



# **EFFICIENCY FIRST: A NEW PARADIGM FOR THE EUROPEAN ENERGY SYSTEM**

**DRIVING COMPETITIVENESS, ENERGY SECURITY AND  
DECARBONISATION THROUGH INCREASED ENERGY PRODUCTIVITY**

# Summary

This briefing explains what “Efficiency First” is and why it should underpin the Energy Union. In a nutshell, it comes down to prioritising investments in energy efficiency – whether end-use savings or demand response – whenever they would cost less or deliver more than investing in supply or networks. Applying this logic to all energy policy decisions can strengthen Europe’s economic recovery, lower fuel imports, build competitiveness, create jobs, improve air quality and bring down the costs of the transition to a low-carbon society.

“[...] IT STARTS WITH TAKING  
“EFFICIENCY FIRST” AS OUR ABIDING  
MOTTO. BEFORE WE IMPORT MORE  
GAS OR GENERATE MORE POWER, WE  
SHOULD ASK OURSELVES: “CAN WE  
FIRST TAKE COST-EFFECTIVE MEASURES  
TO REDUCE OUR ENERGY [USE]?”

*Miguel Arias Cañete, EU Climate and Energy  
Commissioner <sup>1</sup>*

# Introduction

The year 2016 is when we start delivering on the real substance of an Energy Union with a Forward-Looking Climate Policy. There is no better time to start applying the concept of Efficiency First. This is one of the five pillars of the Energy Union after all. Efficiency First means assessing the potential value of investing in energy efficiency – be that end-use savings or demand response – in all decisions about developing our energy system, and prioritizing such investments whenever they would cost less or deliver more than building new supply or networks. Of course we need energy supplies and we need networks, but before taking decisions on these, it makes sense to ask first: “Can we take cost-effective measures to reduce our energy consumption?” Energy is a valuable resource and we should treat it as such. Efficiency First can and should be a guiding principle for the Energy Union. It means getting the best out of the energy system at every level. We have started to do this, but there is a long way to go.

As energy policymakers we face our biggest challenge in decades: how to create an energy system fit for the 21<sup>st</sup> century? At the same time as seeing through an energy transition that is just, affordable and beneficial to European citizens and businesses. Efficiency First can help bring down the costs of this energy transition. By using energy more wisely, we can help restore Europe to growth, create jobs, reduce imports and improve air quality. Efficiency First can help us deliver the Energy Union – and Europe – we want.

To make Efficiency First a reality, we need to embed the principle into our models and impact assessments, funding and infrastructure decisions, and into all energy and climate policies. In that vein, we welcome this paper and the efforts stakeholders are making to think through how we can create a governance framework that fully integrates Efficiency First. As European Commission Vice-President for the Energy Union I look forward to working with stakeholders to further this endeavour, and will make sure the principle finds its place in our forthcoming proposals on power market design, heating and cooling, the National Energy and Climate Plans and beyond.



A handwritten signature in black ink, appearing to read 'Maroš Šefčovič'.

*Maroš Šefčovič*

*European Commission Vice President for Energy Union*



# Europe's energy transformation

Not since the Industrial Revolution has it been such an exciting time to work in energy. Then, it was the steam engine that turned society upside down. Today, it is smart grids, solar panels, and the “Negawatt” (a unit of power representing an amount of energy saved).

These inventions are changing the way the energy system – and the economy – works. In the past, energy production was centralised and fossil fuel-based. Consumers were passive. Today, energy is increasingly produced by decentralised renewables, and consumers are active and engaged. We want heat, light, mobility and comfort; we want modern conveniences, not kilowatt hours. And we expect these services at a decent price, available on demand and responsibly produced.

This transformation can be an engine of economic growth in Europe. But it poses a challenge to policymakers and companies in the energy business. Policymakers must make the transition fair, competitive and sustainable. Companies have to find the business models that make it pay. The principle of Efficiency First is key to unlocking both outcomes.

## What is Efficiency First?

Efficiency First is the fundamental principle around which the EU's energy system should be designed. It means considering the potential value of investing in efficiency (including energy savings and demand response) in all decisions about energy system development – be that in homes, offices, industry or mobility. Where efficiency improvements are shown to be most cost-effective or valuable, taking full account of their co-benefits, they should be prioritised over any investment in new power generation, grids or pipelines, and fuel supplies<sup>2</sup>.

In practice, Efficiency First means giving energy efficiency a fair chance in the models and impact assessments that policy-makers use to make decisions, strengthening those laws that already target efficiency, and integrating it into all other Energy Union policies. That includes funding decisions and infrastructure planning. Applying this principle will help to correct the persistent bias towards increasing supply over managing demand, a bias which has impeded Europe's ability to create a least-cost, jobs-rich, low-carbon energy system.

“THE NEED TO MOVE TO A LOW-CARBON ECONOMY HAS CHANGED THE PARAMETERS OF THE ENERGY CHALLENGE.”

*Philip Lowe, former Director-General for Energy at the European Commission*<sup>6</sup>

“ELECTRICITY MARKETS ARE DESIGNED TO REFLECT AND OPTIMISE THE COST STRUCTURES OF CONVENTIONAL TECHNOLOGIES.”

*Malcolm Keay, Oxford Institute for Energy Studies (OIES)*<sup>9</sup>

“THE PARIS AGREEMENT IS NOTHING LESS THAN A HISTORIC MILESTONE FOR THE GLOBAL ENERGY SECTOR. “IT WILL SPEED UP [ITS] TRANSFORMATION BY ACCELERATING INVESTMENTS IN CLEANER TECHNOLOGIES AND ENERGY EFFICIENCY.”

*International Energy Agency (IEA)*

# Why Europe needs a more efficient energy system

Until recently, European energy policy was a lot about opening up markets. Brussels advanced the break-up and privatisation of utilities to drive competition. The idea was to stimulate innovation and drive down power prices.

Yet consumers remain largely passive takers of the energy products utilities want to sell. European industries and households continue to pay some of the highest electricity prices in the world, more on average than any other major economy except Japan<sup>3</sup>. And energy poverty is a growing problem<sup>4</sup>.

At the same time, energy security has been upgraded to a “permanent” political priority in the wake of the latest Russia-Ukraine conflict<sup>5</sup>. One third of all the gas Europe consumes comes from Russia, most of it for heating. Any transformation of the energy system will have to improve energy security.

But it is climate change that is the real game-changer. This has broken the mould for the energy system. The historic climate deal reached in Paris in December 2015 commits the world to limit global temperature rise to “well below” 2°C – and even aim to limit the temperature increase to 1.5°C.

Energy companies finally have a clear, long-term goal and a framework for getting there<sup>7</sup>.

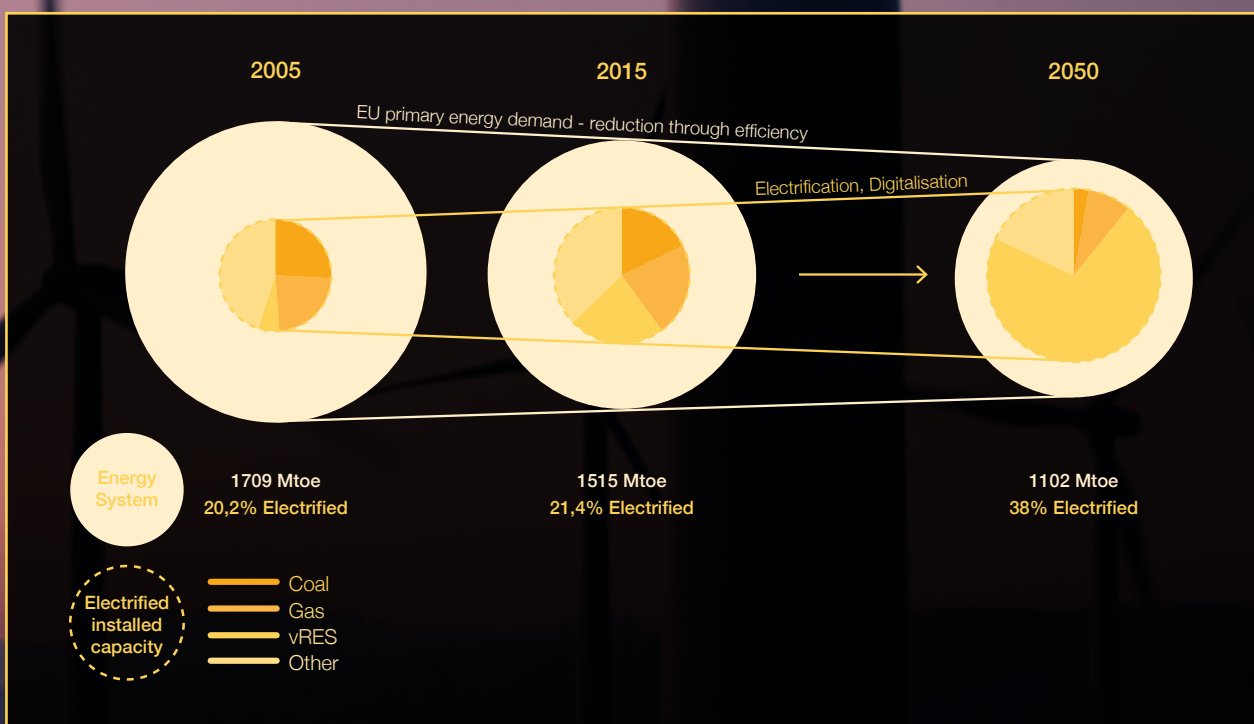
Goldman Sachs announced a quadrupling of its clean energy investment budget to US\$150 billion by 2025 in the run-up to Paris<sup>8</sup>.

For Europe, decarbonisation means an 80-95% reduction in greenhouse gas emissions by mid-century. This will require major reductions in energy demand and lots of renewables to fill what’s left; all the more so, with the anticipated electrification of the heating, cooling and transport sectors. The bottom line is that meeting Europe’s climate goals will require an energy mix that is based on renewables, even if nuclear and carbon capture and storage (CCS) exceed expectations.

The challenge is how to integrate renewables into a market and a grid that were not designed for them.

Over-capacity, near-zero marginal cost renewables and lower demand growth have driven down wholesale power prices and with that the profits of utilities. The market no longer incentivises investment in any kind of generation. Nor does it drive efficient energy use.

The 21st century needs an updated energy system to meet the new demands of climate change, energy security and competitiveness. The EU launched a strategy for an “Energy Union” in February 2015 to deliver exactly this. Together with the Commission’s €315 billion Juncker investment plan, it can help restore Europe to growth. Energy efficiency is the key to making this transition affordable.



REDUCING THE EU'S GREENHOUSE GAS EMISSIONS BY 80% BY 2050 WILL REQUIRE A SIGNIFICANT REDUCTION IN PRIMARY ENERGY DEMAND, BUT AN INCREASE IN THE SIZE OF THE POWER SECTOR AS HEATING AND TRANSPORT ARE ELECTRIFIED. A LARGE SHARE OF ELECTRICITY WILL NEED TO COME FROM VARIABLE RENEWABLES, NECESSITATING SIGNIFICANT FLEX-EFFICIENCY. THE PARIS AGREEMENT IMPLIES EVEN GREATER EMISSIONS AND ENERGY USE REDUCTIONS FOR THE EU.

SOURCE: COMMISSION 2050 ROADMAP (2011); EUROPEAN ENVIRONMENT AGENCY (2015)

# Efficiency First: A new lens for the Energy Union

Efficiency First is the foundation on which a successful Energy Union can be built. Energy is an invaluable resource and we must use it efficiently. Europe has a strong case to promote energy productivity as a key driver of growth and security.

Investments in energy efficiency, whether end-use savings or demand response, can create export potential, lower fuel imports, improve air quality, create jobs, and reduce fuel poverty. They can minimise more expensive investments in generation and the grid. And they can enable Europe to deliver carbon reductions faster and at lower overall cost <sup>10</sup>.

“Efficiency First” aims to deliver different kinds of demand management – both “energy savings” (doing more with less) and “demand response” (shifting consumption patterns to reflect system conditions) <sup>13</sup>.

It is about getting the best out of the energy system at every level, from the European market to the individual household or industrial site. It is a combination of end-use efficiency (e.g. better insulation, windows and heating systems and smarter household appliances), supply-side efficiency (e.g. combined heat and power generation, better industrial design) and system efficiency (e.g. demand response).

## Energy efficiency is an energy source in its own right

- The IEA called energy efficiency the “first fuel” in 2013. It showed that energy savings from efficiency measures exceeded the output of every other fuel in 11 IEA countries from 1974-2010 <sup>11</sup>.
- “Energy Efficiency First” is one of the five pillars of the EU’s Energy Union <sup>12</sup>.

“WE HAVE TO FUNDAMENTALLY  
RETHINK ENERGY EFFICIENCY  
AND TREAT IT AS AN ENERGY  
SOURCE IN ITS OWN RIGHT.”

*European Commission Vice President  
for Energy Union Maroš Šefčovič*

“THIS PENETRATION [OF  
RENEWABLES] REQUIRES A  
MORE FLEXIBLE ELECTRICITY  
SYSTEM AND DEMAND  
RESPONSE IS PROBABLY ONE  
OF THE MOST EFFICIENT WAYS  
– IF NOT THE MOST EFFICIENT  
WAY – TO PROVIDE THIS  
FLEXIBILITY.”

*Alberto Pototschnig, Director,  
Agency for the Cooperation of Energy  
Regulators (ACER) <sup>14</sup>*





# Think about managing demand before locking in new supply

In many ways, the EU has already recognised the value of managing energy demand <sup>15</sup>. Energy consumption today is down to 1990 levels and sinking further.

This is partly to do with the economic crisis, changing economic structure and warm winters. However, the EU has also become more efficient through greater diffusion of energy efficient appliances, building retrofit programs, new building standards and fuel economy standards for cars and vans, for example.

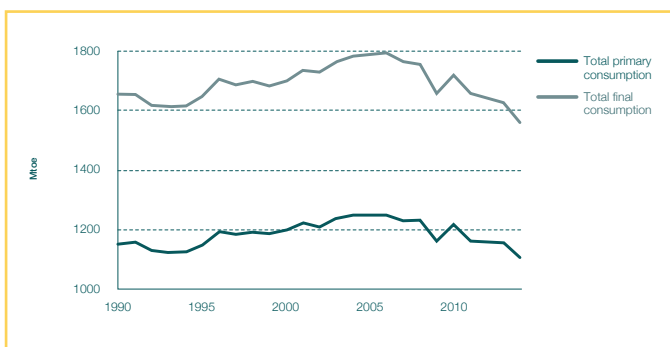
This is a good start to unlocking energy efficiency potentials. But the EU is far from reaching its cost-effective savings potential, which stands at 40% by 2030 according to research published by DG Energy in 2014 <sup>16</sup>.

The fact is that energy efficiency is not systematically considered or prioritised when policymakers make decisions about the energy system. When it comes to energy planning and investment, the focus is still on supply: policymakers worry about the need for new power plants, gas contracts, lifetime extensions for nuclear plants, and upgrading electricity and gas networks.

Yet Europe's energy and economic goals could be met far more reliably, at much lower cost and with much less environmental impact. How? By exploring demand-side options first.

Putting Efficiency First would accelerate progress towards every other goal of the Energy Union – energy security, innovation, decarbonisation and a competitive internal market. Energy efficiency today is an underused European asset. How do we change this?

EU ENERGY CONSUMPTION 1990–2014



SOURCE: IDDRI, ENERDATA

“...IT SEEMS USELESS TO DEVELOP EUROPEAN SUPPLY WITHOUT A CORRESPONDING APPROACH TO THE DEMAND SIDE.”

*European Commission* <sup>17</sup>



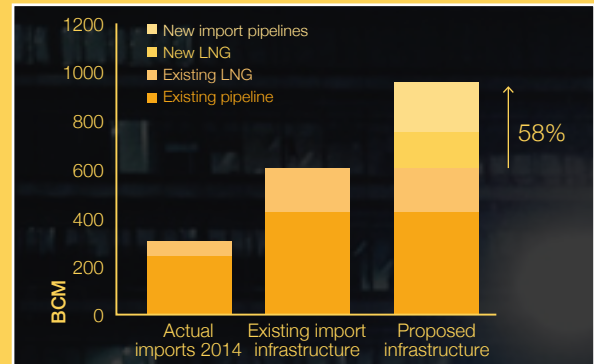
## Three industrial priorities on which Efficiency First can deliver

**Energy security:** There is real potential to improve energy security through energy savings and demand side flexibility.

Did you know that every 1% energy saving could translate into a 2.6% reduction in gas imports? Yet energy security is usually considered a matter of diversifying routes and suppliers. The very definition of “energy dependence” misses the point: it compares EU production to imports, without considering the potential for reducing demand in the first place.

**Economic recovery:** Scotland has made energy efficiency a national infrastructure priority<sup>18</sup>. Thinking about energy efficiency as “infrastructure” makes it part of the economy. Saving energy creates economic capacity after all, just like new generation or grid expansion would. Buildings and boilers are part of the basic infrastructure of a country, not isolated appliances<sup>19</sup>. Lower energy bills for consumers increase their disposable income, helping stimulate the consumption of other goods and services.

**Jobs:** Calculating the job effects of energy efficiency is difficult. Eurostat does not list it as a separate sector. But in general, efficiency is labour intensive compared with energy supply (and even more so, when compared with fossil-fuel imports). Estimates suggest that in 2010, there were close to one million people working in jobs dedicated to energy efficiency in the EU28<sup>20</sup>. As a bonus, investments in efficiency keep money in local economies. This can lead to secondary job impacts that often double the total number of jobs created.



PROJECTS REPRESENTING A 58% INCREASE IN GAS IMPORT CAPACITY ARE UNDER DEVELOPMENT. IN ALL SCENARIOS IN WHICH EU ENERGY AND CLIMATE TARGETS ARE MET, GAS DEMAND FALLS SIGNIFICANTLY.

SOURCE: E3G, BRUEGEL, ENTSO-G, EUROPEAN COMMISSION

“BEING AMBITIOUS ON ENERGY EFFICIENCY IS THE CENTRAL PLANK OF OUR LONG-TERM ENERGY SECURITY STRATEGY.”

*EU Climate and Energy Commissioner Miguel Arias Cañete*

# What does Efficiency First mean in practice?

It is time for policymakers to catch up with what is happening on the ground. They need to start prioritising and facilitating investment in managing energy consumption. This will unlock more private finance, boost energy productivity and accelerate a return to growth. And the cherry on the cake: an energy infrastructure that is in line with the Paris climate deal.

## **Q: Does the Efficiency First principle mean energy efficiency is all that matters?**

*A: No, only that it should always be considered on a par with other options, from renewables to grid reinforcements. Until now that has not been the case. Policymakers prioritise supply-side options since that's the part of the energy system they're most familiar with.*

## **Q: Is it really more than just a slogan?**

*A: Yes. It means systematically scanning every proposal related to the Energy Union with an Efficiency First lens. It's about using efficiency to frame how Europe plans, finances and delivers its energy system.*



# Efficiency First as an “organising” principle

With hindsight, Efficiency First should have been fed into the planning process for the whole 2030 climate and energy policy framework. As it is, one year after the launch of the Energy Union the European Commission has not yet fully assessed what changes would be required to enact the principle. That is the purpose of this briefing.

There is no single policy lever for Efficiency First. Decisions that affect energy systems are made by EU policymakers, national and local governments, regulators, network operators and energy providers. If each of these has a process in place to prioritise efficiency, the system as a whole will deliver. Consider Efficiency First as an organising principle. Think of it as the bedrock of the Energy Union. It means that examining the potential for energy savings and demand response becomes a first reflex.

## What does Efficiency First look like in the Energy Union (EU level)?

PRINCIPLES



### PLAN

E1ST LEGALLY ENSHRINED AS A FOUNDATIONAL POLICY OF THE ENERGY UNION  
E1ST EMBEDDED IN THE EU'S POST-PARIS REVIEW OF ITS DECARBONISATION TRAJECTORY

ACTION PLAN



### PLAN

COMMISSION ACTION PLAN SETTING OUT THE SHORT, MEDIUM AND LONG-TERM ACTIONS NEEDED TO IMPLEMENT, MONITOR AND ENFORCE E1ST  
ANNUAL PROGRESS REVIEW IN STATE OF THE ENERGY UNION

LEGASLATIVE STEPS



### PLAN

APPLY SOCIETAL PERSPECTIVE IN IMPACT ASSESSMENTS  
+ APPLY E1ST PRINCIPLE IN DEMAND PROJECTIONS USED FOR POLICY AND INFRASTRUCTURE PLANNING

### FINANCE

E1ST AS A GUIDING PRINCIPLE FOR THE ALLOCATION OF EU FUNDS, TECHNICAL ASSISTANCE AND STATE AID APPROVAL

### DELIVER

DELIVER EE VIA DEDICATED EE FRAMEWORK  
+ MARKET DESIGN RULES  
+ LOCAL ACTORS

MEMBER STATE ACTION PLANS



### PLAN

E1ST PRINCIPLE INCORPORATED INTO FORMULATION OF NATIONAL ENERGY AND CLIMATE PLANS

FOR MORE DETAILS ON THESE MEASURES PLEASE SEE THE BRIEFING "GOVERNANCE FOR EFFICIENCY FIRST: "PLAN, FINANCE AND DELIVER" - TEN NEAR-TERM ACTIONS THE EUROPEAN COMMISSION SHOULD TAKE TO MAKE EFFICIENCY FIRST A REALITY"



# Getting the fundamentals right

## Use consistent demand projections

First, all of the EU's energy plans and models should use the same energy demand projections. Second, they should assume full achievement of the EU's existing energy and climate goals (i.e. the EU should take its own policies seriously), and account for the EU's long-term climate commitments. Third, the projections should be credible (see graph).

Affected models and plans range from gas stress tests and system adequacy assessments to grid development scenarios and EU funding decisions for Projects of Common Interest (PCIs <sup>22</sup>).

## Employ a societal perspective

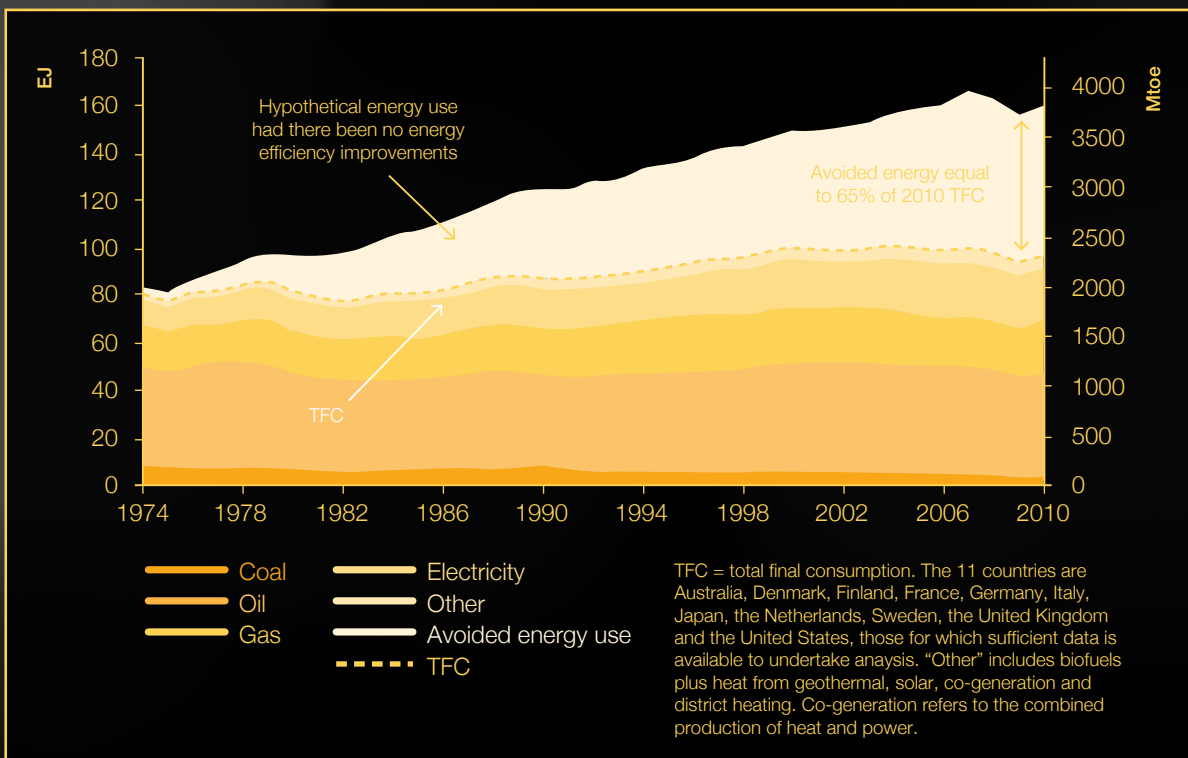
The methodology used to assess the impact of different energy efficiency goals determines their attractiveness to policymakers. The Commission's current methodology does not do energy efficiency justice. It looks at the cost of energy efficiency targets from the perspective of individual consumers, rather than analysing the costs and benefits to society as a whole, or taking into account the role that policy can play in overcoming barriers to realising these benefits <sup>23</sup>. In other words, it estimates the cost of getting a homeowner to insulate their loft in a malfunctioning market, without considering how public policies and measures will reduce obstacles and costs.

The EU needs to properly evaluate energy efficiency in its impact assessments and analysis:

- use the same energy-demand projections for all Energy Union work
- move from an individual to a societal perspective in evaluating energy efficiency's potential and take account of its multiple benefits – for example improvements to air quality
- integrate it into new national energy and climate plans (NECPs) required by the Energy Union.

## DID YOU KNOW?

To date, the European Commission uses different demand projections for different policies. Moreover, these projections are not always in line with agreed EU targets. For instance, the gas demand projections used for funding decisions under the Connecting Europe Facility <sup>21</sup> are 30% higher than the Commission's reference scenario for gas demand in 2030. They are 72% higher than projections if a 30% energy savings target is met.



THE "FIRST FUEL": AVOIDED ENERGY USE FROM ENERGY EFFICIENCY IN 11 IEA MEMBER COUNTRIES  
SOURCE: IEA

A societal perspective is more appropriate to shape the appropriate ambition level for public policy. The Commission's DG Energy has indicated it is ready to move in this direction. In doing so, it follows in the footsteps of other departments (e.g. DG Regio) and several Member States (see below). In practice, the change in approach translates into using a far lower discount rate (the cost of investment) in impact assessments.

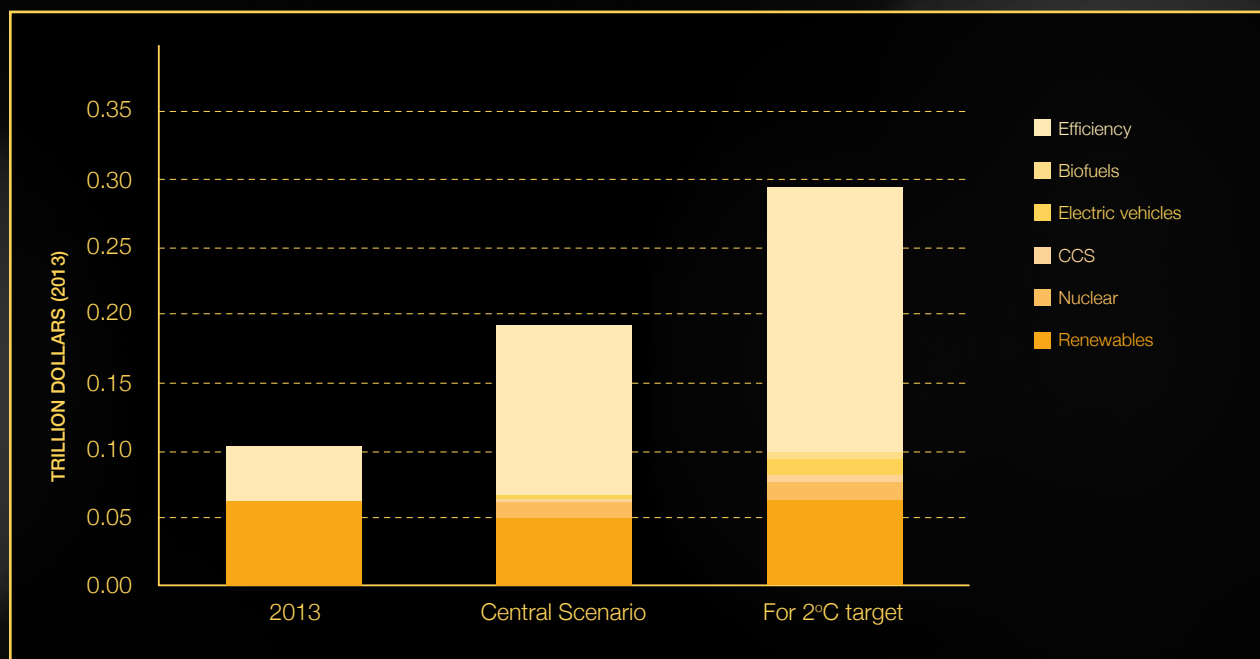
## DID YOU KNOW?

The UK, France, Netherlands and Germany all use a social discount rate of 1.7-6%<sup>24</sup> for private (household) energy efficiency investments, versus 17.5% – and more recently 10% – used by the Commission.

Besides using a lower discount rate to model costs of efficiency measures, adopting a societal perspective will also require the Commission to quantify, monetise and factor in the wider social benefits of energy efficiency. In the past it has presented, but not fully taken into account, benefits beyond direct savings to individual households. These benefits include better energy security, air quality, job creation and a reduction in CO2 emissions. The IEA has created a framework for capturing these benefits.

## Make it the bedrock of national climate and energy plans

Efficiency First should play a central role in all national plans and reporting on the Energy Union. These plans should include projections of energy demand out to 2030 and 2050, in line with energy efficiency targets. Governments should set out a transparent, comparative assessment of potential supply- and demand-side investments. Specific indicators such as primary and final energy savings, energy productivity for key sectors like buildings, transport and industry, energy imports and demand side participation in energy markets must be used by the Commission to monitor national implementation of Efficiency First.



AVERAGE ANNUAL LOW-CARBON INVESTMENT NEEDED IN THE EU TO MEET A 20C TARGET, 2014-2040.  
SOURCE: IEA.

# Improving dedicated EU energy efficiency policies

## Set a 40% energy efficiency target for 2030

The Commission has indicated that it is ready to model a 40% energy efficiency target for the EU for 2030. This would reflect the cost-effective potential for energy savings<sup>25</sup>. It is also the only target that would put the EU in line with what the IEA says it needs to do to meet its climate goals<sup>26</sup>. The Efficiency First logic means that this target should have at least the same status as the other 2030 climate and energy targets, i.e. it should be binding.

### DID YOU KNOW?

A 40% energy efficiency target could trigger over €714 billion of investments in the European economy, more than twice the amount expected to be generated by Juncker's investment plan (€315 billion). It would also create or maintain over 11 million jobs, equivalent to almost half of the number of Europe's unemployed<sup>27</sup>.

## Extend and tighten up energy efficiency obligations

The widely discussed Article 7 in the EU's Energy Efficiency Directive is a cornerstone of this law. It requires an additional 1.5% savings in energy end-use every year until 2020. Why is it so important? First, because it stimulates national policies and measures beyond what is required by existing standards. Second, it leverages finance for efficiency through energy companies and therefore links it with broader energy system investment.

If implemented in full, Article 7 could deliver at least 119 million tonnes of oil equivalent of energy savings by 2020, or around a third of the EU's 2020 energy efficiency target<sup>29</sup>. European and international experience indicate that this is achievable. Many countries beyond the EU have ramped up their annual savings objectives once programmes got going<sup>30</sup>. Europe has done the opposite. The 1.5% goal has effectively been cut in half through various exemptions (for example, for early action). These exemptions need to end, implementation must be enforced and the 1.5% mandate extended beyond 2020. Transport should be included in the baseline, since end-use savings in transport already count towards the target.

Efficiency First needs dedicated EU legislation and policies that set clear goals:

- set a 40% energy efficiency target for 2030
- extend and tighten up annual energy efficiency obligations for end-use savings
- enforce access to demand response in all energy markets

### DID YOU KNOW?

The EU is trying to channel more money to energy-efficiency projects. These projects get fast-track access to finance at the EIB and Juncker's European Fund for Strategic Investments (Efsi) includes a scorecard that is weighted towards energy efficiency.

And yet, energy efficiency accounted for just 2.8% of the EIB's total lending in 2014.

There is currently no consideration of an economy's energy efficiency when allocating EU funds. This leads to a situation where member states with the greatest energy-efficiency investment needs (Central and Eastern Europe) do not use EU money to improve the situation<sup>32</sup>.

A mid-term review of the EU's 2014-20 budget is an opportunity to make adjustments.

### DID YOU KNOW?

There are 16 energy efficiency obligation schemes in Europe today, up from just five before the EU's 2012 energy efficiency directive was agreed<sup>28</sup>. But implementation requires effort. The Commission has sent 27 letters of formal notice and 20 reasoned opinions to member states for not fully transposing the Energy Efficiency Directive into national law. Watch this space.



# Expanding Efficiency First to the rest of the Energy Union

## Make efficiency a principle of energy system design

Market rules need to treat demand on a truly equal footing with supply. International experience has proven that consumers can participate in all energy markets – wholesale, balancing, ancillary services and longer-term capacity – and deliver reliable services and cost savings<sup>31</sup>. In practice, more work is needed in Europe to ensure that all classes of consumers (residential, commercial, industrial) can participate alongside generators.

Aggregators must be allowed to work with customers to pool demand and sell it. They should be able to be access markets without prior agreement of a customer's energy retailer, for example. How products are defined in the market should take account of the potential for demand response. Consumers should have access to all the information they need to participate e.g. via transparent tariff design and smart meters. To start things off, energy suppliers could be required to meet a certain percentage of their demand every year by buying in voluntary demand response. And while the focus in 2016 is on power markets, the same core principles must eventually apply to the heating market too.

Demand-side resources have been neglected in network planning and investment. Network operators should evaluate all cost-effective resources on the demand as well as the supply side. Furthermore, their revenues should be linked to specific performance criteria, not energy sales. And both network and retail tariffs should reflect actual usage by consumers.

The bottom line is that Efficiency First requires new mandates for national regulators and network operators, plus their European associations (ACER, ENTSO-E and ENTSO-G). All resources must be considered when preparing system adequacy assessments and network development plans. And national and European plans must align, of course.

### DID YOU KNOW?

- New York City's local utility, Con Edison, has applied a least-cost investment principle since 2000. From 2003 to 2010, energy-efficiency programmes deferred upgrades in over one third of its 91 distribution networks.
- This saved customers more than US\$300 million.
- Including demand-side management in its ten-year forecast has brought projected capital expenditure down by over US\$1 billion.

Energy efficiency needs its own dedicated laws, but it also needs to become part of many broader decisions about the energy system:

- make it a fundamental principle of electricity market design and energy sector regulation
- make sure it is a central criterion for determining the allocation of EU funds
- get local governments involved

## Use Efficiency First to guide EU funds

All EU funds should prioritise energy efficiency in their lending and distribution criteria. This includes EU structural and investment funds and carbon market funds from the EU Emission Trading Scheme (ETS).

EU funds should not be distributed to new supply-side infrastructure unless it is proved essential after analysing the demand-side options. State aid rules should embrace the Efficiency First principle. Public accounting and budgeting rules could incentivise rather than hinder these investments.

### DID YOU KNOW?

When cities sign contracts with energy service companies (ESCOs) to deliver energy savings, it is treated as an increase in debt, even though these are service contracts that actually lower energy bills. This is clearly a disincentive to save energy. It can make it very hard for regional authorities to get their investments approved by financial supervisory bodies.

## Get local and regional governments involved

Cities and regions should participate in the formulation, delivery and evaluation of Member States' national energy and climate plans.

Regional governments often have jurisdiction over heating infrastructure. Cities need a formal role in urban planning for heating, cooling and electricity. They need more EU support, both technical and financial<sup>33</sup>, to develop a better pipeline of bankable energy-efficiency projects. They need accounting and investment rules that give them greater leeway to invest in energy efficiency. They need an Efficiency First framework at EU level.

For more detail on the specific actions the European Commission should take in 2016 to embed Efficiency First in the Energy Union, see the document "Governance for Efficiency First: 'Plan, Finance and Deliver' – 10 Near-Term Actions the Commission should take in 2016 to make Efficiency First a reality".

# Mythbuster: 11 bad reasons to doubt energy efficiency

Increased energy efficiency is not the solution to every energy challenge. But numerous myths about it have run rife. This is as good a time as any to dismantle some of them.

## 1

### “Energy efficiency is expensive”

Not at all. Energy efficiency is the most cost-effective solution out there to most of our energy problems. That includes high energy bills, climate change and energy security, to name just three. For every euro invested in energy efficiency, the EU will save three euros on infrastructure<sup>34</sup>. Yes, energy efficiency needs upfront investment, but the chemicals industry has not halved its energy intensity for nothing. It has saved millions. There are also indirect wins from less import dependence, energy production and grid expansion. Several US states promote energy efficiency through a “least-cost investment standard”. Here, it regularly out-competes new generation and network projects to provide additional capacity to the energy system.

## 2

### “There is no point. Energy bills are only going one way: up”

Well, the battery of my pre-smartphone phone used to last for over a week. But the phone couldn't do much apart from make calls and send text messages. Today I have to charge my iPhone every other day or so, but it rules my life. If our energy bills are going up, it is in part because we treat ourselves to greater comfort and convenience. That, and the government keeps putting up taxes. We are spending ever more money on energy because energy efficiency improvements are insufficient to keep up with rising prices<sup>35</sup>. Yes, you may pay more for energy in future, but energy efficiency is not a waste of time. It will keep that rise in check.

## 3

### “Energy efficiency is bad for the EU ETS”

Sadly, with respect to carbon prices, the EU ETS has other things to worry about than energy efficiency. The low carbon price is due to a surplus of allowances in the system, but energy efficiency has had little to do with it<sup>36</sup>. Rather, the economic crisis and an influx of international carbon credits can take the blame for that. In any case, the EU has created a “Market Stability Reserve” that is supposed to protect the EU ETS from outside shocks in future, political as well as economic. Many future efficiency improvements will come from sectors that are not covered by the EU ETS, such as buildings and transport. The Commission is also acutely aware of the need for its three 2030 climate and energy targets – for greenhouse gas emissions, renewables and energy efficiency – to reinforce rather than undermine one another. If it decides to change one post-Paris, it will need to change them all. In the meantime, energy efficiency is the most cost-effective way for Europe to exceed its existing climate targets<sup>37</sup>. This is the ticket to a tighter EU ETS cap. Not bad.

## 7

### Energy efficiency is another example of Europe going it alone

Wrong. In many ways, the United States is far ahead of Europe. It can boast far more private sector financing of energy efficiency, for example. Seven US states have an “all cost-effective efficiency” requirement<sup>43</sup>. Major supply-side investments are tested against demand-side alternatives before permits for power plants or transmission lines are issued. Energy efficiency often triumphs. It has saved billions in energy costs, reduced pollution and delinked electricity use from GDP growth. In the United States, over US\$7 billion is spent via utility-funded demand-side management programmes each year, plus much more by consumers themselves. In the meantime, Europe and Japan are trying to catch up. Japan had a wake-up call in 2011: a national energy saving effort helped keep the lights on after the Fukushima disaster by reducing demand by as much as 15%<sup>44</sup>. What kind of drama is Europe waiting for?

## 8

### Energy efficiency eliminates the need for grid investments

Not exactly. Efficiency First optimises grid investments. Money will still have to be spent on the grid, but it can be spent where it is most needed. High-voltage network operators estimate that €10-20 billion in annual grid investments are needed in Europe from now to 2050, whatever the decarbonisation scenario<sup>45</sup>. But this kind of study does little analysis of demand-side options. Nor does it analyse the low-voltage distribution grid for an optimal balance between different kinds of grid investments. Distribution grid operators face a brave new world with the emergence of “prosumers”<sup>46</sup> and an active demand side. Investments will be needed, particularly at local level. But these should be optimised investments, not “wires only”.

## 9

### “Smart” meters and grids will take care of efficiency

Just because you can measure your energy use, would you? And would you act on your newfound information by investing in insulation, buying new appliances or shifting when you do laundry or heat water? Policymakers need to create new market rules that let energy suppliers and independent aggregators (companies that pool demand from different sources) offer contracts that make use of all those meters. And the meters need to provide information in the right time intervals to be useful to markets. We need flexible pricing. But even when the rules and hardware are in place, consumers must be able and willing to engage. “Able” requires understanding the different types of load out there: storable (e.g. heating), shiftable (e.g. washing machine), curtailable (e.g. TV) and baseload (e.g. alarm system). “Willing” depends on financial incentives, social factors, complexity and privacy protection. The many market barriers that have always impaired efficiency investments will continue to do so even when the meters are “smart”.

“REDUCING ENERGY CONSUMPTION IS A GUIDING PRINCIPLE OF THE ENERGIEWENDE. WITH THE MOTTO ‘EFFICIENCY FIRST’, WE MAKE CLEAR THAT LESS ENERGY USE IS THE TOP PRIORITY. THE REMAINING DEMAND WILL BE COVERED BY RENEWABLES.”

*Sigmar Gabriel, Minister for Economic Affairs and Energy, Germany* <sup>41</sup>

# 4

## “Industry is at the limits of what it can do”

Not really. There is actually still vast untapped energy efficiency potential of up to 25% in European heavy industry <sup>39</sup>. Moreover, experts estimate that around half of that, or 10-15%, can be delivered through behavioural change alone, at zero capital cost. Why hasn't this been done? Because it's much easier to buy a new machine than teach people to use an existing machine differently (especially if you're an engineer). Also, a facility's energy manager may think about his or her own factory rather than broader synergies within, say, the industrial park where their facility is located. That's not to say that technological improvements are history – certainly more exist and require R&D to get them out there. Europe's energy-intensive industries are still in business thanks in part to their tremendous efficiency, that's for sure.

# 5

## “Energy efficiency is not an issue for Brussels”

Well, it is true that even within the same country, there is no one formula for deciding the cost-optimal investment to make a building more efficient (Wallonia and Flanders each do their own thing.) The global bank HSBC long called itself “the world's local bank”. Similarly, energy efficiency is delivered at the local level, but needs vision and drive from the political top. For example, all Member States now have a building renovation strategy, thanks to the EU's 2012 Energy Efficiency Directive. Moreover, European energy grids and markets are decidedly transnational and can deliver savings across borders.

# 6

## “Energy efficiency competes with renewables”

No, renewables compete with other forms of generation, not efficiency. Efficiency First is about reducing total demand for energy, not stealing market share away from renewables. We will need energy in future. In theory all of that can come from renewables one day. It still makes sense to go for Efficiency First: optimising end-use will facilitate the rapid uptake of renewables at lowest overall cost. It supports the integration of renewables into the system. Who wants to waste valuable green energy by consuming it inefficiently? Or spend more than necessary on new infrastructure? Europe needs ambitious renewables policies to decarbonise the economy and ambitious efficiency policies to lower the cost of that transition <sup>40</sup>.

# 10

## Energy efficiency is not very innovative

Sorry, but new business models such as Energiesprong, the Dutch initiative that refurbishes existing buildings to net zero energy, within a week, with a 30-year builders' guarantee and no subsidies <sup>47</sup>, prove this point wrong. Regulations like ecodesign and energy labelling automatically reduce the energy consumption of appliances. The EU energy label couldn't keep up with the number of new products asking to be certified and had to expand to A+++ . Meanwhile innovations in lighting and heat pumps are just as important to our energy future as lower-cost wind turbines. Insulation materials are evolving <sup>48</sup>. Prosumers and demand response are changing the way the energy market works. One of the four R&D priorities in the Energy Union is energy-efficient systems and deploying technology to make buildings energy neutral. A great field for innovation.

# 11

## Energy efficiency risks capping economic growth

Quite the opposite: investing in energy productivity can help restore the European economy to growth. Using energy more efficiently is economically productive, just like building new power plants or grid lines: it frees up disposable income to spend on other goods and services, thus fuelling growth and raising living standards. Plus, energy efficiency is one of the key competitive advantages of European industries abroad. Improvements in industrial productivity can be worth 2.5 times the actual energy savings. Health benefits can outweigh the costs of efficiency improvements by a factor of four – freeing up valuable public money <sup>49</sup>. All those billions spent on energy imports: why not invest them in the European economy instead? It's a no-brainer.

“IN THE EUROPEAN COMMISSION'S OWN CALCULATIONS, A COHERENT APPROACH TO RENEWABLES AND ENERGY EFFICIENCY RESULTS IN MUTUALLY REINFORCING BENEFITS TO THE EUROPEAN ECONOMY.”

*Pierre Tardieu, WindEurope* <sup>42</sup>

“OUR EXPERIENCE IN THE EU SHOWS THAT POLICIES AT EU AND NATIONAL LEVEL REINFORCE EACH OTHER AND TOGETHER DRIVE FORWARD RENEWABLES, ENERGY EFFICIENCY AND DECARBONISATION. A REVISED EU ETS, WITH A FUNCTIONING MARKET STABILITY RESERVE, WILL IMPROVE THE ATTRACTIVENESS FOR ENERGY-EFFICIENT PRODUCTS AND TECHNOLOGIES AND WILL ENSURE THAT SYNERGIES BETWEEN ENERGY EFFICIENCY AND CLIMATE POLICIES ARE REAPED.”

*Jos Delbeke, Director General, DG Climate, European Commission* <sup>38</sup>.



# Endnotes

- 1 [http://europa.eu/rapid/press-release\\_SPEECH-15-4439\\_en.htm](http://europa.eu/rapid/press-release_SPEECH-15-4439_en.htm)
- 2 The phrase “energy efficiency” is used in this briefing to capture improvements across the entire energy system, including end-use efficiency, supply efficiency and system efficiency (for example, demand response), which lead to primary and/or final energy savings. “Efficiency First” refers to this broad definition of energy efficiency.
- 3 “Energy Prices and Costs in Europe”, EC Communication 22/01/14 (COM) 2014 21
- 4 In 2012, a tenth of the EU population – 54 million Europeans – suffered from energy poverty. [https://ec.europa.eu/energy/sites/ener/files/documents/INSIGHT\\_E\\_Energy%20Poverty%20-%20Main%20Report\\_FINAL.pdf](https://ec.europa.eu/energy/sites/ener/files/documents/INSIGHT_E_Energy%20Poverty%20-%20Main%20Report_FINAL.pdf)
- 5 “State of the Energy Union 2015”, Commission Staff Working Document on the European Energy Security Strategy, SWD(2015) 404 final
- 6 <http://www.energypost.eu/europes-energy-investment-crisis-eu-energy-market-needs-makeover/>
- 7 The Paris agreement requires governments to sit down together every five years and re-align national climate plans with the “well below” 2°C goal.
- 8 <http://www.goldmansachs.com/media-relations/press-releases/archived/2015/announcement-11-2-15.html>
- 9 <https://www.oxfordenergy.org/publications/electricity-markets-are-broken-can-they-be-fixed/>
- 10 Richard Cowart et al., “Carbon Caps and Efficiency Resources: Launching a “Virtuous Circle” for Europe”, Regulatory Assistance Project, January 2015. [www.raponline.org/document/download/id/7515](http://www.raponline.org/document/download/id/7515)
- 11 [https://www.iea.org/publications/freepublications/publication/EEMR2013\\_free.pdf](https://www.iea.org/publications/freepublications/publication/EEMR2013_free.pdf).
- 12 [http://europa.eu/rapid/press-release\\_IP-15-4497\\_en.htm](http://europa.eu/rapid/press-release_IP-15-4497_en.htm)
- 13 In practice, usage varies as to whether “energy efficiency” refers to demand response or only pure energy savings. In this paper it is used to refer to the full range of demand side resources.
- 14 <http://www.vieuws.eu/energy/internal-energy-market-energy-regulators-agency-cant-promise-lower-prices/>
- 15 The value of the demand side is highlighted in the European Commission’s 2050 Low Carbon Roadmap (2011), the Energy Efficiency Directive (2012), Council Conclusions on the 2030 climate and energy package (2014), the European Energy Security Strategy (2014), the European Commission’s Communication on the Energy Union (2015) and its electricity market redesign consultation (2015), to give a few examples.
- 16 Fraunhofer ISI, PWC and TU Wien (2014): “Study evaluating the current energy efficiency policy framework in the EU and providing orientation on policy options for realising the cost-effective energy efficiency/saving potential until 2020 and beyond”; report on behalf of DG ENER, 19 September 2014.
- 17 “Delivering the internal electricity market and making the most of public intervention” [https://ec.europa.eu/energy/sites/ener/files/documents/com\\_2013\\_public\\_intervention\\_en\\_0.pdf](https://ec.europa.eu/energy/sites/ener/files/documents/com_2013_public_intervention_en_0.pdf)
- 18 <http://www.scottishhousingnews.com/8318/snp-conference-makes-energy-efficiency-commitment/>. The UK has also included energy efficiency in its UK National Infrastructure Delivery Plan for 2016-21, and the International Energy Agency and European Investment Bank already recognise energy efficiency as infrastructure.
- 19 Frontier Economics, “Energy efficiency: an infrastructure priority.” <http://www.frontier-economics.com/documents/2015/09/energy-efficiency-infrastructure-priority.pdf>
- 20 Cambridge Econometrics et al: “Assessing the Employment and Social Impact of Energy Efficiency”, November 2015 - [http://ec.europa.eu/energy/sites/ener/files/documents/CE\\_EE\\_Jobs\\_main%2018Nov2015.pdf](http://ec.europa.eu/energy/sites/ener/files/documents/CE_EE_Jobs_main%2018Nov2015.pdf). The study found 929,000 jobs in 2010 dedicated to the production and sale of energy efficiency products and services. This is about as many as in renewables and more than in the European nuclear industry (800,000 according to Foratom). A broader definition of efficiency-related jobs (e.g. including mass public transport) resulted in an estimate of 2.4 million jobs.
- 21 The Connecting Europe Facility is an EU fund for infrastructure investments in IT, transport and energy. Energy projects include gas pipelines and LNG terminals, electricity transmission lines and smart grid projects, and electricity and gas storage initiatives.
- 22 The Project of Common Interest are a set of trans-European energy infrastructure projects which receive European funding under the CEF, accelerated permitting and other advantages due to their assessed strategic importance. The list of projects is available at <https://ec.europa.eu/energy/en/news/commission-unveils-list-195-key-energy-infrastructure-projects>
- 23 Max Dupuy, Hidden Barriers to Efficiency, The Treatment of Discount Rates and Energy Efficiency Costs in EU Policy Scenarios, Regulatory Assistance Project, April 2015. [www.raponline.org/document/download/id/7678](http://www.raponline.org/document/download/id/7678)
- 24 <http://www.ecee.org/policy-areas/discount-rates/evaluating-our-future-report>
- 25 Fraunhofer ISI (2013): [http://www.bmu.de/fileadmin/Daten\\_BMU/Download\\_PDF/policy\\_paper\\_energieeffizienz\\_bf.pdf](http://www.bmu.de/fileadmin/Daten_BMU/Download_PDF/policy_paper_energieeffizienz_bf.pdf)
- 26 IEA Energy Technology Perspectives, 2015
- 27 Coalition for Energy Savings, 2015. Briefing: “State of Energy Savings”. <http://energycoalition.eu/sites/default/files/20151116%20Coalition%20for%20Energy%20Savings%20-%20State%20of%20Energy%20Savings%20briefing.pdf>

- 28 France, Denmark, UK, Italy, Poland
- 29 Coalition for Energy Savings
- 30 Many examples are given in Crossley, et al. "Best Practices in Designing and Implementing Energy Efficiency Obligation Schemes," IEA-DSM and RAP (2012).
- 31 Doug Hurley et al., "Demand Response as a Power System Resource," Synapse Energy Economics, Inc., prepared for the Regulatory Assistance Project. <https://www.raponline.org/document/download/id/6597>
- 32 Notre Europe – Jacques Delors, "Investment in Europe: making the best of the Juncker plan" (2016). <http://www.institutdelors.eu/media/investmentjunckerplan-rubiorinaldipellerincarin-jdi-mar16.pdf?pdf=ok>
- 33 For example through the EIB's Elena programme, or the EU's Smart Financing for Smart Cities initiative.
- 34 From the Impact Assessment accompanying the July 2014 Energy Efficiency Communication.
- 35 Households' share of budget for energy grew by 15% from 2008-12, although both electricity and gas consumption were down; industry consumed 4% less electricity but paid 4% more for it. EC energy prices and costs communication, 2014
- 36 European Commission (2014): "Impact assessment: energy efficiency and its contribution to the 2030 framework".
- 37 A 2013 study by Cambridge Econometrics and ECN (commissioned by RAP) found that tightening the carbon cap to 30% by 2020, while at the same time implementing an end-use energy efficiency obligation of 1% per year, would reduce the cost to consumers of increased ambition by two thirds. This holds true for increased ambition in a 2030 timeframe too. In fact, it would be possible to establish a virtuous circle by channelling EU ETS revenues into energy efficiency investment programmes, which would in turn enable tightening of the ETS cap sooner than would otherwise have been politically possible.
- 38 Private email communication
- 39 ICF International study for the European Commission, published January 2016
- 40 Energy efficiency and renewables actually face some similar challenges: both demand-side savings and self-consumption mean less energy is sold via the traditional networks. In both cases, this presents a challenge for grid operators.
- 41 DENEFF (Deutsche Unternehmensinitiative Energie Effizienz) Annual Conference, January 24th, 2016
- 42 Email
- 43 Gilleo, A. (2014). « Picking All the Fruit: All Cost-Effective Energy Efficiency Mandates». Retrieved from <http://aceee.org/files/proceedings/2014/data/papers/8-377.pdf>.
- 44 <http://www.forbes.com/sites/jeffmcmahon/2013/01/06/how-japan-discovered-conservation-fukushima/#43c9567e4585>
- 45 e-Highway2050 project results: [http://www.e-highway2050.eu/fileadmin/documents/e\\_highway2050\\_booklet.pdf](http://www.e-highway2050.eu/fileadmin/documents/e_highway2050_booklet.pdf)
- 46 The phrase "prosumer" is used here to refer to an energy customer whose property produces as well as consumes usable energy.
- 47 No direct subsidies, but it does use a preferential loan.
- 48 E.g. Urbanscape, a green-roof system which also insulates: <http://www.green-urbanscape.com/>
- 49 IEA, 2014, "Capturing the multiple benefits of energy efficiency" (as listed in "Energy efficiency first: how to make it happen" by the Coalition for Energy Savings)



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