenario the expected effects of already on-going and adopted policies.

There are an increasing number of initiatives aiming at promoting energy savings or energy efficiency. They may come from public bodies, private companies (see the

[46] The free-rider effect is the share of participants or consumers who would have implemented the promoted action should the policy or programme have not been in place.

[47] The free-driver or multiplier effect is the share of consumers who have implemented energy efficiency actions directly or indirectly due to the policy or programme, but without having taken advantage of the policy benefits.

development of energy efficiency services and markets), NGOs and associations, local communities, etc. They may be at European, national, regional or more local levels. This means that it is (and will be more and more) difficult to attribute energy savings to a particular initiative. Energy savings are the result of combinations of factors (which increase their effectiveness). These combinations increase the total volume of energy savings achieved at the end.

Including additionality in a global target may create oppositions between all the possible initiatives, instead of encouraging synergies. This argues in favour of a global target without additionality conditions. It should be noted that this would not be contradictory to taking into account the assessment of the additional energy savings potential available when defining the level of the target.

In addition to being easier to monitor, a global target without additionality will give more visibility to the contribution of energy savings in the global energy balance, highlighting this is the first fuel as analysed by IEA[48]. In particular, this is a way to acknowledge for previous energy efficiency achievements (often called "early actions" in the European context).

The only reservation is the *risk of not inducing enough additional efforts,* or giving a wrong signal that the target would be easy to reach. This can be avoided by *setting a target ambitious enough.*

A more ambitious target may first seem harder to get approved. This target could be proposed together with showing the magnitude of previous achievements over similar period of time (which is feasible for example by using ODYSSEE data). This would give confidence in the feasibility of meeting the target.

Timeline: combining regular monitoring and a long-term perspective

The timeline is a key element to give signals to the stakeholders, and therefore to create visibility and stability.

A target year provides a perspective, and usually implies that the general framework will remain the same until then. It makes the target clear to communicate (as for the 3*20 in 2020). It also takes into account that time is needed to observe significant changes: a policy needs time to deliver.

However, a target year alone (as for the 2020 framework) may create a risk of delay in action. Even if a regular monitoring is put in place, one may argue that a low progress in the beginning can be compensated by higher efforts at the end. As the political mandates are often shorter than the period of commitment, the accountability may then be transferred to the ultimate mandate of the period.

Moreover, a target evaluated in a given year is sensitive to possible particular conditions in this given year. Possibilities for corrections may be given, but the rules should be clear to keep the transparency (see discussions below for the Option 2 proposed).

Regular milestones (as for the ESD) are thus necessary to ensure that measures are put in place from the start. The corresponding rendez-vous are also useful to analyse whether the current strategy is appropriate.

Another option is to set the target on an annual basis (as for EED article 7). An annual basis may help keeping energy efficiency on the agenda. But attention should be given to not create a too heavy reporting burden.

The main reporting pace is currently every 3 years, with the National Energy Efficiency Action Plans. The EED added a lighter annual reporting, focused on key statistics to monitor progress towards the energy consumption target and on outputs of key provisions.

[48] http://www.iea.org/newsroomandevents/pressreleases/2013/october/name,43788,en.html and http://www.iea.org/Textbase/nptable/2013/EEMR2013_f3_4.pdf

In parallel, it should be kept in mind that in terms of impacts for climate change, the cumulative GHG emissions are more important than the result in a given year (see for example the budget approach analysed in WBGU, 2009). Therefore the path does matter as much as the target. Indeed, "low public support for mitigation policies may arise from misconceptions of climate dynamics rather than high discount rates or uncertainty about the impact of climate change" (Sterman and Sweeney, 2007 p.213).

This is also particularly important because upcoming decisions about infrastructures (including infrastructures related to energy consumption/demand-side) will create the main operating conditions of the energy systems for the 20 to 40 years to come, due to their average lifetime.

Commitment: only a binding target would give a signal strong enough.

The general rationale why a binding target is needed has been discussed in the previous part.

So far, the targets for a sustainable energy demand have remained indicative. The overarching target for 2020[49] is very likely to be missed according the analysis presented in the Impact Assessment, and the observation made by (EEFIG, 2014) about the investment gap.

The situation has been very similar as regards the development of generation capacities from renewable energy sources. An indicative target at the EU level had been set in 2001 (Directive 2001/77/EC). Then this target became binding and shared among Member States in 2009 (Directive 2009/28/EC), as the previous trends were not in line with the former indicative target. The need for a binding target was acknowledged in the Directive.

> *The main purpose of mandatory national targets is to provide certainty for investors and to encourage continuous development of technologies which generate energy from all types of renewable sources. Deferring a decision about whether a target is mandatory until a future event takes place is thus not appropriate.* (Recital 14 of Directive 2009/28/EC on the promotion of the use of energy from renewable sources)

The RES example shows the added value of a binding target. "The binding targets serve as a benchmark for implementation of a suite of targeted policy instruments" (Ecofys and Fraunhofer ISI, 2010 p.5). The positive impact of this shift to a binding target has been confirmed in the EEA review of the progress towards 2020 (EEA, 2013 p.113): "RES contributed 13 % of gross final energy consumption in the EU28 in 2011. The EU has therefore met its 10.8 % indicative target for 2011–2012 and is therefore currently on track towards its target of 20 % of renewable energy consumption in 2020".

As an example, the average growth in installed capacity for wind power has been of 7,2 GW per year for 2001-2009, and then of 10,6 GW per year for 2009-2013 (as shown in ***Figure 1*** below).

[49] Maximum 2020 level of 1474 Mtoe for primary energy consumption or of 1078 Mtoe for final energy consumption (see EED article 3)

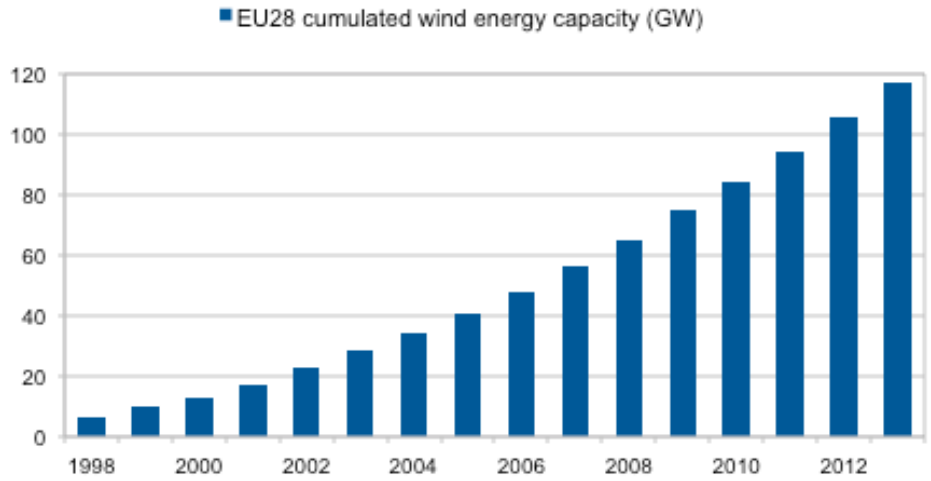

Figure 1. Cumulated wind energy capacity for EU28 (in GW).
Source: based on data from the European Wind Energy Association[50]

Likewise, the average growth in installed capacity for wind power has been of 3,4 GWpeak per year for 2005-2009, and then of 17,6 GWpeak per year for 2009-2012 (as shown in ***Figure 2*** below).

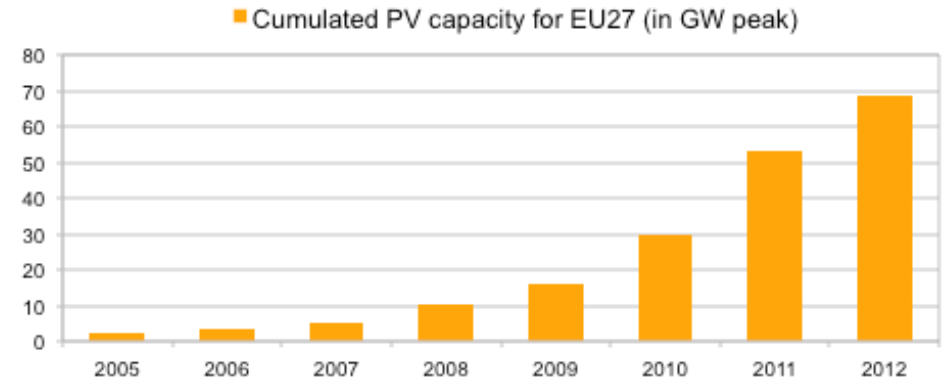

Figure 2. Cumulated photovoltaic energy capacity for EU27 (in GW peak).
Source: based on data from Observ'ER Photovoltaic energy barometers[51]

One key issue raised by setting a binding target for sustainable energy demand is the system that would be needed for its monitoring and verification (M&V). The opponents to this binding target often argue that there is no reliable M&V system available. This is discussed in a dedicated section below, explaining that knowledge and experience are in fact available. The remaining problem would be to decide to allocate sufficient means to make the system effective.

This is a critical question. The Impact Assessment and other reports (e.g., EEFIG, 2014) highlight that the stakes for achieving the targets for 2020 and then 2030 imply investments amounting to hundreds of billion euros, corresponding to millions of jobs. This is important enough to justify the efforts needed to have a reliable M&V system.

[50] http://www.ewea.org/statistics/european/

[51] http://eurobserv-er.org/downloads.asp

The alternative to a binding target used so far for energy efficiency has been to define binding measures (as in the EED for ex.). However binding measures have not proven to induce effective implementation (see for ex. the measures required in the ESD for the public sector). Moreover it is opposite to the claim of Member States for flexibility.

Sharing: key to get everyone on board.

Previous studies assessing the energy savings potentials over Europe (see for example: Fraunhofer ISI et al., 2009) have shown that there remain large potentials in every Member States. These potentials are indeed much less sensitive to local climate conditions, unlike for renewable resources. Therefore, the target could be uniformly distributed among Member States. This has been the case so far for all the global targets for sustainable energy demand set in European Directives.

However, the energy savings potentials are not the only criteria to consider. For example, EED article 3 lists the following criteria (relevant for a primary energy consumption target connected to a target on GHG emissions):

a. remaining cost-effective energy-saving potential;
b. GDP evolution and forecast;
c. changes of energy imports and exports;
d. development of all sources of renewable energies, nuclear energy, carbon capture and storage;
e. early action.

Some of the criteria to consider are specific to the type of indicator chosen.

The general criteria could address the following issues (for each country):

- what sources and magnitude of energy savings are available: this is usually represented by the assessments of energy savings potentials (see next section);
- what would be the marginal costs of further energy savings: going deeper in the using the potentials may be more costly; this effect and its magnitude may be assessed through the analysis of the energy savings potentials[52];
- what investment capacities are available: this may be indirectly assessed through GDP, but other financial indicators could be more appropriate;
- what market or actors' capacities are available: this is often overlooked in the analysis. However, the market maturity is a key element for the dynamics of achieving energy savings. For example about buildings renovation, if the current number of professionals trained to conduct energy efficient renovations is low compared to the objectives, this will likely impede to increase significantly the renovation rate on short term.

Whatever the choice made, sharing the target should be first put into discussion. This is essential for Member States to take ownership of and really commit to the target at a national level. Within the 2020 framework, sharing the targets for GHG emissions and renewables has been discussed, while not explicitly for energy efficiency. This is one of the major reasons (after the target being only indicative) why Member States may have not taken this target seriously enough, compared to the two others.

Any type of target sharing implies a negotiation process. Based on similar situations for target setting, the possible options to organise this process can be (either independently or combined) (Bosseboeuf and Broc, 2011):

[52] The target may be more difficult for a country having achieved more savings already in the past. However, the increased expertise and know-how may also be a factor of decreasing costs. While a country not having done significant investments in energy efficiency may face higher initial costs, for example for the development of new activities or services.

- a direct negotiation between the central body (EU) and the obliged parties (EU member states) (without preliminary analysis or experience, as done in China for the energy intensity target for 2010; unlikely to be feasible for the European Union);
- using the solidarity and equity principles (applying factors based on economic indicators like GDP or revenue per capita), as applied for the Effort Sharing Decision and the Directive on renewables
- using a study of potentials (also taken into account for the Directive on renewables, and often used when setting targets for energy efficiency obligation schemes).

Current EU practices argue in favour of combining the solidarity and equity principles together with a shared assessment of potentials.

It has to be noted that applying a uniform target (e.g., same rate for all Member States) does not provide a direct incentive for Member States to perform their own analysis of energy savings potentials. This has for example been the case when Member States reported their national indicative targets for the ESD. Most of them only presented a direct calculation, applying the 9% rate to their national statistics of energy consumption. Very few Member States made the link to actual energy savings potentials.

Organising a negotiation for target sharing would therefore be an incentive for highlighting this link between objectives and potentials. This would also create a forum where national specificities could be discussed more in details than what the scenario exercise for the Impact Assessment could allow.

The basis for the negotiations: estimating the energy savings potentials

A previous bottom-up study (Fraunhofer ISI et al., 2009) was commissioned by the European Commission in 2008-2009 to support the policy process in order to achieve the 2020 target of 20% energy efficiency improvement. This study has then been one of the key inputs for the Impact Assessment setting the ground of the Energy Efficiency Directive voted in 2012.

For this study, contacts were taken with most Member States, who could also react thanks to an online platform (http://www.eepotential.eu/esd.php). The feedback was variable. But a consultation process can more easily be implemented now.

First because all Member States have *gained experience* in estimating their own energy savings potentials, due to the reporting done for the National Energy Efficiency Action Plans or for the first annual report in 2013 within the EED framework, where they had to define their energy consumption objective for 2020.

Second because the policy objective of the study conducted in 2008-2009 was not to define national targets. It was meant to support Member States in the implementation of the ESD (especially by identifying the most cost-effective options to meet their targets), and to provide the European Commission with a tool to assess national NEEAPs. The authors mentioned as well that "the main focus of this report [was] to prepare the analytic basis for an in-depth discussion of economic energy efficiency potentials in the different energy-end uses" (Fraunhofer ISI et al., 2009, p.18). But as this study was not directly linked with a process for defining targets, the in-depth discussions did not really happen at that time.

Another reason can be that this process was launched, and therefore perceived by many Member States, as top-down from the European Commission's side, hence not as a collaborative process.

This study has been updated in 2012 (Fraunhofer ISI, 2012), and was complemented by a voluntary consultation of stakeholders (Fraunhofer ISI, 2013). Other references could also support the process: see for example (Ecofys, 2013 ; Ecofys and Fraunhofer ISI, 2010 ; European Commission, 2012 ; Institute for European Environmental Policy, 2013).

In parallel of these bottom-up approaches, the different Impact Assessments published by the European Commission provide valuable information from a macro-economic perspective. They are well documented and their process includes an extensive consultation of Member States.

A new bottom-up study about energy savings potentials has been recently delivered to the Commission, to complement the last Impact Assessment accompanying the proposal of the European Commission for the 2030 framework.

There are therefore *already enough evidences* available to *endorse now the principle of a global target* for sustainable energy demand at the EU level. However, setting the type and level of the target in the hurry would create a high risk for the target to not be clear neither ambitious. *The sounder the foundations to set the target, the stronger the target.*

One of the key issues is to combine the macro-economic approach of the Impact Assessment with the bottom-up approach of the assessment of the energy savings potentials. Moreover, additional inputs from Member States (e.g., based on national studies of energy savings potentials) or stakeholders (e.g., based on analyses of market dynamics for energy efficiency solutions) could also increase the confidence and appropriation in the definition of the target. The current consultation about progress towards the 2020 energy efficiency objective and a 2030 climate and energy policy framework might bring such inputs. But it is unclear if this kind of public consultation makes it possible to deal with contributions entering in the details of the foundations for a target.

Monitoring & evaluation of the target achievement

A target cannot be effective if it does not come with a predefined, agreed and consistent measurement and verification framework. This is the reason why some analyses of the target design give the priority to the "evaluability" of the possible options, see for example (Harmsen et al., 2014).

Significant experience has been gained in this field, through Intelligent Energy Europe (see for example EMEEES and ODYSSEE-MURE), the reporting by Member States for the NEEAPs, the implementation of energy efficiency obligation schemes, the standardisation work at European (CEN) and worldwide (ISO) levels, and not the least the development of a European community of energy efficiency evaluation (see panel monitoring & evaluation of eceee Summer Studies and IEPPEC). A very rich experience is also available from other countries, especially from the US[53].

Whatever the type of target chosen, the *monitoring and evaluation systems needed are mostly already available:*

- for an energy consumption target: this would be based mainly on statistics already regularly provided by Member States to Eurostat, and now for the annual report required by the EED; complementary analyses might be needed, especially in case the target is not met → this could be done using the experience gained on monitoring of energy efficiency trends with ODYSSEE;
- for an energy savings target: this could be based on the monitoring and evaluation systems now set by Member States to comply with EED article 7, also using experience gained on bottom-up methods through the reporting in previous NEEAPs or within well-experienced energy efficiency obligation schemes.

There is a *long experience of monitoring and evaluation systems*[54] that have made it possible to validate energy savings for the purpose of verifying target achievement or of

[53] See for example the resources from California: http://www.calmac.org/

[54] See for example the energy efficiency obligation schemes in Denmark, France, Italy or in the UK, or the numerous utility schemes in the US (Bertoldi et al, 2010 ; Vine, 2008 ; Vine et al., 2006 ; Waide and Buchner, 2008).

deciding the level of investments that could be recovered or of profits to be distributed to shareholders. This proves the *feasibility of defining a binding target that would be backed by a legal basis.*

As mentioned above in the discussions about binding vs. indicative target, the question is therefore not if it is feasible, but if there would be sufficient means available to make the monitoring and verification system work. The stakes related to a target for sustainable energy demand in terms of investments and jobs justify by themselves to allocate the means needed for this purpose.

Whatever the system chosen, there should be a clear validation process of the results by the European Commission, possibly with at least a share of independent review or evaluation. These results should be as much as possible based on hard data from official statistics. It should be possible for the Commission to take a Member States to court if they do not comply with their target. *The legal dimension of the target should therefore be clarified as well.*

An option could be to have a progressive approach in case of non-achievement of the target by a Member State:

- asking for detailed analyses of reasons for non-achievements;
- requiring certain measures;
- financial penalties (that could be used for an energy efficiency fund).

These gradual warnings/penalties could be defined together with thresholds.

The legal aspects should be further investigated with jurists (these discussions are beyond the scope of this paper).

Beyond the evaluation of energy savings, it would be very useful to develop costs/benefits analyses of policies implemented, not only considering energy costs and benefits, but also co-benefits. This would reinforce the interest of policy makers and stakeholders in energy efficiency measures.

After reviewing the pros and cons of the main possible choices, two options appear to get the best balance, especially when combined together. The proposals below are made by the author, and *do not necessarily represent the views of the European Council for an Energy Efficient Economy.*

Moreover, *binding targets for sustainable energy demand would not deliver energy savings by themselves.* As explained earlier in the reason 3 for a target, these targets are *meant to strengthen the implementation of and complement sectoral measures and other provisions,* such as the ones included in the Energy Efficiency, Energy Performance of Buildings, and Ecodesign Directives.

As mentioned in the Impact Assessment, setting targets does not prejudge what policies or measures should then be used to achieve them. This would require further and more in-depth analysis.

Options for setting targets

Option 1: pursuing the framework set by the article 7 of the Energy Efficiency Directive

The Energy Efficiency Directive (2012/27/EU, article 7) has defined a target over the period 2014-2020 of new annual energy savings amounting to 1,5 % of the average annual energy sales for 2010-2012. These energy savings should be achieved within an energy efficiency obligation scheme set up at the national level by each Member State or by implementing alternative policy measures.

This provision is indeed close to a mandatory energy savings target at Member States' level. This was a first positive signal to stakeholders and investors. But the ambition of

this article is partly watered down by different possible exemptions that may amount up to 25% of the target (see also Coalition for Energy Savings, 2014).

Therefore *the first option is to set a target that would ensure the continuation of the Energy Efficiency Directive's article 7 beyond 2020.* The target could be expressed in the same way, as an annual energy savings rate defined from the average annual energy consumption for 2017-2019. Moreover, the target would give a stronger signal, if no exemption is allowed.

A higher consistency could be ensured with the European Directives, if the energy savings resulting from their implementation would be accounted for the target (which would then be set at a higher level). This would encourage a higher ambition and stronger implementation of these directives.

Most of the monitoring and verification schemes needed are already in place. Their continuation would increase the related experience and know-how, while *providing a direct feedback on energy efficiency policies through bottom-up evaluations.*

Features for the Option 1 target

Scope	• economy-wide/global, so that all possible energy savings are included • Member States' level, to ensure national commitments
Metrics	• final energy, to ensure actions on the demand side (with special attention to fuel switch, e.g. through common conversion factors for electricity and district heat)
Indicators	• energy savings, to ensure that results are related to policies or measures
Reference	• absolute (base year/period), for more stability and transparency • energy consumption, as easier to define • no additionality criteria (but higher level of target), so that all energy savings can be accounted for and to avoid conflicting situations with other directives (+ more transparent and easier to monitor)
Timeline	• annual basis with 3-year reporting, to avoid deferment of acting and provide continuity/stability, while limiting reporting to current rate
Commitment	• binding, as indicative targets have proven not be enough
Distribution	• to be discussed (see last section)

Option 2: updating the target of maximum primary energy consumption level at the EU level

The **second option** is based on the approach used to define national objectives of energy consumption level for 2020, as required by Energy Efficiency Directive's article 3.

The main points are to define transparent rules for possible adjustments (for monitoring) as well as for the distribution of the EU target among Member States (see last section).

Allowing adjustments would be needed, at least for the following reasons:

- the current period of the ETS has shown the risk of not considering possible adjustments in case of significant unforeseen changes in the economic trends;
- the target should not create a barrier to the objective of Europe’s re-industrialization (not to mention that importing goods from outside Europe does not help mitigating climate change overall);
- the smaller countries can see within a short period very significant changes in their energy balance for reasons not related with energy efficiency policies (for ex.,

closure/opening of a large energy intensive plant; changes in electricity import/export).

However allowing adjustments may create risks of uncertainties within the 2030 framework. These risks could be limited by restricting the possibility of adjustments to situations above given thresholds (e.g., 5% annual decrease/increase in GDP or population; 10% decrease/increase in total primary annual energy consumption due to closing/opening of industrial plants or to changes in electricity import/export).

In order to ensure that the possible adjustments are applied in a fair way, the corresponding analysis should be done by an independent party (meaning neither the Member State nor the authority in charge of reviewing the achievement of the target).

To avoid creating inconsistencies with the GHG target, adjustment rules would need to be similar for both (e.g., possibilities of adjustments are currently under discussions for the reform of the ETS).

Allowing adjustments would be meant to address concerns decision makers may have regarding a target that could be influenced by significant variations they could not directly act upon. The assumption is therefore that it would support a stronger commitment.

At the opposite, one may argue that medium to long term targets should not be subject to possible adjustments, as the challenges of climate change and resource depletion cannot be adjusted.

It would be useful to complement the monitoring of the primary energy consumption with the monitoring of **energy efficiency indicators** (see for ex. ODYSSEE indicators), and with an energy savings target (Option 1) and the related bottom-up monitoring. This would help analyse the trends and their main causes, and therefore **where additional measures are needed.** The required experience and know-how in data collection are already available with the ODYSSEE project.

Features for the Option 2 target

Scope	• economy-wide/global, as more consistent with the metrics chosen • EU and Member States' level, to provide a harmonised European ambition and to ensure national commitments
Metrics	• primary energy, to favour integrated policies and include primary efficiency/energy savings (and in line with national energy balance), then should take into account the target for renewables (requires a level of target high enough so that the targets for primary energy consumption and for RES are complementary).
Indicators	• level of energy consumption, as easier to understand/appropriate and easy to monitor and verify
Reference	• absolute (base year/period), for more stability and transparency • energy consumption, as more consistent with the indicator chosen • additionality criteria not relevant for this indicator, but rules for possible adjustments should be clear from the start
Timeline	• target year with regular milestones, to identify changes in trends early enough, while setting a clear horizon/rendez-vous and limiting reporting to current rate
Commitment	• binding, as indicative targets have proven not be enough
Distribution	• to be discussed (see last section), should be clarified when setting the EU target

A combination of Options 1 and 2: harnessing the advantages of both

Option 2 includes changes non-related to energy savings or energy efficiency. But it reflects the real level of consumption, directly connected to GHG emissions. A combination with Option 1 would ensure energy savings on the demand side. **Option 1** would provide the **signal for energy efficiency markets,** while **Option 2** would ensure **consistency with the long-term objectives**.

This choice of combining both options would ensure the **continuity** with the current European framework for energy efficiency, hence increasing the **visibility** for stakeholders. Making them binding would strengthen the framework, as well as the signal for investors.

In case only one of the two options could be agreed upon, we would recommend to keep the Option 1 target (in final energy), due to the risk of a primary energy target not to induce enough improvements on the demand-side, as explained above within the discussion about the metric.

Moreover Option 1 is directly linked to the implementation of actions. It therefore offers a stronger basis for political commitment.

A specific issue is raised when combining two targets: what about the case where a Member State would meet only one of the two targets?

As for any situation where the target is not met, the first step is to analyse the reasons for non-achievement. For example:

- in case Option 1 (final energy savings) would be met but not Option 2 (energy consumption), there would be high chances that the reasons for non-achievement would be linked to structural effects (e.g., economic trends):
- in case Option 2 would be met but not Option 1, there would be high chances that the Option 2 achievement would be linked to an economic downturn, explaining lower investments in energy efficiency, hence missing the Option 1 target.

In both cases, it could be required to implement additional measures, but penalties would not appear relevant.

Should the reasons for meeting only one of the two targets be different to the ones considered above, this could always be addressed by defining a progressive approach for warnings/penalties.

Sharing among Member States: from a burden to an opportunity sharing

In both cases (Options 1 and 2), the level of the targets should be defined taking into account a shared diagnosis of energy savings potentials and the long term objectives. This diagnosis should be used to assess the investments needed and the benefits expected, including direct co-benefits. The Impact Assessment has shown that the scenarios with ambitious energy efficiency policies lead to higher overall benefits for the society.

This would change the picture from a burden to an opportunity sharing. The rules for sharing the targets among countries could take into account criteria such as GDP per capita, potentials/relative effort needed (as for the GHG and/or the RES target for 2020), previous energy efficiency trends, effective investment capacities and maturity of energy efficiency markets. EU Cohesion Policy could be used to help Member States in a less favourable situation.

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http://ec.europa.eu/energy/2030_en.htm

Roadmap for moving to a low-carbon economy in 2050:
http://ec.europa.eu/clima/policies/roadmap/index_en.htm

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Annex A: the 2020 framework and current progress towards the 2020 targets

A Binding Target for Sustainable Energy Demand: Why and How?

The current European climate and energy policy framework, also known as the "EU climate and energy package", has defined a combination of three targets for 2020[1], as described in the tables below.

Specific objective	**General targets for 2020**	**European Directives** (or Decisions)
GHG Emissions	-20% compared to 1990 levels *(binding)*	ETS Directives (2003/87/EC then 2009/29/EC)[2] Effort Sharing Decision (Decision n°406/2009/EC)[3]
Renewable Energy Sources (RES)	20%-share of EU gross final energy consumption *(binding)*	Renewable Energy Directive (2009/28/EC)[4]
Energy Efficiency	20% improvement (compared to a baseline scenario) *(indicative)*	Energy Services Directive[5] (2006/32/EC, until 2012), then Energy Efficiency Directive[6] (2012/27/EU, from 2013)

The overall package was attractive and easy to promote, with the catch line 3*20 for 2020. However, the basis for the GHG and RES targets were more explicit than the one for energy efficiency. The concept of relative improvement compared to a baseline is more difficult to appropriate. Moreover, the baseline scenario had to be revised in 2009 after the economic crisis.

Another key point is that the GHG and RES targets are binding, while the target for energy efficiency is indicative. This explains why the European Commission mentions that "*the climate and energy package does not address the energy efficiency target directly*"[1].

Policies	**Specific targets and characteristics**
ETS Directive	national caps on emission allowances (until 2012) and then a single EU-wide cap + cap cut each year to meet a 21% reduction by 2020 compared to 2005 level + free allocation of allowances to be progressively replaced by auctioning
Effort Sharing Decision	binding national annual targets for reducing GHG emissions from the sectors not covered by the ETS (period 2013-2020) + 10% reduction by 2020 compared with 2005 levels (at EU level) + effort sharing based on Member States' relative wealth (GDP per capita)
Renewable Energy	binding national targets for raising the share of renewable energy in their energy consumption by 2020

1 http://ec.europa.eu/clima/policies/package/
2 http://ec.europa.eu/clima/policies/ets/documentation_en.htm
3 http://ec.europa.eu/clima/policies/effort/documentation_en.htm
4 http://ec.europa.eu/energy/renewables/targets_en.htm
5 http://ec.europa.eu/energy/efficiency/end-use_en.htm
6 http://ec.europa.eu/energy/efficiency/eed/eed_en.htm

Directive	+ 20% share of energy from renewable sources by 2020 (at EU level) + specific target at EU level of 10% share of renewable energy for transport sector + EU target distributed among Member States according to their starting point (principle of equal increase in national shares) and their GDP
Energy Services Directive	indicative national energy efficiency target by 2016 + uniform target for all Member States of 9% energy savings by 2016, compared to a reference final energy consumption (average from 2001-2005)
Energy Efficiency Directive	indicative national energy efficiency target, to be expressed in terms of an absolute level of primary and final energy consumption in 2020 based + Member States "free" to define the level of their target + national targets should make possible to limit the EU's 2020 primary energy consumption to 1474 Mtoe or the final energy consumption to 1078 Mtoe (thresholds equivalent to the 20% energy efficiency improvement compared to the baseline scenario) + article 7 target: new savings each year from 1 January 2014 to 31 December 2020 of 1,5 % of the annual energy sales to final customers (calculated based on the average over the most recent three-year period prior to 1 January 2013) (the EED also includes sub-targets such as for the rate of refurbishments of public buildings)

Most of the targets are distributed among Member States taking into account the differences of national context, except for energy efficiency. Moreover, the metrics for the national energy efficiency targets have changed from the Energy Services Directive (volume of energy savings) to the Energy Efficiency Directive (absolute level of energy consumption).

Policies	Monitoring and reporting scheme	Current progress towards 2020[7]
ETS Directive	Annual report by each operator under ETS regulation about their total emissions, checked by an accredited verifier (according to the "compliance cycle")[8] Transactions checked and recorded by the European Union Transaction Log Annual report by th European Commission on the functioning of the European carbon market	Emissions reduced below ETS caps in almost all Member States for 2008-2012 Verified emissions under ETS decreased by 16 % in 2012 compared to 2005 Large surplus of allowances for 2008-2012 due to the accelerated use of offset credits and the effects of the economic crisis (+ fuel switch to natural gas and increased share of RES for electricity generation)
Effort Sharing Decision	Annual report by the Member States about non-ETS emissions and projected progress (see decision N°280/2004/EC[9]) Report by the European Commission (by 31 October 2016) about the implementation of this Decision	15 Member States expect to meet their individual emission targets through policy measures already in place ; 13 Member States will need to implement additional measures or use flexibility mechanisms (6 countries having a larger gap to fill)
Overall GHG target	Annual GHG inventory reports as defined in decision N°280/2004/EC[21] (and from 2013, as defined in regulation (EU) N°525/2013[10])	18% reduction of EU emissions in 2012 compared to 1990 levels expected level of EU emissions in 2020 to be 21 % to 24% below 1990 levels
Renewable Energy Directive (RED)	*The assessment of progress towards RES objectives and targets was for the most part based on information reported by Member States to Eurostat under the Energy Statistics Regulation (EU, 2013f)* NREAPs Renewable Energy Progress Report by the European Commission every 2 years[11]	RES contributed 13 % share of gross final energy consumption from RES in 2011 (vs. indicative target of 10.8 % for 2011–2012)
Energy Services Directive (ESD)	National targets defined by the Member States and then achievements reported every 3 years in the National Energy Efficiency Action Plans (NEEAP)	Most of the Member States have met their intermediate targets in 2010 (based on NEEAPs reported in 2011), for many of them thanks to so-called “early actions” New NEEAPs are to be reported by the Members States by April, 30th 2014

7 Mostly based on (EEA, 2013) and (European Commission, 2014b)
8 For more details, see http://ec.europa.eu/clima/policies/ets/monitoring/documentation_en.htm
9 http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32004D0280:EN:NOT
10 http://eur-lex.europa.eu/Result.do?RechType=RECH_celex&lang=en&ihmlang=en&code=32013R0525
11 http://ec.europa.eu/energy/renewables/reports/reports_en.htm

Energy Efficiency Directive (EED)	National targets defined by the Member States in April 2013[12] Annual report (including energy consumption indicators) + NEEAP every 3 years (including energy savings results) by the Member States Eurostat data for primary and final energy consumption European Commission to review the energy efficiency progress towards 2020 by the 30th of June 2014	EED implementation and additional measures in the transport sector expected to lead to a 17 % reduction in primary energy consumption (below the 20% target)[13] A review of the progress in the EED implementation is to be published by the European Commission by June or July 2014 First assessments about EED article 7 has shown an overall low ambition[14]

The assessment of 17% reduction in primary energy consumption (compared to the PRIMES2007 baseline for 2020) is based on the reference scenario updated in 2013 (Capros et al., 2013) that includes all policies adopted until 2012 (included) (see also **Fel! Hittar inte referenskälla.** in the main report).

More details about the progress towards the 2020 targets can be found in (EEA, 2013) and (Commission, 2014b). A detailed analysis about the targets and approaches adopted by Member States to comply with EED article 7 can be found in (Coalition for Energy Savings, 2014).

12 http://ec.europa.eu/energy/efficiency/eed/reporting_en.htm
13 (European Commission, 2014b)
14 (Coalition for Energy Savings, 2014)

Annex B: on-going process to define the 2030 framework

On-going discussions involving European institutions, Member States and European stakeholders are debating the update of this policy framework towards 2030, whose process and key initial deadlines are summarised below.

March 2013	Green Paper ("A 2030 framework for climate and energy policies") published by the European Commission[15]
April 2013	Member States reported their first annual national reports for the Energy Efficiency Directive, including their national energy consumption targets for 2020[16]
March 2013 to July 2013	Public consultation
22 May 2013	Summit of the European Council (see conclusions: EUCO 75/1/13, 23 May 2013)[17]
End of 2013	Impact Assessment prepared by the European Commission (published on the 22 January 2014)
22 January 2014	Proposal for the 2030 framework to be issued by the European Commission
5 February 2014	Adoption by the European Parliament of a Resolution on a 2030 framework for climate and energy policies[18]
20-21 March 2014	Summit of the European Council (decision on the 2030 policy framework postponed to October 2014)[19]
3 February – 28 April 2014	Public consultation on Progress towards the 2020 energy efficiency objective and a 2030 energy efficiency policy framework[20]
30 April 2014	Member States to report their third National Energy Efficiency Action Plans (first ones within the framework of Energy Efficiency Directive)
5 June 2014	National transposition of the Energy Efficiency Directive to be completed by Member States and notified to the European Commission
26-27 June 2014	Summit of the European Council
30 June 2014	European Commission to review the energy efficiency progress towards 2020 (communication likely to be postponed in July)
23 September 2014	UN climate change summit in Lima
October 2014	Expected decision about the 2030 policy framework at the Summit of the European Council

15 http://ec.europa.eu/energy/green_paper_2030_en.htm
16 http://ec.europa.eu/energy/efficiency/eed/reporting_en.htm
17 http://www.consilium.europa.eu/uedocs/cms_data/docs/pressdata/en/ec/137197.pdf
18 http://www.europarl.europa.eu/sides/getDoc.do?type=TA&language=EN&reference=P7-TA-2014-0094
19 http://www.consilium.europa.eu/uedocs/cms_data/docs/pressdata/en/ec/141749.pdf
20 http://ec.europa.eu/energy/efficiency/consultations/20140428_eed_2020_2030_en.htm

In parallel, consultations and discussions are organised between the European Commission, the European Council and the European Parliament.

Moreover, discussions and consultations are organised e.g., through meetings of the Energy and/or Environment Ministries[21], stakeholders meetings and bilateral contacts (such as for the Impact Assessment).

The most debated positions are whether or not keeping a set of three targets (GHG emissions, renewables, energy efficiency/demand). While there seems to be a consensus about a target on GHG emissions, views are conflicting about renewables and energy efficiency/demand[22].

Meanwhile, the conclusions from the European Council Summit in May 2013 gave the priority to industrial competitiveness over climate change, emphasising the issues of energy prices, competitiveness and diversification of Europe's energy supplies (implicitly raising the question of shale gas)[23]. The Council's conclusions still states that the policy options should be discussed "*bearing in mind the objectives set for the COP 21 in 2015*" but the focus is clearly set on investments for the energy infrastructures (energy supply and networks).

Energy efficiency remains mentioned as "*a significant contribution to reversing current trends in energy prices and costs*", that "*should be promoted at all levels*". But this statement comes at the end of the list, and is not developed (compared to the other issues). Energy efficiency is obviously again downgraded among the policy options considered by the European Council. Whereas the European Commission keeps promoting energy efficiency as the first priority[24].

For more details, see the ECEEE discussion paper about competitiveness[25] and the ECEEE response to the Green Paper's consultation[26]. See also the part of this paper about Why a binding target for sustainable energy demand is needed.

21 Either official (http://www.consilium.europa.eu/meetings?lang=en) or informal (http://gr2014.eu/events/informal-meetings-ministers)
22 See in (European Commission, 2014b) the synthesis from the public consultation about the Green Paper ; see also http://www.euractiv.com/energy/2030-energy-target-doubts-oettin-news-530613
23 http://www.euractiv.com/energy/energy-council-set-turn-eu-clima-news-519883
24 See President Barroso's presentation on energy priorities for Europe: http://ec.europa.eu/energy/council/2013_en.htm
25 http://www.eceee.org/all-news/press/2013/the-real-issue-on-energy-and-competitiveness
26 http://www.eceee.org/about-eceee/eceees_views/eceee-2030-views

Annex C: analysis of existing targets for sustainable energy demand

The European framework for energy efficiency

The current European policy framework for energy efficiency[27] is defined by the Energy Efficiency Directive (EED, 2012/27/EU). Complementary specific objectives have been set for buildings (Energy Performance of Buildings Directive – EPBD, 2010/31/EU), energy-using products (EcoDesign Directive, 2009/125/EC) and vehicles (Emission Performance Standards of Passenger Cars, Regulation (EC) No 443/2009). In parallel, the energy intensive industries (including the energy sector) are covered by the European Emission Trading Scheme.

Detailed analysis of these European policies can be found on the eceee website.

Overview of targets at national level in Member States

The definition and adoption of energy efficiency targets (sectoral or global) by Member States are for most of them driven by the European Directives. A review made by Enerdata (2011) identified 76 targets in the 27 European Member states, whose 27 were the national targets defined for the Energy Services Directive. The different types of national targets found were (see **Figure 1** below):

- Energy intensity reduction (the most common target in the 1990's);
- Energy savings in volume, expressed in TWh, PJ, ktoe, etc. (targets for the Energy Services Directive);
- Energy consumption reduction (in absolute values) (type of targets that was increasing, even before the Energy Efficiency Directive was adopted);
- Rates of energy efficiency improvement, usually at sectoral or sub-sectoral level (in % or %/year);
- Thermal retrofitting objectives for buildings;
- Share of CHP (Cogeneration of Heat and Power);
- Carbon emission reductions.

27 http://ec.europa.eu/energy/efficiency/index_en.htm

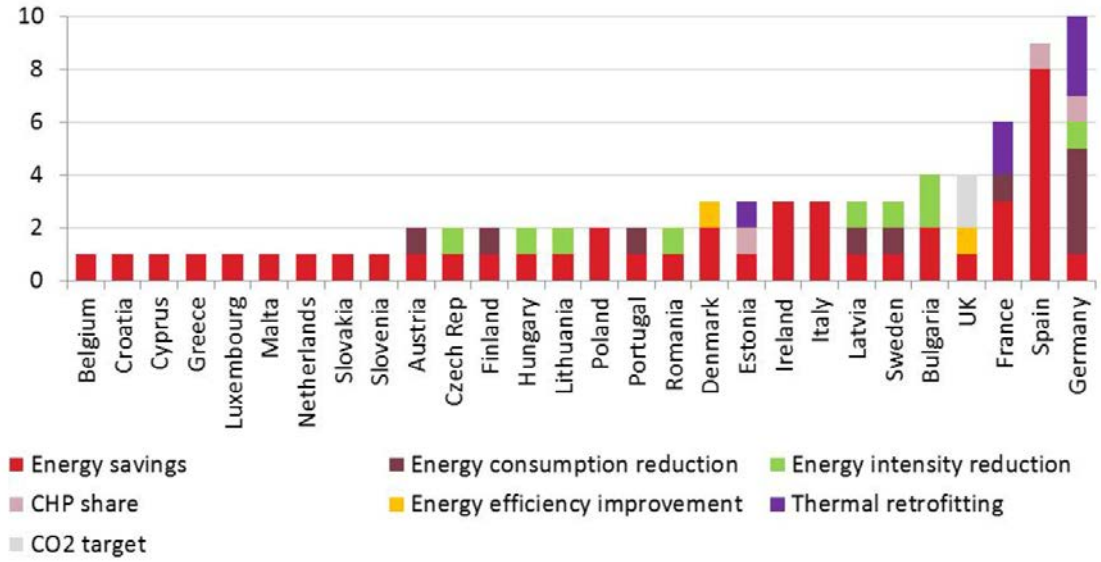

Figure 1. *Distribution of targets for sustainable energy demand (economy-wide or sectoral) according to their mode of expression (in the EU27 as of 2011).*

Source: Enerdata, 2011 (figure 4, p.7)

A complementary analysis of the targets for sustainable energy demand before the vote of the EED can be found in (ECEEE, 2011).

Table 1*. Economy-wide energy efficiency and energy saving targets (in the EU27 as of 2011).*

	Economy-wide target 1				**Economy-wide target 2**			
	note	*target*	*from*	*by*	*note*	*target*	*from*	*by*
Belgium	energy intensity (Flanders)	20%		2020				
Czech Republic	energy intensity	40%		2020	EE improvement of final energy consumption	2.1% per annum	2006	2009
Denmark	final energy demand	1.5% absolute per annum	2008		gross energy consumption	2% / 4% absolute reduction	2005/2006	2013/2020
Finland	final energy demand	30% below 2020 projection	2020	2050	final energy demand	11% below projected baseline		2020
France	energy intensity	20%	2005	2015				
Germany	primary energy intensity	20%	2008	2020				
Hungary	primary energy intensity	3.5% per annum	1999	2010	final energy demand, based on NEEAP method	1.1% per annum		2020
Ireland	primary energy demand	30% below projected baseline		2020				
Latvia	final energy intensity	0.22 toe/€1000		2020				
Netherlands	energy efficiency improvement	2% per annum		2020				
Poland	energy intensity	2005 EU-15 average		2030	primary energy	0% increase	2020	
Romania	energy intensity	40%	2001	2015				
Slovakia	energy intensity	EU-15 average	long-term goal					
Spain	primary energy demand	13.7% below projected baseline		2012				
Sweden	energy intensity	20%	2008	2020				

Source: ECEEE, 2011 (table 2, p.9)

In April 2013, Member States had to report their national targets expressed in terms of primary and final energy consumption in 2020, as required by EED article 3[28]. It should be noted that the details provided by the Member States vary very significantly (from a 1-page report for the Netherlands up to more than hundred pages for the Portugal for example).

28 See the table presenting these targets, together with the reports : http://ec.europa.eu/energy/efficiency/eed/reporting_en.htm

***Table 2**. National targets[29] for primary and final energy consumption for 2020 (as reported in 2013).*

		Targets reported for 2020			
		Base indicator[30]	**final energy consumption** (Mtoe)	**primary energy consumption** [31] (Mtoe)	**Comments** about the definition of the 2020 targets in the 2013 national reports
s	AT	final energy consumption	26,2	31,53	Target calculated in final energy consumption, applying 20% decrease to a final energy consumption corrected from the PRIMES 2007 baseline (due to higher population growth ; but no correction for economic growth) More or less equivalent to stabilise the 2011 level of consumption
Belgium	BE	primary energy consumption	32,5	43,70	18% reduction of primary energy compared to the primary energy consumption based on PRIMES 2007 baseline ; taking into account impacts from ETS and RES target
Bulgaria	BG	primary energy intensity	9,16	14,7	50% decrease in primary energy intensity ("EE potential maximising scenario"), using assumptions from PRIMES 2009, which is equivalent to 28,5% of primary energy savings compared to PRIMES 2009 baseline (32,5% compared to PRIMES 2007 baseline) Caution: Bulgarian report uses Gross Inland Consumption. Non energy uses are to be deducted to get primary energy consumption (1,1 Mtoe in 2020 based on PRIMES 2009)
Cyprus	CY	primary energy savings	2,2	2,76	target based on a study of energy savings potential (0,463 Mtoe), amounting to 14,3% savings in 2020 compared to a baseline estimated with a national model, and including EU and national policies voted up to 2010 (included)
Czech Republic	CZ	final energy savings	25,315	39,6	*(report not yet available in English)*
Denmark	DK	primary energy consumption	14,8	17,78	target based on a baseline including all policies decided by March 2012, and calculated by the Danish Energy Agency
Estonia	EE	final energy consumption	2,8	6,5[32]	target defined as keeping the final energy consumption at the 2010 level, equivalent to 13% final energy savings compared to baseline of PRIMES2009 (the target has been confirmed by a national study in 2012, but the national baseline for 2020 is lower

29 Croatia has not been included in these analyses, as the 2020 target mentioned in the EED was for EU27. However, Croatia would have to be included in further analysis.

					than in PRIMES2009 ; compared to this national baseline, the additional savings would represent 5,6%)
Finland	FI	final energy consumption	26,66	35,86	Target calculated on the basis of sector-specific reports and estimates
France	FR	final energy consumption	131,4	236,3	Target based on national scenarios, equivalent to 17% final energy savings compared to the national baseline scenario
Germany	DE	primary energy intensity	194,3	276[33]	target based on decreasing primary energy intensity (with national assumptions made in 2010 on GDP trends), and equivalent to a 12% decrease in both, primary and final, energy consumption compared to 2008 consumption levels
Greece	GR	final energy consumption	20,5	27,1	target based on a national baseline scenario, taking into account modeling of cost-effective potentials for end-use and primary efficiency, as well as the evolution of the generation capacities (including thermal plants needed to back up RES plants)
Hungary	HU	primary energy consumption	18,2	26,6	*(report not yet available in English)*
Ireland	IE	final energy savings	11,69	13,94	target equivalent to 20% of the average final consumption for 2001-2005, combined with a national baseline scenario + for primary energy, does not seem to take into account changes in energy mix
Italy	IT	primary energy savings[34]	126	158	energy savings targets calculated as the difference between national baseline and NES scenarios
Latvia	LV	primary energy savings[34]	4,47	5,37	energy savings targets calculated as the difference between two alternative energy development scenarios for 2030 (study done in 2012)
Lithuania	LT	final energy savings	4,28	6,48	final energy savings target defined from the study of energy savings potential done for the European Commission in 2009, combined with a baseline scenario (assumptions on economic growth and population decrease)
Luxembourg	LU	final energy consumption	4,24	4,48	target defined based on the PRIMES2007 projections for Luxembourg (baseline primary energy consumption -20%)
Malta	MT	primary energy savings[34]	0,493	0,825	use of bottom-up calculations to assess expected savings by 2020 (including primary energy savings from new electricity plants) ; the 22% savings announced for primary energy savings are not compared to PRIMES2007 baseline but compared to a national scenario

33 ambiguity on the target for primary energy consumption (276,6 Mtoe is 88% of the 314,3 Mtoe in 2008), while the report states the national target means reducing the 2008 level by 20% , which would give 251,4 Mtoe in 2020

34 Final energy savings was also used as a base indicator for Italy, Latvia and Malta.

Netherlands (the)	NL	primary energy consumption	52,1	60,7	reference to a study in Dutch: Verdonk, M., W. Wetzels (2012), Referentieraming energie en emissies: actualisatie 2012, Energie en emissies in de jaren 2012, 2020 en 2030. PBL/ECN, 2012
Poland	PL	primary energy savings	70,4	96,4	assessment of expected reduction in primary energy consumption based on national scenarios (likely bottom-up)
Portugal	PT	primary energy savings	17,4	22,5	target defined based on the PRIMES2007 projections for Portugal (baseline primary energy consumption -25%), also making the link with the RES target (+bottom-up assessment of expected final energy savings by 2016)
Romania	RO	primary energy savings	30,32	42,99	target expressed based on the PRIMES2007 projections for Romania (baseline primary energy consumption -19%). Caution: this baseline includes non-energy use (gross inland consumption, not primary energy consumption) the target has been defined based on a national scenario for final energy consumption done with the LEAP model, taking into account bottom-up assessment of final and then primary energy savings
Slovakia	SK	final energy savings	10,4	16,2	no report available in English yeat
Slovenia	SI	final energy savings	5,088	7,313	target based on national scenarios for final energy consumption
Spain	ES	primary energy intensity	82,9	121,6	using the article 7 target as a starting point + national targets based on national macro-economic scenarios
Sweden	SE	primary energy intensity	30,27	43,42	20% reduction in the energy intensity compared to a base year (2008), considering different average GDP annual growth for 2008-2020 (assuming 1,4%) growth rate based on the 2008-2012 average) ; then applying a primary-to-final energy ratio, taking into account nuclear losses
United Kingdom	UK	final energy consumption	157,8	177,6	target based on the national projections for UK (baseline final energy consumption -18% of 157,8 Mtoe in 2020, close to the PRIMES 2007 baseline)

Source: national 2013 reports available at http://ec.europa.eu/energy/efficiency/eed/reporting_en.htm

This review of these national reports shows the diversity in the approach used by Member States to set their national targets for 2020.
8 Member States (AT, BE, BG, EE, LU, MT, PT, RO) are explicitly making a reference to the PRIMES baseline scenarios (mostly PRIMES2007, as this was the baseline used to define the European target for 2020). Only 1 Member State (LT) refers to the study of potentials done in 2008-2009 (Fraunhofer ISI et al., 2009). Most of the Member States have used their own national scenarios to define their targets.

7 Member States (AT, EE, FI, FR, GR, LU, UK) have used as starting point thei energy consumption. 7 Member States (CY, IT, LV, MT, PL, PT, RO) have used savings. 5 (CZ, IE, LT, SK, SI) have used final energy savings. 4 (BE, DK, HU, primary energy consumption. 4 (BG, DE, ES, SE) have used primary energy intensi

The sum of the national targets gives 1536 Mtoe of primary energy consumption, ar final energy consumption for EU27 in 2020. These results should be considered wit Member States have used different ways to define their national targets and have sc perimeter different from the EED definitions for primary energy consumption.

However, it can be noted that this sum is above the maximum level set for EU27 ir Mtoe for primary energy consumption and 1078 for final energy consumption in 202

Figure 2 below shows the targets expressed in % of primary energy savings in 20 the PRIMES2007 and PRIMES2009 baseline scenarios. The rates reported by the are far from uniform (compared to the European target for energy efficiency of 20% the red line). This shows the diversity of situations, which would argue for a tar takes into account national specificities.

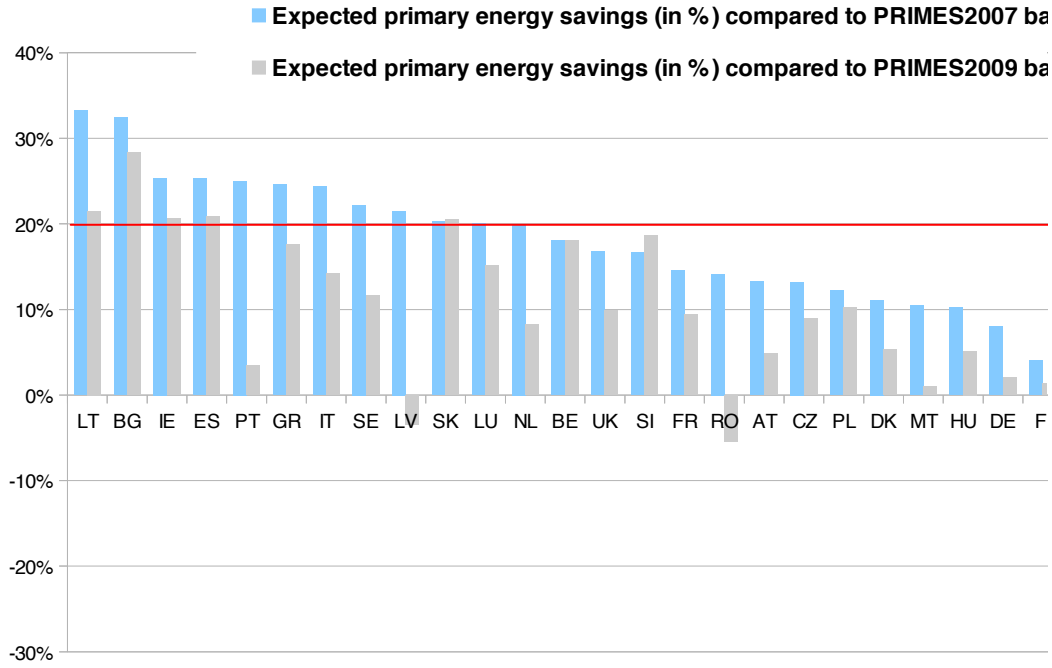

***Figure 2**. Expected primary energy savings (in %) in 2020 (as reported in 2013)*[35].

Source: national 2013 reports[36]

Figure 3 below presents the same primary energy savings, expressed in Mtoe, **Figure 2** with absolute figures. And then **Figure 4** shows the changes observed consumption for the period 2008-2012, as a percentage compared to the 2007 level.

35 Negative values mean that the target of primary energy consumption in 2020 reported by the Mer than the one forecasted in the PRIMES2007 or PRIMES2009 baseline scenario.
36 http://ec.europa.eu/energy/efficiency/eed/reporting_en.htm

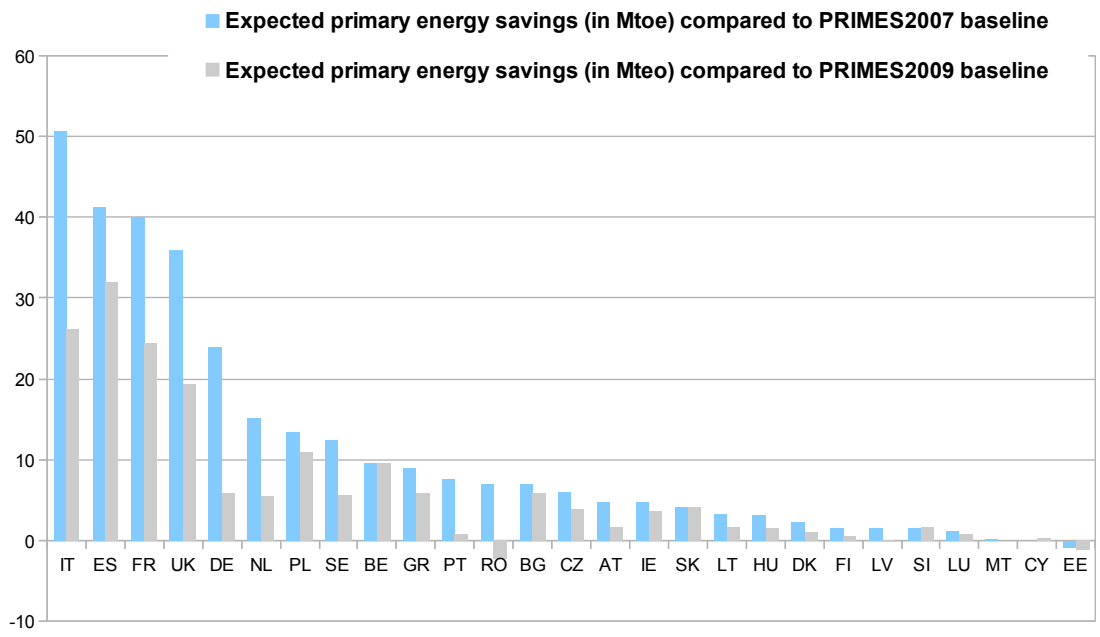

Figure 3. *Expected primary energy savings (in Mtoe) in 2020 (as reported in 2013)*[37].

Source: same as for **Figure 2** above.

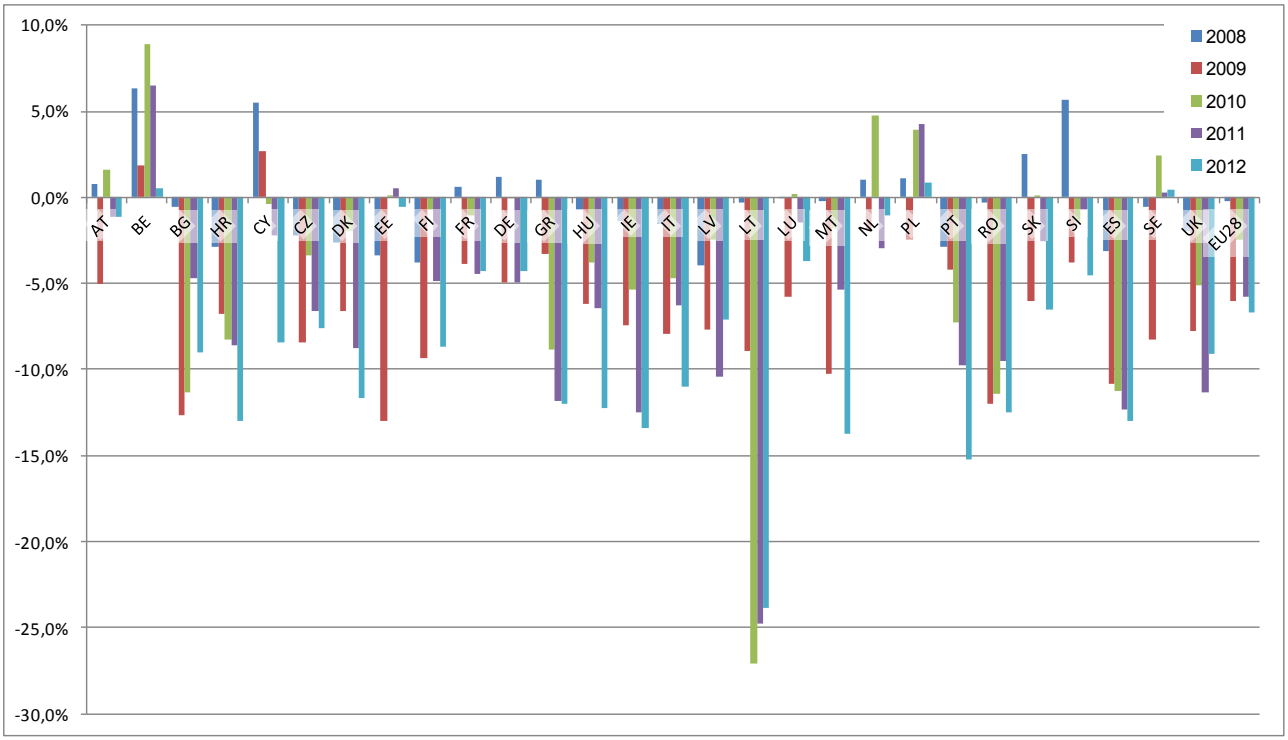

Figure 4. *Change in gross inland consumption (in%) compared to 2007 level.*

Source: Eurostat data[38]

Targets outside Europe

37 Negative values mean an increase in the primary energy consumption as reported in Member State's target compared to the PRIMES2007 or PRIMES2009 baseline scenario.

38 http://epp.eurostat.ec.europa.eu/tgm/table.do?tab=table&init=1&language=en&pcode=ten00086&plugin=1

Enerdata has performed a review of targets for sustainable energy demand, concluding that "***increasingly, countries are adopting national energy-efficiency programmes with quantitative targets: this is now the case with 86% of the countries surveyed in 2012*** *(72 countries), with most countries doubling their figures when compared to 2006. The progression can be observed in all regions and reflects more ambitious policies*" (WEC, 2013 p.33).

China

China has first adopted a binding target in its 11th Five-Year plan (March 2006): reducing energy intensity by 20 % from 2005 to 2010. This was equivalent to a reduction of 620 million tonnes coal equivalent for the primary energy consumption, and of 1.5 billion tons of CO2 for avoided GHG emissions (Lin et al. 2008).

An energy intensity reduction of 19% has been achieved. The target has been pursued in the 12th Five-Year plan, with an objective to reduce its carbon intensity by 17% in 2015 compared to 2010. The corresponding policy framework includes an Energy Conservation Target Responsibility System that imposes mandatory energy intensity reduction requirements on local governments. These requirements were distributed on a uniform basis for 2005-2010, while the sharing for 2010-2015 takes into account the difficulties encountered by some provinces in the previous period (Lo et al., 2013 ; Yuan et al. 2014).

This policy framework also includes several sectoral targets, such as the Top 1,000 Energy-Consuming Enterprises Programme.

United States

In his 2013 State of the Union address, President Obama has issued the objective to "*cut in half the energy wasted by our homes and businesses over the next twenty years. The states with the best ideas to create jobs and lower energy bills by constructing more efficient buildings will receive federal support to help make it happen*"[39].

The 2011 "Better Buildings Initiative" set a sectoral objective of 20% improvement in energy efficiency by 2020 for commercial buildings, equivalent to an overall energy bill reduction of $40 billion per year[40].

In parallel, the ACEEE (American Council for an Energy Efficient Economy) takes records of the states having specific energy savings targets, and counted 25 states under this criterion as of April 2014[41]. These schemes were analysed by the US DOE in 2010 (see Glatt and Schwentker, 2010), and can be compared to energy efficiency obligation schemes in Europe.

Russia

The Energy Strategy of Russia defined in 2009 sets a 56% energy intensity reduction target for 2030 compared to 2005 level, with an intermediate target of 40% by 2020 compared to 2007 level[42].

39 http://www.whitehouse.gov/the-press-office/2013/02/12/remarks-president-state-union-address
40 http://www.americanprogress.org/issues/2011/02/pdf/building_fact_sheet.pdf
41 http://www.aceee.org/topics/eers
42http://www05.abb.com/global/scot/scot316.nsf/veritydisplay/9549bd5f263fc6b6c12579d0004f36b9/$file/russia%20energy%20efficiency%20report.pdf

Brazil

The Brazilian National Policy on Climate Change adopted in 2009 requires a reduction in the national greenhouse gas emissions of 39% by 2020, equivalent to about 1.06 billion tCO2e by 2020 (with significant measures for reducing deforestation).

As regards more specifically energy efficiency, Brazil has no formal target yet, but has implemented an energy efficiency obligation scheme for its utilities since 1998. This is an obligation of means (share of revenues to be invested in energy efficiency programmes), not an energy savings obligation (Broc et al., 2012).

India

India has adopted in 2008 its National Action Plan on Climate Change, including a National Mission on Enhanced Energy Efficiency. One of the key measures is the Perform, Achieve and Trade (PAT) scheme covering the largest industrial and power generation facilities (representing more than 50% of fossil fuel use in India). The PAT target is a 4% to 5% reduction of energy consumption of the participating facilities in 2015[43].

India has also defined several other sectoral targets within its 11th Five-Year plan (2007-2012), with objectives expressed in terms of saved capacity[44].

This short overview is of targets outside Europe not meant at all to be exhaustive. It is just to present a few examples, in order to show that Europe is not the only region of the world with objectives for energy efficiency.

43 http://iepd.iipnetwork.org/policy/perform-achieve-trade-scheme-pat-scheme
44 http://www.teriin.org/events/docs/present_japan/sess1/v_raghuraman.pdf

Annex D: Answers to 5 misleading arguments

Main answers per argument are summarised below. References supporting these answers are listed in the paper.

Argument 1	The objectives of **competitiveness**, security of energy supply and sustainability (often restricted to climate objectives) should be considered on an equal footing. In particular, attention should be paid to the **energy price** differential with major competitors.
Answer	• Confusion between energy prices and energy costs should be avoided. • There are a rich literature and a wide agreement among stakeholders to recognise energy efficiency as a key driver (and not as a barrier) for competitiveness. So this argument should actually support the setting of a target for sustainable energy demand.

Argument 2	An inappropriate (meaning too ambitious) 2030 framework would be **costly** for Europe, and may cause **job losses** (in particular due to so called "carbon leakage").
Answer	• Cost-effectiveness of energy efficiency actions is widely recognised and supported by a large amount of studies. • Energy efficiency has also been acknowledged by business advocates as well as researchers as one of the key advantages of the European industries in the global competition (especially for energy intensive sectors). It actually mitigates the risk of "carbon leakage". • Improved energy efficiency helps meet key general priorities, and among them jobs preservation/creation and positive health impacts. It is indeed one of the key pillars for a sustainable and resource efficient economy. • Several studies have shown that large cost-effective energy savings potentials remained untapped. In particular, they prove the achievability of the 40% energy savings target agreed by the European Parliament. • Altogether, this shows that this second argument should support as well the setting of a binding target for sustainable energy demand.

Argument 3	**The combination of three 2020 targets** (GHG emissions, renewable energy sources and energy efficiency) **would have proven to be counterproductive**, especially due to overlapping scope of the EU targets for energy efficiency and renewable energy sources with the EU ETS
Answer	• Inconsistencies in the framework are not due to targets themselves, but to the lack of integration, especially among policies for renewable and GHG emissions. A better integration would be favoured by taking the target for sustainable energy demand as a starting point, as shown by the Fraunhofer ISI[45]. • Defaults of the EU ETS come more from too high volumes of free allowances, unsuitability to unexpected economic cycles and international offsets, than from overlaps with other targets, and above all with energy efficiency. • EU energy policies do not only aim at reducing GHG emissions. A single target for GHG emissions would not ensure energy security/independency (in particular due to fuel switching, meaning higher gas consumption). Likewise, the Impact Assessment has shown that scenarios with ambitious energy efficiency policies lead to higher societal benefits (including lower energy costs).

45 http://energycoalition.eu/sites/default/files/Fraunhofer%20ISI_ReferenceTargetSystemReport.pdf

Argument 4	The 2030 framework should avoid bureaucracy and "one size fits all" approaches. At the opposite, the framework should allow for the maximum flexibility.
Answer	• Energy efficiency is recognised as the most cost-effective way to meet the energy and climate objectives. It would then be inconsistent to argue that an energy efficiency target would restrict the flexibility of the framework, while this flexibility is meant as allowing using the most cost effective options. In addition, improved energy efficiency lowers the pressure on the energy systems, meaning increased flexibility to choose among energy options. • Improving energy efficiency can be achieved by a very large number of different options. For most of them, the energy efficiency principles are based on taking specificities into account. An energy efficiency target is therefore the opposite of a "one size fits all" approach. • Significant experience has been gained in monitoring and evaluating energy savings or energy efficiency trends. The reporting and verification of energy savings can be done in a cost effective manner, as shown for many national schemes such as the energy efficiency obligation schemes. This is not more costly, risky or bureaucratic than managing the EU ETS. • The proposition of the Commission to merge the different reporting (for GHG emissions, renewables and energy efficiency) into one reporting scheme already addresses the need to minimise the administrative burden. In addition, the reporting on the three criteria would have to be done whatever the nature of the target (or non-target) adopted for each.

Argument 5	A target for energy demand is too complex to define, and would be too difficult to monitor. Moreover, due to the economic crisis, the European Union cannot afford anymore to be the world leader for climate policies while others are not committing.
Answer	• As mentioned above, significant experience has been gained in monitoring and evaluating energy savings or energy efficiency trends. • Targets for energy demand have already been implemented either at EU level (for ex., the 9% energy saving target for 2016 of the Energy Services Directive) or national levels (for ex. the energy efficiency obligation schemes in UK, France, Italy and Denmark). • Examples of energy efficiency targets also exist outside Europe, and their number is growing (for ex. national targets on energy intensity in China and Russian Federation, different types of targets in many states of the US, targets for large consumers in India or for utilities in Brazil). If the European Union does not adopt a target for sustainable energy demand, the situation would then become the opposite where most of the countries would have targets and not Europe!