



THE EUROPEAN FILES

May 2018 - n°52



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EDITORIAL

The COP21 and the resulting Paris Agreement outlines an objective to ensure sustainable human progress and economic growth across the world. This objective to limit the increase in global average temperature well below 2°C above pre-industrial levels is born out of a necessity to minimize the losses from extreme and changing weather patterns, frequent natural disasters and added stress on our natural capacity to grow as a civilization. Achieving this pragmatic commitment requires a complete rethinking of our energy production and consumption. Gradually eliminating the global dependence on non-renewable energy sources is just one avenue to limiting the worst effects of climate change. However, the harsh reality requires a more comprehensive approach to solving this global problem; in response, the International Energy Agency (IEA) has identified a more impactful avenue of progress: energy efficiency. Through this concept, we hope to create an improved ecosystem of reliable, cost-saving and sustainable energy sources and distribution. Within this system, the gains in efficiency and productivity can represent its own energy source. The European Commission has demonstrated particular receptivity and proactivity to this new conceptualization of energy consumption and is leading the political dialogue in reclassifying energy efficiency as a primary source of energy for the continent. This comes as no surprise when we consider the European Union's dependence on energy imports, amounting to 53% of their consumption and a considerable

cost of up to EUR 400 billion per year. The Commission's Energy Efficient Directive adopted in 2012 has set ambition savings goals that are currently being strengthened. This issue of *The European Files* launches an investigation into the opportunities and challenges of an energy efficient transition in the European Union (EU) today.

The choice to pursue energy efficiency is backed by a considerable effort to create new industrial and political opportunities to tackle climate change as well as the rise in CO2 levels in the atmosphere. It is an effective channel towards real progress that unites the European Commission, the European Parliament (including some of its more radical members) and Member States as a trilateral legislative force to strengthen the entire continental economy. Its benefits go beyond the decarbonisation of the economy and contribute to strengthen the EU's position in a competitive - and at times unstable - international market for primary resources. Therefore, energy efficiency is a central facet and a key priority of the Energy Union framework strategy. We can also expect greater sustainability in economic development as reduction in costs and innovation for more efficient industrial processes form the foundation of energy efficient incentive structures. The integration of these policies into the private sector is an opportunity for businesses to increase their competitiveness and to deliver higher standards of living for consumers. We identify the construction and buildings' renovation industry as the best case-study to measure

the full potential of the EU's strategy and to deliver concrete benefits to EU citizens. The alignment required by urban policy makers, financing institutions or even startups to produce sustainable solutions for end-users is a source of insight in a deeply innovative political and commercial sector.

Of course, implementing energy efficient strategies is not without its issues. As we've mentioned above, the coordination of policies and incentive structures is evolving and must capture various (and sometimes conflicting) interest groups: energy companies, industrial enterprises, consumer associations. Energy production and distribution is characterized by complex decision-making and long-term benefits which discourage private interest or investment. Private organizations expect more efforts to be made from public financing institutions. If the European Commission is to mobilize the appropriate funds and organizations to take action, it must maintain the momentum as a pioneering institution for innovation. Strengthening the EU's energy reality requires considerable coordination from partners across the political and economic spectrum. We hope to cover much of this ground through the contributions published in this issue of *The European Files*.

LAURENT ULMANN

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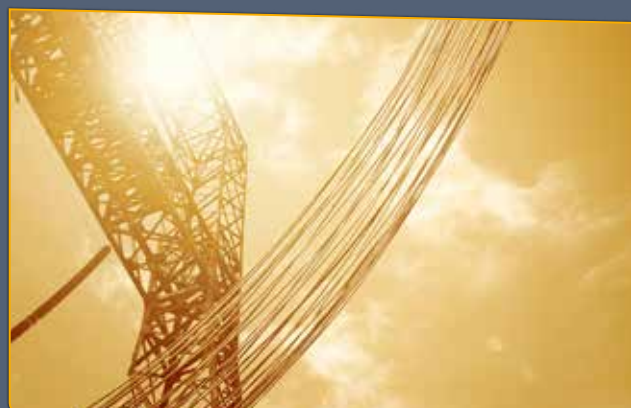
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A new ambition for energy efficiency in Europe



Miguel ARIAS CAÑETE

*Commissioner Climate Action & Energy,
European Commission*

To address the biggest challenge of our time, climate change, the EU has decided to lead the worldwide clean energy transition. To do so, it is clear that, alongside the integration of renewable energy sources into the mix, energy efficiency should be one of the major drivers towards a sustainable society, one that will unlock the true potential of the energy transition. Let us recall that the cheapest, cleanest, and most secure form of energy is the one we do not use, the one that we save. That is why energy efficiency measures are the most cost effective way to support the shift to a low-carbon economy and, in the process, boost investment, growth and employment opportunities in Europe.

These past 10 years, the EU has already implemented a number of solid measures to improve energy efficiency in all sectors – notably through the existing Directives on Energy Efficiency and on the Energy Performance of Buildings, as well as important rules on Ecodesign and Energy labelling. These measures have contributed considerably to a reduction in EU energy consumption and helped consumers save energy - and money. We are very close to achieving our self-imposed 2020 target of 20% in energy efficiency savings across the EU. However, now is not the time for complacency: we need to accelerate our efforts considerably and raise our ambition, if we want the EU to successfully drive the global clean energy transition, meet its energy and

climate targets and be in the vanguard of the fight to save our planet. This high ambition, particularly for energy efficiency, is reflected in the Clean Energy for All Europeans package, presented by the Commission in November 2016.

Aimed at providing a stable legislative framework to meet our 2015 Paris Agreement commitments, the proposals include: setting a new, binding energy efficiency target for 2030, and measures to improve the energy performance of buildings. Why a new target? We need an objective that takes into account the remarkable pace of change in terms of new technologies and reduced costs through economies of scale. Indeed, I believe that this rapid rate of change means that we can now set an even higher level of ambition than the 30% figure we used when we drafted the original proposals in 2016. The final level of the targets will of course be the outcome of the negotiations between the European Parliament and the Council. The former has proposed a 35% binding EU target, while the latter a 30% target. Thus we can assume that a compromise level will be found within this range. This new ambition will benefit us all in the long run and will translate into further savings for consumers and the development of new energy efficiency technologies.

As for the revised Energy Performance in Buildings Directive, I'm delighted to say that this has now been adopted by the European Parliament and Council, and Member States will now have 20 months to implement the new changes. Let me recall that the building sector is the largest energy consumer in Europe, accounting for 40% of final energy consumption and 36% of greenhouse gas emissions in Europe. Yet, about three quarters of our building stock is energy inefficient and the current level of renovation is low. These changes will boost investor certainty and help us increase renovation rates, by taking advantage of smart building technologies and e-mobility infrastructure. It will also foster innovation and the creation of jobs, particularly in the construction and renovation sectors, that are local, sustainable and not at risk of relocation. In addition, reductions of expenditure on energy will help the most vulnerable of our society by alleviating energy poverty. Smarter and more efficient buildings

will lower the energy bill each month and will, at the same time, create better and more comfortable living conditions in households. This will be one of the many concrete benefits felt by everyone in the transition to a decarbonised society.

We are therefore making progress. And our new ambition for energy efficiency in Europe is just one building block of the overall drive towards the low-carbon economy and society that we want. To accompany the EU in this path, we have also recently tabled our concept for the EU budget for 2021-2027. It is a budget aimed at achieving a modern, low-carbon economy, which will keep the EU as the global frontrunner in sustainability. Spending will be increased on the clean energy transition, and climate action will be mainstreamed across all EU programmes, with a target of one quarter of *all* EU expenditure contributing to climate objectives.

Looking further ahead, and following a request from EU heads of government, we are now starting work on a long-term emissions reduction strategy for 2050. The strategy will aim at net zero emissions by the middle of the century, and be based on a deep transformation of the European economy. We hope to launch a public consultation on this subject in the coming weeks.

All in all, we in the Commission are driving the policy foundations for the greatest foreseeable societal and economic change we will witness in our lifetimes. The aim is to create the conditions which will enable the necessary transformations and investments. While all these political initiatives are important and will provide a number of incentives, the real change must be led by society itself. We must start acknowledging that everybody will need to make an effort, and that fundamental change is just around the corner for all of us: the energy transition, of which energy efficiency is a cornerstone, is planting the seeds of our planet's future.

The Energy Efficiency Directive and the goal for the EU to reach its 2020 energy efficiency target



Zhecho STANKOV

Bulgarian Deputy Minister for Energy

Member States are on track in collectively reaching the EU goal to increase their energy efficiency by 20 % by 2020. This statement is the outcome of the official Commission assessment of the progress made in Europe towards the target set by the current Energy Efficiency Directive.

Without a doubt, the fact that Member States will fulfill their commitment to lower their energy consumption both in terms of primary and final energy consumption is a very positive message in the context of the clean energy transition – a multi-layer and para-European project for which there is a common understanding and consensus on EU level. The question which now remains for the national governments is to assess the consequences and the impact of the improved energy efficiency and to provide for a consistent energy efficiency perspective for 2030.

The numbers reported by the Commission indicate the clear benefits of the energy efficiency - savings for households and industry, competitiveness, sustainability, security of supply, reduction of greenhouse gas emissions, improved air quality. As a Deputy Minister for Energy in Bulgaria I can only confirm the priority and the positive impact of the energy efficiency policy in my country.

This political statement is supported by the national reporting data which show that

Bulgaria has already achieved energy savings of 5,056 GWh for the period 2014-2020 and it is realistic to expect that the final energy savings target of 8,325 GWh by 2020 will be met. These savings directly contribute to boosting the competitiveness of the economy and are a way of stimulating economic growth and creating new jobs in a situation of rising fuel and energy prices. Furthermore, according to Eurostat data the energy intensity of the national GDP shows a steady downward trend and has decreased with 10.6 % since 2012, giving Bulgaria the opportunity to reach the EU average levels in the near future.

Another sign of the ambition of the government to deliver further on the energy efficiency goals is the approval of additional 1 billion leva (around 500 million euros) from the state budget for the implementation of the National Energy Efficiency Program for Multifamily Residential Buildings. The Program is expected to achieve significant improvements in one of the areas with greatest potential for energy savings – the building stock, and to accelerate the renovation rate.

As a politician I appreciate highly one particular aspect of the energy efficiency policy – its role as a long-term measure to tackle energy poverty. I fully share the opinion that energy poverty is incompatible with the European social model and that it has to be eradicated with complex and comprehensive instruments. One of these measures with long-lasting effect can indeed be the energy efficiency improvements in the households affected by energy poverty which have the potential to reduce the bills of the consumers, increase their living standard and provide comfort and security in their everyday live.

Once we have recognized the potential of energy efficiency for the EU energy policy, we have to take a look in the future and the 2030 targets which are negotiated currently under the framework of the Clean Energy for all Europeans legislative package between the European Parliament and the Council, represented by the Bulgarian Presidency.

As a participant in the negotiation rounds with the Parliament and on behalf of the Bulgarian Presidency and can confirm that our goal is to strike an ambitious, balanced and

sustainable compromise which will reflect the positions of the Member States and will adequately contribute to the overall goals of the Energy Union and the international climate commitments of the EU. What is important for me is not only the overall EU target for energy efficiency, but also the instruments which will be put in place in order to achieve progress in cost-efficient, sustainable and coherent manner. In that regard the energy efficiency policy should not be seen as a separate policy consideration but should be developed hand in hand with the other dimensions of the Energy Union and should complement the existing EU mechanisms which also deliver on the goal for zero-carbon economy such as the ETS system. Finding such a balance is a complicated political task but I am convinced that in the end the Council and the Parliament will agree on a robust, flexible and ambitious framework for the energy efficiency policy for 2030.

In conclusion, in my capacity as a deputy minister and negotiator of EU legislation I aim to deliver the following political message - improving the energy efficiency improves also the lives of our citizens, enhances the competitiveness of our economy and contributes to a brighter and cleaner EU future. Having seen the national impact of the energy efficiency policy, I am looking forward to build up on what's already achieved in the EU context.

Towards a carbon-free transport sector



Cora VAN NIEUWENHUIZEN

Minister of Infrastructure and Water Management, Netherlands

The transition towards zero-emission transport is both necessary and irreversible. Necessary, because transport accounts for 30% of all CO₂ emissions worldwide and traffic volumes will continue to grow sharply over the coming decades. Irreversible, because more and more of the transport sector's customers are demanding sustainable shipping of their products. Of course, there is still a lot to do. The sector is made up of a diverse range of outfits, from large transport companies and airlines to small family businesses that carry freight on inland waterways. There is also a wide range of alternative fuel options on offer. But since the Paris Agreement our climate goals have been crystal clear. Industries like aviation and maritime shipping have come to realise that they too will need to make some significant changes to how they operate. Partly of course because we want to ensure clean air and a liveable planet for future generations. But also because there is a compelling business case for investment in clean transport and alternative fuels. Investing in a green future also means investing in a healthy and competitive European economy.

We can achieve most by following a robust policy aimed at tackling the problem at source. So we advocate strict standards and requirements to ensure all modes of transport are clean. But strict standards alone will not enable us to achieve our climate goals. A genuine green transition requires a systemic

leap that will in turn require the involvement of all stakeholders, from customers to producers. And we will need to adopt an international approach, given the international dimensions of the transport sector, involving individual member states, the European Union and global organisations; all stakeholders across supply chains; and the transport, energy and ICT sectors. Because the task and the challenges we face are immense.

The strategy agreed last month within the International Maritime Organization is a good example of how international agreements can be forged. The Netherlands applauds the target of cutting total CO₂ emissions from international shipping by 50% by 2050. It will spur the sector on to invest further in clean fuels and develop technological innovations. In the Netherlands we recently signed the 'Nijmegen Declaration' with the inland shipping sector, in which the sector pledges to reduce CO₂ emissions by 20% by 2030 through the use of clean fuels. This is an illustration of how a national government can make greening arrangements with specific industries.

The Netherlands is convinced that cooperation between national governments and industries will enable us to make significant progress in Europe. The European Commission and individual member states do not possess a

magic wand enabling them to make the necessary changes by themselves. Government will have to work with the sector to make heavy goods vehicles, aircraft, seagoing vessels and inland waterway vessels cleaner and more energy-efficient. Sustainable technologies and innovations will play a key role in these endeavours.

Fundamental, industrial and experimental research are crucial in this regard. R&D cooperation, like the 'ERA-NET Cofund to further advance electric mobility in Europe: the Electric Mobility Europe initiative', brings together the scientific community, industry and governments from 12 countries to learn about developments in electric public transport, clean freight and the necessary IT systems. By using European cofinancing funds for alternative fuels, we are accelerating the roll-out of the associated infrastructure for high-speed charging, hydrogen and biofuels. Working together means jointly removing the obstacles and enhancing Europe's competitiveness, rather than 28 countries each reinventing the wheel.

Perhaps you can move more quickly acting alone, but together we can go further. This applies to many modes of transport. Take inland shipping, for example. Imposing an obligation on the inland shipping sector to blend





biofuels – an obligation for the fleet as a whole rather than individual vessels – would deliver considerable climate gains in Europe. Towards the end of 2018 we will see the first fully electric inland waterway vessels coming into service in the Netherlands. The European Commission provided a helping hand by making a grant available. Hydrogen fuel cells will also feature prominently in future transport solutions. We will be conducting a pilot in the Netherlands next year involving shippers and carriers in inland shipping, research institutions and government. This is a good example of the kind of partnerships that can help us make progress. The next step will be a joint project with other European countries.

In aviation, the Netherlands will work to ensure participation by as many countries as possible in the Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA). The Emissions Trading System will have to be adjusted accordingly. The Netherlands also seeks to encourage the development of biokerosene in aviation in Europe. But we can also achieve considerable reductions in CO₂ and noise nuisance through smart design of the European airspace. In the road haulage sector the Netherlands will continue to urge strict standards and requirements and will forge alliances with the more ambitious countries.

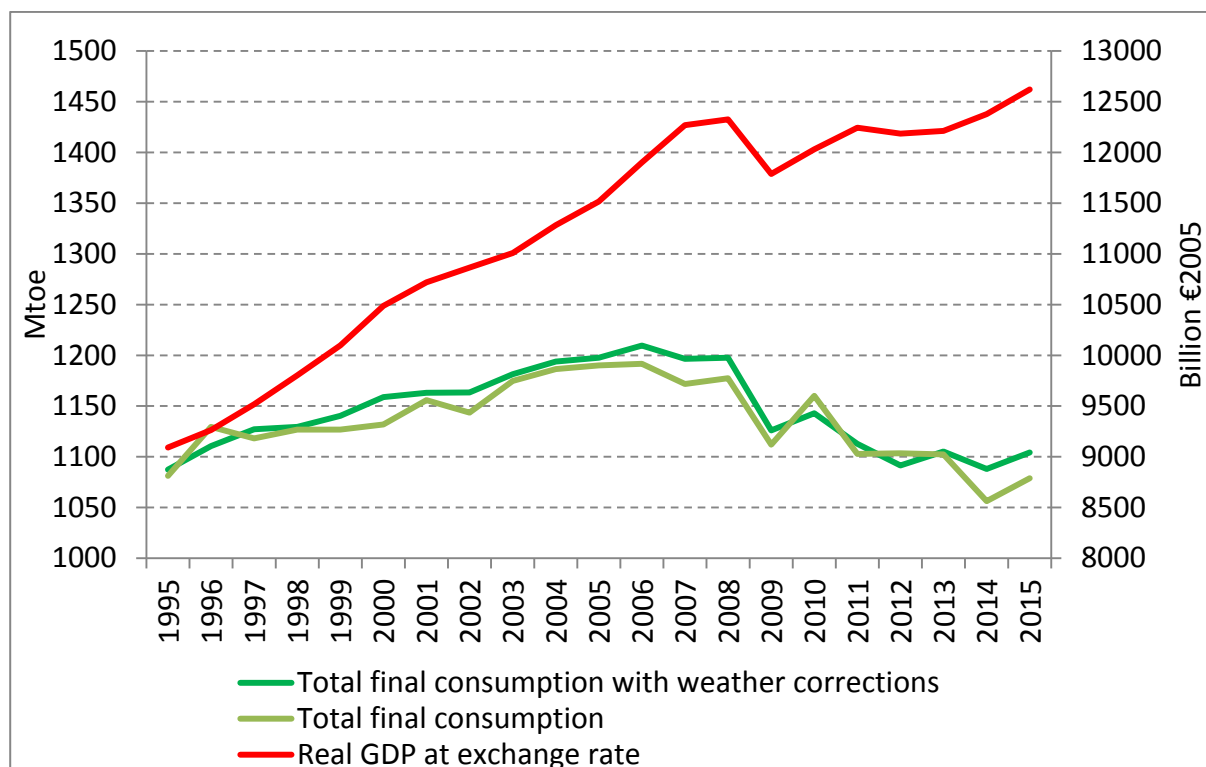
European heavy goods vehicle manufacturers are slowly starting to experiment with clean and fuel-efficient vehicles. But if we want to see them going into mass production we



will need to further encourage and reward sustainable product development by means of strict standards, innovations and financial incentives. In addition, we need more intelligent logistics. Carrying more freight by water or by rail means fewer lorries on the road. And many goods vehicles on Europe's highways are only using part of their load capacity. This is an area where we can do better.

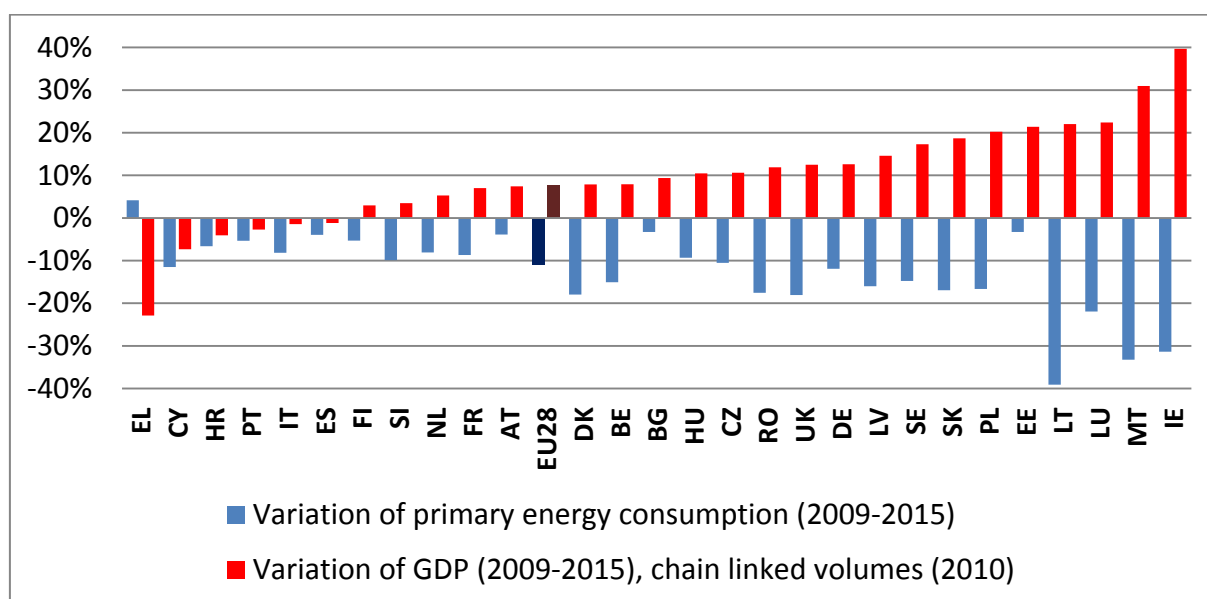
The European transport and logistics sector is a vital cog in a competitive European economy. I'm convinced that investing in

low and zero-emission transport will make us more competitive globally. Obviously we won't complete this transition overnight. But this is a common challenge that we have to solve together. This is true of all sectors, and transport is no exception. The Netherlands, which has long had a strong transport and logistics sector, is keen to work with other EU member states and the Commission so that we can rise to this challenge.

GDP and weather corrected final energy consumption in 1995-2015¹⁰

Source: Odyssee-Mure

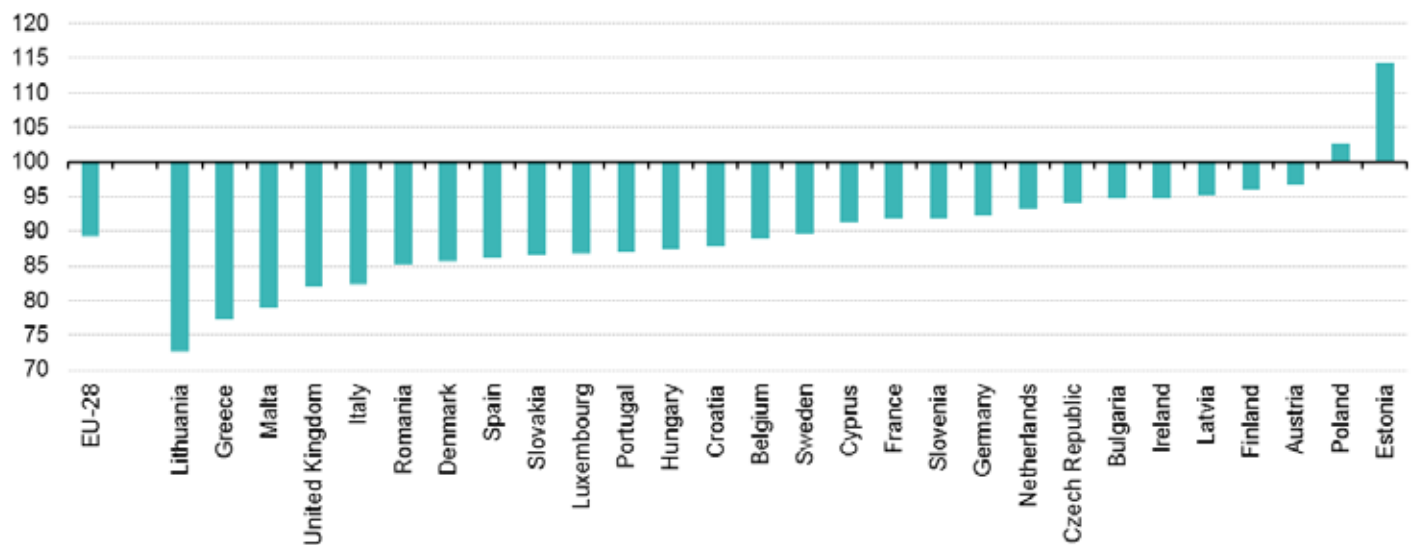
GDP and primary energy consumption, 2009-2015



Source: Eurostat

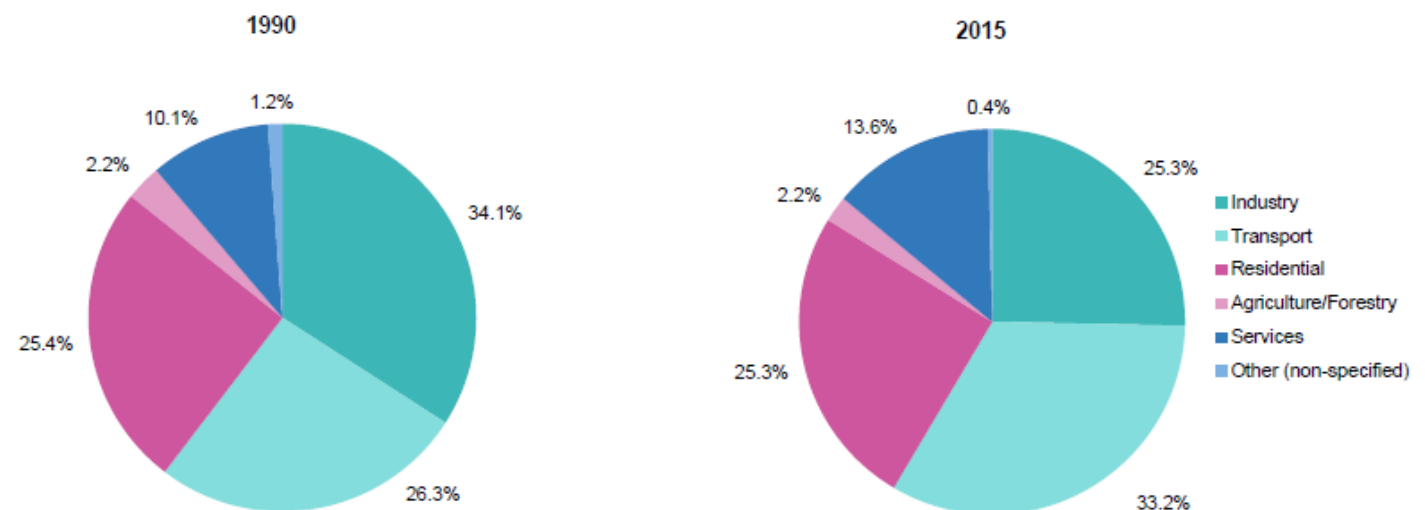
Change in primary energy consumption, by country, 2015

Source Eurostat



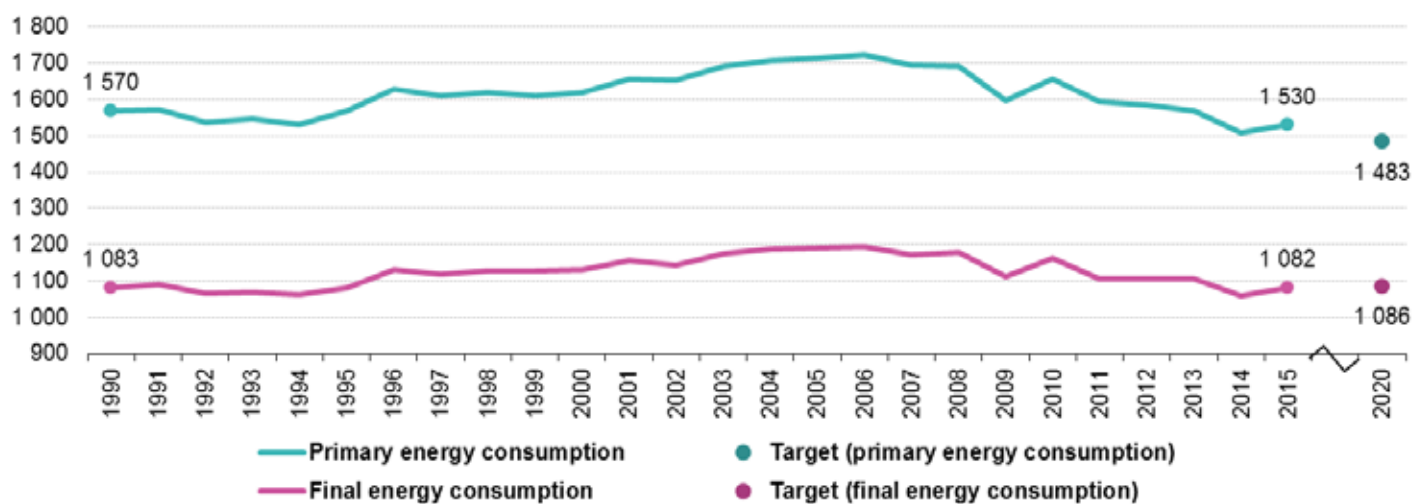
Final energy consumption, by sector, EU-28, 1990 and 2015

source Eurostat



Primary energy consumption and final energy consumption, EU-28, 1990-2015

Source Eurostat



Energy efficiency is one of the key dimensions of the EU's energy union strategy



Miroslav POCHÉ

MEP (S&D Group), Member of the ITRE Committee, EP rapporteur on EED

The main aim of the EU's energy union strategy is to make energy more secure, affordable and sustainable. It should accelerate the transformation of the European energy system and contribute to the transition to decarbonized economy by 2050. All five pillars of this strategy are interlinked, mutually reinforcing and stimulating actions in various segments of this key economic sector. Market integration, decarbonization of energy mix, innovation – these are important policy dimensions which substantially contribute to the one or more goals of the energy union. The energy efficiency is also one of the five pillars. However, it is the pillar that contribute to all goals of the strategy at the same time. Reducing our energy consumption and improving the way we use energy will strengthen our energy security, make the energy more affordable for households and industry as well as facilitate deployment of renewable energy sources and make European energy mix cleaner.

This is also the reason for promoting the energy efficiency first principle which has been supported both by the European Parliament and the Commission for a very long time. The meaning of this principle is to prioritize in all energy planning, policy and investment decisions measures that make energy demand and supply more efficient. It also considers energy efficiency as “an energy source in its own right” because energy we do not use is energy we do not need to produce or import.

There are clear benefits of energy efficiency policy. However, it is still relevant to look on the areas where they can appear in order to better understand the role it plays within the overall energy union strategy. The first area is the security of energy supply. More than half of energy consumption in EU comes from imported sources and some Member States are dependent on imports for more than 75 per cent. Moderating energy demand, therefore, provide cost-effective solution of increasing dependence on energy imports. The evidence proves that countries with higher energy intensity rely on energy imports more heavily. In particular it can improve the situation of countries with high dependency on gas imports. Substantial part of EU gas consumption is used in buildings, especially for heating, where potential for savings has not been fully tapped so far. Targeted measures to modernize the heating systems, to renovate and better insulate buildings will directly translate in gas imports reduction and improved energy security of Europe.

There are also relevant economic reasons for implementing energy efficiency first principle. Energy efficiency can contribute to improving trade position of EU through significantly reducing costs of energy imports. Some studies estimated that 40 per cent efficiency target for 2030 would save up to 2 trillion Euro on energy imports during 2020-2030. We are no longer discussing this level of ambition, however, there is strong evidence that higher target will save huge amount of money and improve our balance of trade. In addition to trade position of EU, energy efficiency will have benefits in terms of growth, increased international competitiveness and creation of decent local jobs. It is possible to once again use the example of building sector where almost 40 per cent of all energy is consumed. According to the European Commission renovation and energy retrofits add twice as much value to the economy as the construction of new buildings with substantial part of the work done by the local SMEs. Having in mind that three quarters of buildings in Europe are still energy inefficient, there is enormous economic potential which can accelerate economic growth across the Union. Lastly the energy efficiency measures can help industry to cope better with international competition

by reducing their energy, as well as material, intensity and associated costs.

Energy efficiency has also significant health and social benefits. Especially it can be the way how to address growing problem of energy poverty. More than 50 million European households cannot afford to attain adequate thermal comfort, to pay their energy bills or to live in homes without mold, damp and comparable inconveniences which are caused by bad insulation, ventilation and heating. And these are people which are at the same time unable to bear the costs of renovation or retrofitting of their homes. The new legislative framework for energy efficiency policy should therefore target in particular households which are in danger of energy poverty because there has been very little done so far. It is long term solution how to can help millions of people to make their lives better, to improve their health and to make paying their energy bills easier.

There are certainly other reasons why energy efficiency is one the key dimensions of energy union strategy. For example, moderation of energy consumption leads directly to greenhouse gas emissions cuts and is key for meeting our international climate commitments. Energy efficiency also contribute to higher shares of renewable energy in our energy mix. However, these three dimensions alone - security, economic and social – make the energy efficiency so important for the European Union in next decades.

Why European buildings hold the key to an energy efficient Europe



Bendt BENDTSEN

MEP (EPP Group) - Rapporteur for the revision of the Directive for Energy Performance of Buildings

With a consumption of more than 40 % of our total energy consumption in Europe, our buildings are also responsible for 36 % of our CO₂ emissions. Since 75 % of our buildings are energy inefficient, it is obvious that buildings hold the key to an energy efficient Europe.

It became increasingly relevant to harvest these “low hanging fruits” with the commitments that EU set itself in 2014 to reduce CO₂ emissions - including the goals of the Paris COP21 agreement of 2015.

As the first legislative file to be adopted in the Clean Energy for All Europeans package, the revised EPBD is a significant step in the right direction to meet our goals.

Previously, the framework mainly focused on ensuring highly efficient new buildings, but new buildings only come at a rate of roughly 1 % yearly in Europe, while 80 % of our current buildings will still be in use in 2050.

With the revised EPBD, we will walk the walk and deliver on an energy efficient Europe.

To support an increased renovation effort, financing tools are needed. However, investors are rarely keen to invest in a stop-and-go policy environment, and therefore I consider it a major success that the revised EPBD will commit Member States to long-term

renovation strategies - with a view all the way to 2050 and an ambition of a decarbonised building stock.

And while many say that particularly private households will not afford to improve their homes, nor have the needed incentives to do so. I hear these concerns and the EPBD will tackle this in the future;

Firstly, Member States must solve situations of split incentives that hamper renovations. By introducing concrete actions to tackle “market failures”, like tenants who lack the right to improve their rental home, but pay the energy bills for consumption. Member States will also be obliged to provide guidance and information on renovation offers and financing tools.

And while public money and programmes are surely both helpful and necessary, they will not do it alone. Getting private money out working in the field of energy renovations is crucial. And since the business case for energy savings is clear, there is a huge interest in private investor participation - not least from institutional investors such as pension funds and mortgages banks, but also from private companies providing energy savings contracts and conducting renovations with real results.

With the revised EPBD, we have provided a framework that will deliver investor certainty,

clear incentives to renovate and bring projects and investors together. In addition, we establish ambitious new requirements for the deployment of technologies such as building automation for commercial buildings and individual room temperature controls for residential buildings.

To improve our buildings, we should deploy all available tools - be it for example low-energy windows, smart meters, insulation, thermostats, heat pumps, software solutions. The solutions vary from house to house - and across the continent.

In the current low interest environment, investments in energy renovations of buildings offer a superior return - to the benefit of both citizens and businesses in Europe. Growth in the building sector means non-outsourcable jobs, particularly in SMEs. A win-win.

With this new EPBD, we will deliver a better European building stock and a significant contribution to energy efficiency and the sustainability, competitiveness, comfort and economy of Europe. Hopefully, the rest of the Clean Energy for All Europeans package will follow with the same level of commitment soon enough.



Putting energy efficiency first: the key for a competitive energy transition



Dominique RISTORI

Director-General, DG ENERGY,
European Commission

In the wake of its commitments under the Paris Agreement, Europe is showing leadership in the shift towards a modern and clean energy system. Indeed, energy will be decisive for implementing the Paris Agreement as two thirds of Europe's greenhouse gas emissions are related to energy production and consumption.

To accelerate the necessary public and private investment towards the clean energy transition, the European Commission tabled the Clean Energy for All Europeans package in November 2016 which is now being negotiated by the co-legislators. This package sets the most advanced regulatory framework to reinforce Europe's leadership in the clean energy transition and to modernise the EU economy. This package represents a clear opportunity for Europe and has three main goals: putting energy efficiency first, achieving global leadership in renewables and providing a fair deal for consumers.

In this context, **'putting energy efficiency first' is not an advertising slogan but a fundamental principle.** It is a concrete and productive priority with positive impacts for all European energy consumers. Let's not forget - the cheapest, cleanest, and most secure form of energy is the one we do not use. That is why the Commission is promoting new and ambitious energy efficiency measures to bring further savings to consumers and to accelerate the development of energy efficiency technologies.

Building on the progress achieved through the existing regulatory framework – notably the existing Directives on Energy Efficiency and on the Energy Performance of Buildings, as well as rules on Ecodesign and Energy labelling - the aim is to set an ambitious energy efficiency target for 2030, as well as measures to improve the energy performance of products and buildings. This will send the right signal to European investors, companies, national authorities and citizens.

It is worth being ambitious. A higher ambition for energy efficiency means higher benefits for the environment as well as higher returns on investment. It increases the competitiveness of industries especially the energy intensive ones, and contributes to reducing the energy bills of consumers. Besides, it reinforces Europe's energy security. For every additional 1% increase in the 2030 energy savings target, combined with the 2030 targets for renewables and greenhouse gas emission reduction, the EU can reduce its gas imports by more than 3%.

Energy efficiency is not only one of the most cost effective ways to support the transition to a low-carbon economy; it is also an effective way to create investment, growth and employment opportunities in Europe as well as better living conditions for the benefits of all Europeans.

This is particularly true in the buildings' sector, where a considerable cost effective energy saving potential exists. Just consider the facts: the building sector is the largest energy consumer in Europe, accounting for 40% of final energy consumption and 36% of greenhouse gas emissions in Europe. Besides, the construction industry provides already 18 million direct jobs in Europe and accounts for 9% of our GDP. Construction activities that include renovation work and energy retrofits add almost twice as much value as the construction of new buildings.

In that context, it is very positive that an agreement was reached on the revised European Performance of Buildings Directive, with a very large majority in the European Parliament. This sends a very strong signal towards the clean energy transition.

The revised Directive on the European Performance of Buildings will boost investor certainty and help to increase renovation rates,

while taking advantage of all technologies and progress available such as ICT, smart building technologies and e-mobility. It will stimulate the uptake of digital technologies for buildings, in particular smart metering technologies and smart home appliances, and it will boost engineering industries representing 11 million jobs in the EU. It will also facilitate the penetration of renewable energy and encourage the active participation of consumers.

At the same time, raising the energy performance and intelligence of buildings will strengthen Europe's competitiveness, reduce the level of greenhouse gas emissions, decrease energy dependence and will foster innovation and the creation of local jobs. In that context, the energy renovation of buildings could become a real European source of growth and jobs.

In addition, energy efficiency is one of the most powerful tools to address energy poverty and to ensure that no citizen is left behind in the energy transition. Energy efficiency measures focusing in priority on social housings and buildings will provide tangible health and lifestyle improvements to our citizens and will contribute to alleviate social inequalities. It is now over to Member States to show their level of ambition by transposing these measures into national law by early 2020.

The measures put forward by the Commission as part of the Clean Energy for All Europeans package contribute to a European Union that protects, empowers and defends. This is also the aim of the next EU budget for 2021-2027 proposed by the Commission early May where energy transition is recognised as a clear priority to achieve a modern and low carbon economy in the EU.

Considering the various benefits of energy efficiency, it is worth being ambitious as this will underpin the clean energy transition in Europe for the next decades. This is also highly relevant in the context of the future Long Term Decarbonisation Strategy under the Paris Agreement that the March European Council asked the Commission to present. Public consultation on this long term strategy will be launched in the coming weeks.

Energy efficiency first: a sure bet!



Isabelle KOCHER

CEO of ENGIE

Energy efficiency provides major benefits in the way to a clean energy world

Climate change is the greatest challenge of the century and of our generation.

But how do we address it? What usually first comes to mind is the development of renewable capacities.

Energy efficiency comes second and is largely viewed as an adjustment variable.

On the contrary, I believe that energy efficiency is the main building block of the new, clean energy world. In the EU, according to an IEA report (2016), 76% of the emission reductions needed to meet the Paris Agreement should be reached through energy efficiency actions.

Moreover, energy efficiency is what I call a "magic square". It has only benefits and no downside. Indeed:

- Energy savings improve the comfort of individuals, diminish energy bills, and enhance the competitiveness of industries,
- Energy efficiency creates local jobs,
- It also means fewer greenhouse gas emissions,
- And an increased energy independence.

Unfortunately, the importance of energy efficiency is too often overlooked. I believe that companies can clearly drive the push by increasing their investments in energy efficiency. Significant energy saving deposits, largely untapped, exist throughout the value

chain. They concern every sector (commercial & residential buildings, industry, district heating & cooling, agriculture, mobility...) and must mobilize all actors.

At ENGIE, energy efficiency is a pillar of our strategy. 100,000 employees, representing two thirds of ENGIE's global workforce, already work in energy services.

One of the differentiating services offered by ENGIE is our ability to help our clients reduce their energy consumption. To this end, we are developing our know-how on the valorization of energy uses.

The Group, as a producer of "NegaWatts", proposes innovative and integrated solutions to meet new needs, by using digital tools. We thus:

- perform energy audits for companies and identify energy savings in buildings by means of connected sensors,
- offer an analysis of invoices,
- develop algorithms to optimize energy performance.

But if we want to meet engagements taken under the "Paris Agreement", we must change the scale and accelerate the pace of this energy transition. This is why we need a policy impetus by EU if we want to tap the full economic potential of energy efficiency.

The Clean Energy Package (CEP) unleashes an ambition that can go well further

Commission's proposals within the CEP constitute an ambitious starting point, in particular in setting a target of 30% of energy efficiency by 2030. It is important that this ambition is maintained throughout the legislative process. The EU needs to consolidate the commitments it has made and, as far as possible, reach the upper bounds of targets discussed between co-legislators.

ENGIE is a strong supporter of a very high and binding energy efficiency target. It would help to mobilize all actors, in particular investors, raising we their awareness on the fundamental changes underway and fostering a clear vision of the future.

Action must be taken to unlock investments in energy efficiency

Delivering energy efficiency per se is rarely the only trigger of an investment. The achievement of projects requires a technical & financial

engineering (able to assemble interdisciplinary know-hows and medium and long-term private and public financing) as well as a subtle customer-focused approach (able to offer a good proposal).

New mechanisms need to be put in place. Achieving energy saving operations for individuals is for instance more complex because it is difficult for these customers to commit themselves over several years.

To implement energy efficiency projects on the ground, it is also essential to favor:

➤ Simplified contractual models.

Simplification of the use of energy performance contract at all levels of local authorities and state services should be promoted. Under these contracts, energy performance is measured and verified during the contractual term, with an economic performance incentive. Furthermore, the integrated approach in the framework of an EPC is an exception that needs to be extended in the context of public procurement.

➤ Generalization of energy saving certificates (ESC).

This system, which is based on an energy saving obligation imposed by public authorities on energy sellers, makes it possible to boost renewal of obsolete energy equipment, to develop insulation devices for buildings, or to equip greenhouses with efficient heating systems. ESC should be extended to all sectors with unexploited energy savings.

➤ Strong reliable price signals.

The price of carbon has a direct impact on the profitability of energy efficiency projects in the industrial sector. The reform of the European carbon market (EU-ETS) is a step in the right direction, but it will unlikely be sufficient to reach the medium and long-term commitments of the Paris Agreement. Complementary measures such as a carbon floor price are needed to strengthen the carbon price signal.

Energy efficiency must be more than a slogan. It creates a win-win-win situation, by fighting global warming, creating new jobs, increasing the purchasing power of individuals and the competitiveness of companies.

Energy efficiency first – but keep the saving-targets realistic



Markus PIEPER

MEP (EPP Group), Shadow Rapporteur on energy efficiency directive review

The EU is a world leader in climate change.

Europe's energy efficiency is outstanding. Since 1990 we have reduced CO₂ emissions by 23%, while the EU's gross national product has risen by 53% over the same period. Greenhouse gas emissions are falling and economic performance is on the rise, bringing more jobs and social achievements. Such sustainability is also achieved through ambitious energy legislation – but this is not the whole story. Industry, tenants and home-owners are also highly motivated to save energy and invest accordingly. The market regulates many things automatically, by means of cost savings. Legislation must provide this market with guidelines, not force it to its knees.

The EU can lead the way for clients and the Member States with ambitious yet flexible framework legislation which gives citizens, companies and the Member States room to breathe. The Commission's 2017 proposal for a review of the Energy Efficiency Directive was such a proposal: 30% energy savings by 2030, with many options for the Member States to optimise their savings potential. Unfortunately, a small majority in the Committee on Industry, Research and Energy supported the ideas of certain large companies involved in control, measurement and insulation technology and in the heating industry, as well as specific environmental groups: the figure is now set to be 40% within a few years. There should be strict obligations to make savings

and compulsory annual renovations to keep the Member States on a very short European lead. This would be paid for equally by private households, industrial electricity users and energy-intensive industry.

The EPP achieved a realistic compromise, with a 35% savings obligation by 2030

We do, however, have a commitment to more than a few lobbying groups. The European Parliament must focus on the overall economic and environmental interest, which should guide its actions. The EPP's compromise proposal for plenary to vote in favour of 35% had long been rejected out of hand; only at the last minute did reason win the day, with even the Greens supporting the EPP compromise line in the vote in plenary. In the end, all the EPP's key demands for more flexibility from the Member States were passed with a majority, albeit in some cases a small one. Greens, communists, UKIP, Five Star and S&D realised that their Committee on Industry, Research and Energy positions would not only have made it impossible to have a strong vote in Parliament but would also have caused the trilogue with the Member States to grind to a halt.

Tougher savings obligations endanger the ETS system

Now the trilogue can begin. Parliament will be starting negotiations with a strong majority. I am confident that we can push through robust energy efficiency requirements which go beyond the Council and Commission proposals. We must not, though, negotiate with blinkers on; rather we must keep in mind interaction with other energy and environmental legislation. Already the agreed 35% savings obligation would have a dramatic effect on the emissions trading system and would force down allowance prices as far as EUR 15 per tonne. This would result in more state intervention in what is essentially a market economy system, which would render European economic policy unreliable. And if some politicians, for example, were to say that we should aim much higher than the 30% target in order to fulfil the conditions of the Paris Agreement, that would again be deliberately misleading. Impact assessments conducted by the Commission have found that the EU will fulfil the global climate objectives with a 27% CO₂ savings obligation.

Electro-mobility and building efficiency will require more energy, not less

We also owe the fact that we must not throw the baby out with the bathwater to the structural change – which everyone wanted to see – and beyond, to electro-mobility and increased building efficiency. One magic word for more green energy in this context is sector coupling. Coupling, as energy production increasingly means electricity: for heat pumps in buildings or car batteries, with the key word electro-mobility. But if we want that to feature in the technology race, it must be understood that cutting back on diesel in favour of electrical propulsion will require a great deal more energy. Before the energy which feeds our sockets flows into car batteries, we must firstly put up with a significant reduction in efficiency. This also applies to replacing gas and oil heating by heat pumps in our homes.

The energy legislation of the future will prioritise green energy consumption

The way to make this work politically is to make sure more green electricity reaches the socket – in other words, to promote the use of renewables. But if we reach the stage when green electricity really does power our cars and heat our homes, savings obligations on electricity from renewables will be counter-productive, as they suffocate structural change before the socket is reached. So it is unfortunate that the EPP narrowly lost a vote in plenary on introducing 'breathing energy legislation'. The higher the EU had set the target for the proportion of green electricity, the more flexibly we could have achieved the savings targets. A savings obligation for green energy, which is not harmful to the climate, makes little sense. Unless, of course, we want to have a completely different world and cast serious doubt on the achievements of economic growth. But if we were to get behind Claude Turmes, member of the Greens and former secretary-general of the radical NGO Friends of the Earth, and his radical associates from the Left and the Right, we would be treading a dangerous path into the environmental abyss.

Achievement of a net-zero carbon economy by 2050: The strong Parliament's energy stance



Michèle RIVASI

MEP, (Group of the Greens/European Free Alliance), Member of the ENVI Committee, Rapporteur on the Governance of the Energy Union

We need an ambitious clean energy package. The accelerating climate change drives us to act rapidly to reach a net-zero carbon economy by 2050 at the latest, in compliance with the Paris Agreement. The incorporation of the Paris Agreement into EU law requires a strong governance that covers all aspects of the energy transition and maximises citizens and local authorities' involvement in the formulation of national energy and climate plans and long-term climate and energy strategies.

On renewable energy and energy efficiency files, EU member states are more inclined towards less ambitious targets, backing only 27% for renewables and 30% for energy efficiency, versus the Parliament's 35% benchmarks for both. Rapporteurs of the European Parliament on Energy files have agreed that there will be no final deal if both targets are not well above 30%. We need ambition. Science is there, alerting us on the pace of global warming. Costs, the main argument against higher targets, are falling and public opinion continues to back implementation of the Paris Agreement.

Concerning the new governance of the Energy Union, one of the cornerstones for the European Parliament is a carbon budget. For the first time, we are proposing a carbon budget which will set out exactly what can still be emitted into our atmosphere if we are to comply with the 1.5 and 2 degrees limits set

out in Paris and achieve a net-zero carbon economy by 2050. The global carbon budget is 890 Gt of CO₂, of which Europe's fair share could be between 47 and 61 Gt of CO₂. In order to stay within budget, more ambitious 2030 targets on climate, renewable energy sources and energy efficiency are needed.

Another crucial aspect in the energy union governance is a European methane strategy. The battle against climate change focuses largely on carbon dioxide but tends to forget a gas that weighs heavy on the climate. The EU should rapidly implement policies that effectively reduce methane emissions, as the gas has a high global warming potential and a short atmospheric lifetime, making it a much more powerful greenhouse gas than carbon dioxide. Over a 20-year horizon, methane traps heat and warms the planet 86 times more than carbon dioxide. Being a precursor for ground level ozone, it is also considered an air pollutant.

The only viable option for the Union is to achieve a net-zero emission, highly energy-efficient and fully renewables-based economy by 2050 at the latest. Emissions cuts will be achieved mainly by maximising energy efficiency in all sectors and accelerating significantly the increase of renewable energy sources in the final energy consumption. The whole energy supply system needs to be transformed and rely fully on renewable energy sources. Fossil fuels will be phased out, while wind, solar, geothermal and biomass from waste and residues will deliver almost all primary energy in 2050. Although action in all sectors is required, the key actors are power generation, transport, buildings and industry, where electrification and phasing out coal should happen rapidly. We need the Energy Efficiency First principle as a key policy instrument, so that energy consumption will decrease despite

the rapid growth in renewables. Without

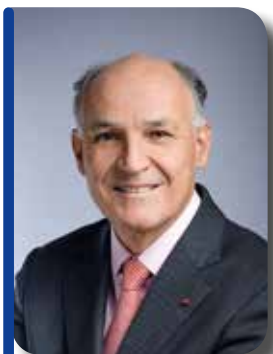
ambitious energy efficiency targets, the EU will most likely miss even its current 2030 climate target of reducing greenhouse gas emissions by 40% based on 1990 levels, let alone deliver on the commitments made in Paris.

In a context where the cost of renewable energy technologies is falling, it is high time

to unleash the immense potential of the numerous and powerful driving forces around us: cities and regions, citizens, cooperatives, investors, businesses... Centralised energy production has prevailed as an energy system for a long time, but the recent emergence of local energy initiatives implies that distributed energy production could compete with, or even replace, the old system in the future. Distributed renewable energy production has become a considerable option in the transition from fossil fuels to renewable energy sources, and the review of the renewable energy directive should ensure that all individuals have the right to produce, store, resell and use their production of electricity, energy and heat.

Finally, setting up a more favourable regime for small investors and local authorities would allow cities and their inhabitants to invest directly in renewable energy projects, which has been repeatedly proven to increase local acceptance of these projects. Cities and regions are already largely mobilised to deliver the energy transition, as shown by the 7,000 cities representing 226 million inhabitants gathered in the Covenant of Mayors with action plan to reduce their greenhouse gas emissions by at least 40% in 2030. Energy communities and cooperatives are a vital part in reforming the energy sector, offering benefits to the communities and the country as a whole by decreasing energy imports and creating new jobs.

Our road to Paris starts with renovating our buildings



Pierre-André DE CHALENDAR

Chairman and Chief Executive Officer of Saint-Gobain

As buildings account for 40% of Europe's energy consumption and over one third of its greenhouse gas (GHG) emissions, they are central to the continent's energy transition. **It is clear now that if no tangible progress is made in decarbonizing the building sector in the near future, we shall fail to meet our commitments under the Paris Agreement.**

Energy efficiency progress made over last two decades in the EU has yet to offset the increase in floor space and changing occupation patterns. Space heating still accounts for over two thirds of household energy consumption and the demand for air conditioning is on the rise. Worryingly, at a global level, the slowdown in energy efficiency improvements contributed significantly to the increase in GHG emissions in 2017.

On matters pertaining to the climate and energy, we can certainly recognize and acknowledge the positive impact of EU-driven legislation. For example, new build requirements are, on the whole, well on track with the Energy Performance of Buildings Directive (EPBD) and the drive towards near-zero energy buildings (nZEB) standards is changing the traditions in construction and, thanks to higher volumes, reducing manufacturing costs.

However, the large-scale transformation of our existing building stock has yet to happen: new build represents, on a yearly basis, only 1% of the total building stock, with over three quarters of the current stock being built prior to the existence of any energy performance requirements. As a result, only about 10% of European buildings are classified A or B on the energy performance certificate (EPC) scale. With today's renovation rates (stagnating around 1%), it is going to take over a hundred years to renovate the EU building stock.

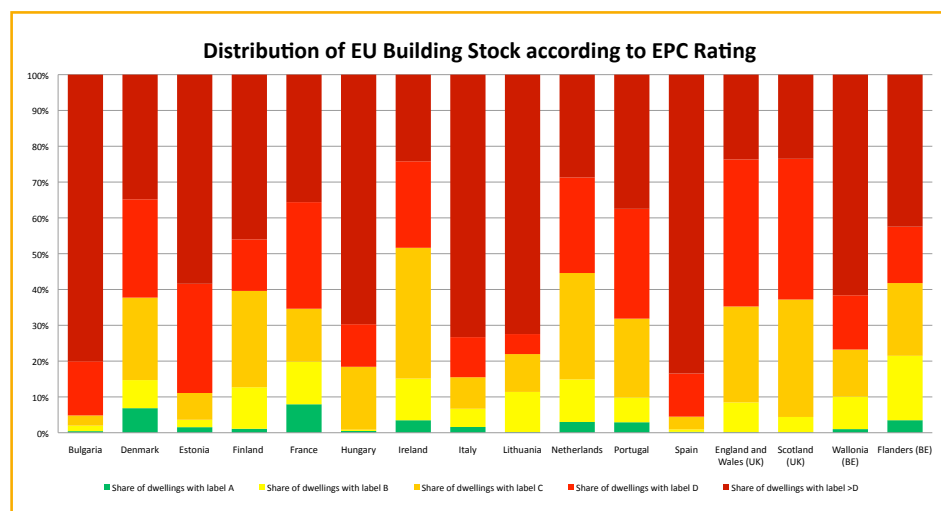
Given the scale and urgency of the renovation challenge, and considering the too timid progress made in renovating the stock, we could question whether this is actually feasible, affordable, or even if there are any alternative solutions to reach our decarbonisation goals.

First, we believe that it is technically feasible to bring our building stock up to a level of high energy efficiency and low carbon standards, since most of the required passive and active technologies already exist. These technologies typically include insulation, airtightness, glazing, ventilation, lighting, heating systems and controls. In a Group like Saint-Gobain which realizes 44% of its turnover in renovation markets, innovation remains essential to develop new

solutions, and improve their performance, facilitate their installation, and enhance the customer experience. Among our products sold today, one out of four did not exist five years ago.

The technology is there, but what needs to become common practice is a faster deployment of those solutions, at a much greater scale. Importantly, we need to move away from a silo approach to undertaking energy renovation steps. Holistic renovations, implemented at once or through coordinated steps, need to be mainstreamed in the interests of savings and comfort. This is where tools such as building renovation passports can help, but also better training of the workforce is needed. The digitalisation of the construction sector also offers a great opportunity to better organize renovation.

Second, the affordability question is actually multifaceted. Estimated investments of €100bn per year to renovate the EU building stock sound quite substantial. Yet this figure has to be compared to energy infrastructure costs – which are to some extent avoidable if energy demand durably decreases, e.g. as a result of peak demand reduction thanks to insulating buildings. At an individual level, we often forget that most energy improvements are undertaken in conjunction with other works which can be driven by comfort,



Distribution of EU Building Stock according to EPC Rating, BPIE analysis (2017)

technical, or aesthetic considerations, or simply linked to a change in ownership.

Beyond that, the question of affordability has to be addressed alongside the cost of non-action, meaning energy dependency, air pollution, loss of asset value, low productivity and poor living conditions, to name but a few. And here, there is a twist: *Can we afford, in Europe, in the year 2018, to see 1 in 10 people unable to keep warm in winter?* The hidden costs of our leaky, damp and cold buildings concern physical and mental illness, inability to recover after hospitalization, or social exclusion starting at school age. In France, we have over 7 million buildings in energy class F or G, the sadly famous “energy sieves”, of which 4 million are occupied by low income households. Too many people are being left out of the energy transition question.

Third, is there any serious alternative to deeply renovating our building stock? As tempting as it may sound, it will not be possible to reach a decarbonized building stock in 2050 without significantly reducing the energy consumption in buildings. As reminded by abundant studies including the recent analysis by the Global Alliance for Buildings and Construction (GABC), decarbonized energy supply will only partly solve the problem. A number of clean, modern heating technologies, e.g. heat pumps, are designed to work in interaction with well-performing building envelopes. But also, increasing the share of renewable energy supply in buildings without undertaking the necessary energy efficiency improvements would limit their respective potential. In a systemic perspective, efficiency gains support the high penetration of renewable energy sources, and vice versa. **At building level, switching supply does not increase comfort or health.** It is energy efficiency improvements, undertaken in a sound, logical and holistic manner, that trigger enhanced living conditions such as thermal, acoustic and visual comfort, as well as indoor air quality.

In short, postponing action to tackle the building renovation challenge would not only make the overall energy transition more expensive and risky. **It would also fail to engage EU citizens in a positive manner in the overall decarbonisation journey, when they should be the first to get involved and benefit from EU leadership in this field.** Buildings hold this formidable power to enable tangible reductions in GHG emissions, while making us feel better and healthier. They have this ability to bridge policy ambitions and consumer expectations on an easy converging path. As reminded by the latest Saint-Gobain OpinionWay survey, 90% of French people

think that comfort at home has a positive impact on their wellbeing. Over 95% link such comfort with the quality of insulation.

So, what is next? We believe that the EU Clean Energy Package should deliver a solid policy framework that supports long term investment in renovation. **Importantly, the Package needs to bring the EU on a decarbonisation pathway that is compatible with its commitments under the Paris Agreement, for the sake of consistency which should help bridge divergences in the course of the ongoing trilogue discussions.**

More specifically, we believe that the Energy Efficiency Directive should deliver an ambitious and mandatory energy efficiency target combined with reliable delivery mechanisms, such as energy efficiency obligations schemes, which are key in developing energy efficiency markets. In France, energy saving certificates have proven to be a successful tool to drive action, notably in buildings, and this is why it has been decided to double the volume of certificates over the period 2018-2020 (vs. 2015-2017).

We also welcome the agreement on the revised Energy Performance in Buildings Directive, and call all Member states to seize

the opportunity of developing impactful long-term renovation strategies to drive renovation in the direction of highly efficient and decarbonized building stock. These strategies are a prerequisite to transforming our buildings, as their preparation and implementation will put all players around the table. They are also key to leveraging private funding. Additionally, transparency should guide the calculation of energy performance, starting with energy needs, and inform improvements of the EPC and work on the building renovation passport. Trigger points should be developed and are a great topic for exchanging best practices between countries. This is about ensuring energy efficiency can be part of all decisions taken during the life of the building. Not least, we believe that special attention needs to be given to public buildings, and social housing in particular.

If we are not serious with building renovation, we are not serious with our commitment to the Paris agreement. But if we do it right, renovation will deliver more than GHG and energy bill reductions. Aside from helping me realise my dream that buildings consume just 20% of our energy by 2030, this will also truly win EU citizens support for renewed European climate leadership.



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Studying in multi-comfort: interior of the primary school in Masano di Caravaggio (Italy) Saint-Gobain contributed to renovate according to its Multi-Comfort principles

Energy efficiency, a real economic and societal challenge for Europe



Benedek JÁVOR

MEP (Greens/EFA Group), Shadow Rapporteur on energy efficiency directive review, Member of the ITRE Committee, Vice-Chair of the ENVI Committee

We are currently living in an age of transition: considerable and dangerous alterations in climate and weather leading towards increased global warming and extreme events have already modified our planet's environment, general biodiversity and peoples' lives.

To face the challenge of Climate Change, the Paris Agreement has been signed by more than 190 states. The energy sector, which is responsible for the bulk of climate change related greenhouse gas emissions,¹ has the key role in achieving the Paris goals and the electricity sector alone needs to be decarbonised by 2050.² This requires a true energy revolution: We need to fundamentally change the way we produce and consume energy, while respecting environmental, economic and social considerations and, furthermore, establish a new system that is living up to the very notion a democratic society.

As the worldwide demand for energy keeps growing and that the cheapest energy is the one we do not consume, Energy Efficiency (EE) is the best tool to deliver results. Increased EE is cost-efficient and necessary to meet the

climate targets³ and thanks to its demonstrated multiple benefits⁴ has the potential to serve as an economic and social instrument to solve the ever more pressing problems of our modern society.

First, EE brings along great economic opportunities: Ambitious energy efficiency policies lead to public budget signals that are resulting in GDP and employment rate increases, as well as higher industrial competitiveness of products and production processes. SMEs and local enterprises are also favoured and can create new jobs. In short, EE serves as a boost for both national and local economies.

Secondly, EE brings about social benefits: Energy poverty, a real affliction in many EU countries, can be alleviated by increased EE with positive impacts on human dignity, social inclusion and health: It has been shown⁵ that living in leaky or damp houses is causing diseases such as asthma. People in hospitals

and schools take more time to get well or learn if the building is inefficient. In renovated homes, our citizens have to spend less on their energy bills and can live in a healthy and comfortable environment.

In addition, increased EE is also lowering our energy dependency on Russia and other fossil fuel exporting countries.

Lastly, EE helps creating a fully democratic and well-balanced society, where the consumer is empowered to engage with energy providers, can contribute to so-called load- or peak shifting through remunerated demand response schemes and where communities are less dependent on governmental subsidies. In fact, EE helps reshuffling the existing power structure between consumers, (big) energy companies and public authorities, with the citizen becoming an active stakeholder.

The EED's (Energy Efficiency Directive) legislative journey has not been an easy one: The ongoing inter-institutional dialogue is facing several hurdles. A first important element is the level and the nature of the EE headline target. The European Parliament's position advocates a binding energy efficiency target of minimum 35% in 2030, which can be achieved cost-effectively⁶ and would provide the necessary long-term policy framework that will

3 RAP/Ökoinstitut and S Scheuer Consulting via <http://www.raonline.org/knowledge-center/destination-paris-why-eus-climate-policy-will-derail-without-energy-efficiency/>

4 IEA 2014 Capturing the Multiple Benefits of energy efficiency, via http://www.iea.org/publications/freepublications/publication/Multiple_Benefits_of_Energy_Efficiency.pdf

5 Ecofys/Fraunhofer study 2017 for Velux Healthy Homes Barometer, via <https://press.velux.com/new-study-startling-correlation-between-poor-housing-and-ill-health/>

6 Non-paper from the European Commission 2018, via <https://www.euractiv.com/section/energy/news/leaked-eu-analysis-makes-case-for-higher-renewables-energy-saving-goals/>



1 EEA, via <https://www.eea.europa.eu/data-and-maps/indicators/en01-energy-related-greenhouse-gas-emissions/en01>

2 Ökoinstitut: Green vision scenario for Europe via <http://extranet.greens-efa-service.eu/public/media/file/1/5492>

unlock investments and unfold the multiple benefits of EE. The Council sets a mere 30% target.

In addition, Article 7, which deals with yearly energy savings achieved among final consumers, is also the object of heavy discussions, as the positions of the Commission, of the Council and of the EP differ largely. The European Parliament is critical of the current “flexibilities” which have de facto lead to halving yearly efficiency efforts⁷. The Council proposal would introduce even more flexibilities and lead to even less yearly ambition.⁸ Additionally, we should not miss the chance achieve efficiency gains in the transport sector, which is responsible for more than a third of EU final energy consumption.⁹

With the upcoming mid-century strategy¹⁰ that, according to European Commission

sources, will be published as early as November this year, Member States will realise that EE is their best ally to implement their CO₂ reduction commitments under the Paris Agreement.

Only a strong EED will allow us reaping the economic, social and environmental benefits and enables us to cut our emissions in line with EU climate ambition. Industry and investors stand ready¹¹ to embrace ambitious strategies; citizens have tasked the European Parliament to take a solid position, not at least to reduce their energy bills.

The ball is now in the Member States’ court to embrace a strong and stable long-term framework, to show that Europe is delivering on the goals of the Energy Union and the Paris Agreement, while leading the way towards a sustainable economy providing adequate jobs, homes and products to its citizens in a healthy environment.

7 RAP Analysis via http://eng.janrosenow.com/uploads/4/7/1/2/4712328/eed_paper_final.pdf

8 RAP Analysis via <https://www.raponline.org/wp-content/uploads/2017/08/rap-rosenow-assessing-european-council-proposal-article7-energy-efficiency-directive-august2017.pdf>

9 EUROSTAT 2017 via http://ec.europa.eu/eurostat/statistics-explained/index.php/Consumption_of_energy

10 EUCO Summit Conclusions on Strategy for long-term EU greenhouse gas emissions reduction in accordance with the Paris Agreement via <http://www.consilium.europa.eu/media/33430/22-euco-intermediary-conclusions-en.pdf>

11 EU-ASE via <http://euase.net/eu-energy-ministers/> and IIGCC via http://www.iigcc.org/files/publication-files/180419_CEP_letter_to_Ministers_-_Informal_Council_-_FINAL.pdf



Energy Efficiency First: a golden rule for a Paris agreement-compliant Energy Union



Patrick LABAT

CEO, Veolia Northern Europe

Introduction

Buildings and industrial facilities use a considerable amount of energy for the purpose of heating, cooling, lighting and hot water use. They are nowadays responsible for about 40% of final energy consumption in the EU¹. It is hence all the more important to make sure this energy is produced and consumed in the most cost-effective manner. Indeed, saved energy is the cleanest one available to European customers. The International Energy Agency (IEA) has long recognised energy efficiency as the “first fuel” of the global energy system, for which an enormous and untapped potential exists.

¹ And are responsible for 36% of the total EU's emissions.

The Clean Energy Package proposed in November 2016 by the Commission as well as the current discussions on the future of multiannual budget constitute an exceptional window of opportunity for the EU to put energy efficiency on the top of its climate and energy agenda and to take on the energy efficiency leadership.

Energy Efficiency needs to be increased across the entire energy chain

For years now, Veolia has been providing resource (water, materials and energy) optimization solutions for municipalities and industries across Europe. Hence, the group carries energy efficiency at the heart of its activities, as a part of its circular economy paradigm. In collaboration with our customers and partners, we develop services that aim at reconciling energy and environmental performance. We do it notably through **energy performance contracts** by which we commit to our clients when it comes to the optimization of the production efficiency, reduction of energy consumption, and improvement of their energy mix. Our solutions apply to buildings both when it comes to the energy supply - since we operate boiler and cogeneration installations, as well as to the demand side, given we provide tailor-made solutions for enhancing the way buildings operate. Part of the agreed remuneration is results-based. Regarding district heating networks, their operations are covered by contractual arrangements so as to incentivize the operator to improve both their generation and distribution efficiency.

Because of this dual focus, we can not but see energy efficiency as something to be strived for and achieved across the entire energy chain - from generation through transmission and distribution to consumption. While so far, the regulatory framework (in particular the 2012 Energy Efficiency Directive) has focused almost exclusively on the final energy consumption, **the significant potential of efficiency in the energy generation and supply has been generally overlooked**. Searching for the reduction of final energy consumption, although essential, can only take us that far. This is all the more alarming that the potential for increased energy efficiency on the supply side is tremendous: for instance, the EU project [Heat Roadmap Europe](#) estimates that there is more heat wasted during electricity generation than is required to heat all buildings on our continent.

Getting energy efficiency piece in the Clean Energy Package right

The EU Clean Energy Package - currently under interinstitutional negotiations - offers a significant window of opportunity to make Energy Efficiency a centerpiece of a successful transition towards decarbonized future in Europe. The results of the on-going trilogues will also underpin the bloc's position at the December's COP24 climate conference in Katowice.

Ambitious targets

In order to achieve its decarbonisation objectives by mid-century, the EU needs ambitious energy efficiency target for 2030. The Parliament understood this imperative and proposed in its compromise report to raise the overall EU target from 30% proposed by the Commission to at least 35 % and to make it binding at the European level. However, as we know today, in particular in the light of its commitments to the Paris agreement, the EU will have to review both its 2030 (40%) and 2050 GHG reduction targets. We also know that in the EU, 3/4 of the emission reductions needed to meet this Agreement must be reached through energy efficiency improvements. Hence, together with a group of 75 leading businesses and associations, Veolia signed a **call for a cost-effective energy efficiency target of 40% by 2030 with an extension of 1.5% cumulative annual energy savings obligations beyond 2020** (with a



2050 perspective) to be inscribed in the final text of the Energy Efficiency Directive. These objectives would radically strengthen investor confidence and channel private investments towards large-scale renovation and conservation projects. Member States now need to get on board and take the responsibility for the future of energy efficiency in the EU.

Primary energy approach should prevail

In line with its objectives, the EED should promote all energy savings both in the energy generation and energy use. But according to the latest [Eurostat data](#) we are far from the objective when it comes to primary energy savings: the European Union falls short of meeting the EU Energy Efficiency target with a 4% gap for primary energy consumption². In this perspective, attempting to **reduce primary energy consumption by increasing the efficiency of production, transmission and distribution processes should be from now on prioritized** in the revised EED. This could be achieved through technologies such as district heating networks and cogeneration facilities.

As a corollary of an increased focus on primary energy consumption, existing inefficiencies that are being found across the entire energy chain should be correctly assessed and communicated to final consumers so that they could make informed choices. Hence the importance of having the right value of the [EU Primary Energy Factor for Electricity](#) (PEF). It indicates how much primary energy is used to generate a unit of electricity. When Member States choose to express their energy savings in primary energy, the PEF is applied to convert final energy savings into primary energy. A too low of value, as the one proposed by the Commission (PEF of 2.0) actually underestimates the transmission losses that occur on the electricity grids.

Because such a value creates a distorted picture regarding the real efficiency of electricity based-solutions as compared to their alternatives (such as district heating and cogeneration), we argue **in favour of maintaining the current 2.5 PEF value for grid electricity. The compromise proposed by the EU Parliament of 2.3, and limited only to the EED³ would be suitable.**

'Energy efficiency first' is more than a slogan

Although energy efficiency is a key objective of the Clean Energy Package, **the need to optimize energy consumption across the entire energy system before investing in more generation capacities is not reflected in the current policy debate.** Even more, in recent weeks, it became evident that rather than being a guiding principle for all EU and national energy and climate policies, *Energy efficiency first* has been seen by some as a mere "slogan". In fact, Member States should make sure this principle is applied across the entire Clean Energy Package, not only to the EED. Enshrining this principle also in both the Energy Union Governance Regulation and the Renewables Directive⁴ will enable countries to maximise their energy efficiency potential while pursuing their renewable energy development strategies. The embodiment of the *Energy efficiency first* principle will also help acknowledge significant efficiency gains that stem from growing integration of renewable energy sources such as wind, solar and hydro⁵. It will also help Member States to move faster to decarbonised, secure and cost-effective energy systems that reap all the benefits of an integrated approach to energy planning and an effective sector coupling⁶.

Governance of the EU as a lynchpin of successful efficiency policies

The quality of the coordination - to be achieved under the umbrella Regulation on the Governance of the Energy Union - will be essential to secure the transposition of the future Energy Efficiency Directive and its objectives into national measures. **This regulation needs to include a methodology to equitably share the overall ambition if national targets do not add up. The Commission should monitor progress made by each Member State against a trajectory based on mandatory and common checkpoints.** In case of a delivery gap, national measures must come first.

The design, monitoring and review of the National Energy and Climate Plans (NECP) are paramount to align Member States' progress with the EU overarching and binding targets.

In addition, to enable the realisation of NECPs, the next Multiannual Financial Framework should tackle the estimated €179 annual decarbonization investment gap.

Enshrining the Energy efficiency first principle in the future EU Budget

When it comes to energy efficiency, securing a favorable financial framework is essential, as energy efficiency projects typically require sizable upfront investments that industries, cities and individual consumers are not always in capacity to deliver. Therefore, the future Multiannual Financial Framework should fully integrate the *Energy efficiency first* principle, to ensure viable business models and to **avoid diverting funding streams into potential stranded assets** (such as not "Paris-compliant" energy supply infrastructures). In parallel, the overall budget should be earmarked for climate action, **prioritizing energy efficiency projects** (such as deep staged renovation projects) and incentivizing **public-private partnerships**.

Conclusion

At a time when the European Union is struggling to reach its own climate and energy objectives⁷, has to adjust its short term and long term policy to be compatible with the Paris agreement, and strengthen its energy security, the need for putting our efforts into increased energy efficiency is more urgent than ever.

Only by adopting both a constructive legislative framework for 2030 horizon and a responsible 2021-2027 budget that are guided by the *Energy Efficiency First* principle, the EU will be on the right track to meet its climate commitments, enhance indoor and outdoor air quality, and reach energy independence.

Committed to its core missions, Veolia stands ready to help industries, cities and people achieve an optimized decarbonisation of the European economy through increased energy savings.

² The picture is a bit brighter for the final energy consumption with a 2% gap.

³ Outside the EED, i.e. for legislation related to buildings and space heating, an adapted approach and a dedicated impact assessment will be needed to determine the appropriate PEF, in order to account for the seasonality of heat and the marginal impact of additional electric heating in the energy system.

⁴ An energy system with an increasing share of intermittent renewables will still need to be as efficient as possible to reduce waste in terms of primary materials used to produce installations for RES generation

⁵ See Irena Report "[Synergies between Renewable Energy and Energy Efficiency](#)", August, 2017

⁶ That is combining all available efficiency and renewable energy solutions across electricity, heat and gas networks.

⁷ Recent increases in primary energy consumption in 2014 and 2015, together with an update of the national indicative target in some MS in their 2017 National Energy Efficiency Action Plans (NEEAPs), makes the achievement of the EU 2020 target uncertain [source](#).

Facilitating the energy transition with european standards



Elena SANTIAGO CID

Director General, CEN-CENELEC

The transition to a low carbon economy has started. The Energy Union strategy is in place, with a 'Clean Energy Package' that sets an energy efficiency target of 30% and at least 27% of renewable energy consumed in the EU in 2030.

Helping businesses and consumers to make a better and more rational use of energy can lead to important benefits in terms of cost savings and promotion of efficiency. The further modernization of the EU economy and the development of more secure, affordable and sustainable energy systems for all EU citizens call for the renewal of infrastructures and the emergence of new technologies.

One of the great values of European Standardization is to prevent and eliminate technical barriers to trade, fostering innovation friendly legislation, therefore European standards not only play a critical role in supporting the creation of a single market for energy, enabling the reduction of energy costs and the further deployment of new technologies but also in facilitating the energy transition.

CEN - the European Committee for Standardization - and CENELEC - the European Committee for Electrotechnical Standardization - is working with industry partners, the European Commission and other stakeholders to develop and adopt European Standards that support the successful implementation of European legislation. Together, we have developed standards that provide industry with the tools to reach the Clean Energy Package objectives and facilitate the transition to a low carbon economy. These standards guarantee the spread of best practices and provide energy users with the necessary tools

to analyse and adapt their energy consumption patterns.

Experts from all over Europe develop standards following the WTO/TBT criteria of openness, transparency, impartiality, consensus and inclusiveness. Once approved by CEN and CENELEC, the National Standard Bodies and National Electrotechnical Committees members of CEN and CENELEC respectively adopt the standard identically, withdrawing national conflicting standards.

A series of European Standards that provide dedicated methods to measure the energy performance of various energy-related products against the compulsory values and thresholds laid down in Ecodesign and Energy Labelling Regulations have been published in 2017. These methods cover specific products such as air conditioners, vacuum cleaners, power transformers, domestic ovens, etc. Last year, CEN and CENELEC also elaborated European Standards for a methodology calculating the integrated energy performance of buildings and estimating the environmental impact in support of Directive 2010/31/EU on the energy performance of buildings.

Geared for the future

Today, new challenges and opportunities arise with the fourth industrial revolution and the use of cyber physical production systems (a. o. IOT). European industry is digitizing its processes, systems and is therefore increasingly using digital technologies, calling for speedy solutions and raising their level of complexity. These innovative features and solutions, like IoT, will further enable the energy transition in Europe and facilitate decentralized, simpler and more efficient energy systems and architectures.

European Standards provide a basis for the integration of technologies into complex systems, prevent vendor lock-in, and facilitate interoperability and data exchange. This is key at a time when traditional sectors, not using IT in the past, need IT standardization responses.

Since 2011, CEN and CENELEC have developed more than 300 European standards that support the deployment of smart grids in Europe and that enhance the upgrading of the energy system. These standards ensure the flexibility, accessibility and reliability of the power network. They propose solutions that are scalable, increase capacity for power transfers, reduce energy losses, heighten efficiency and security of supply.

Moreover, in the future, decentralized systems will most likely replace centralized systems.

An electricity market with smaller subsystems and more renewables create the need for more adaptability and flexibility, smarter energy grids, demand management and energy storage. In this context, the use of data models allowing the communication between devices without the use of protocol converters is vital. International standards adopted at European level, such as IEC 62325 series (Framework for energy market communications) and IEC 61850 (Communication networks and systems for power utility automation) standardise models covering communication aspects of the (electricity) networks. The continuous development of these data models is the cornerstone of the successful digitalization of European industry.

Breaking the silos

The success of the digitalization of European industry relies on the effective engagement of all stakeholders, from network operators, suppliers, equipment manufacturers, ICT professionals, consumers, regulators, to standardizers. CEN and CENELEC offer a platform for those stakeholders to exchange on their needs and agree on the state-of-the-art most agreeable solutions.

In this digital market, data management has to be transparent and understandable. At the same time, the enhanced integration of the energy grids is synonym of higher concerns and risks in terms of threats and vulnerabilities introduced in the infrastructure.

In this context, to support the deployment of the digital single market, CEN and CENELEC have adopted their Strategic Plan for Digital Transformation. Its focus is twofold: to support the digital transformation of European industry with a flexible and timely standardization response, and to lead the digital transformation of European standardization with four pilot projects looking at digitalising the standardization tools, processes, deliverables and establishing relevant strategic partnerships.

By making the European standardization system more agile and adaptable to market and technology innovations, European standards and standardization deliverables will continue to be strategic tools for industry to facilitate business interaction and to provide interoperability between new and existing products, services and processes, while ensuring the achievements of European policy objectives, such as the energy transition.

www.cencenelec.eu

Making the efficient transition happening



Kristian RUBY

Secretary General of Eurelectric

Clear priorities

In December 2017, the European electricity sector announced a new long-term vision for the electricity industry in Europe. Sector leaders committed to take action to support the economy-wide shift to a climate-friendly society and achieve a carbon-neutral electricity mix in the EU well before mid-century. With this the sector sends a clear message that the European power sector not only accepts its responsibility in decarbonising the European economy, but that it wants to lead the transition. Today, we are working with a clear set of priorities to accelerate the energy transition and to embed sustainability in all parts of the value chain.

Going forward, decarbonised electricity will increasingly be needed in the transport sector, heating sector and in industrial processes. As the share of electricity in our energy demand is set to rise, our overall energy needs will be affected significantly through the switch toward more efficient, smart technologies. Electro-mobility, new types of home services, smart-homes and electric heat pumps are just a few examples.

For our homes

Electricity is still not perceived as the most cost-efficient and decarbonised option when choosing the technology to heat or cool our homes, offices and public buildings. In 2014, 75% of Europe's heating and cooling demand

was met by fossil energy sources, with nearly half of the demand being met by natural gas. The sector - which consumes half of the EU's energy budget and is inherently wasteful - can benefit from untapped energy efficiency potential. Alongside simple energy efficiency measures, additional efforts should be complemented by the electrification of heating and cooling in modernised building stock where electrified solutions can offer real and practical solutions. This would reduce the carbon output originating from the sector, enhance air quality especially in urban settlements, and help saving the EU around €45 billion in fossil fuel imports per year.

Moreover, significant efficiency improvements are inherent in this technology switch: heat pumps have efficiency levels of 300-400% (for 1kWh electricity consumed 4kWh of thermal energy is generated). No other technology can rival this.

Therefore, progressive electrification of the sector enabled through the introduction of heat pump technology for space heating and cooling systems in Europe can deliver immediate and substantial efficiency improvements. For the energy system it also means a great opportunity to allow higher penetration of power coming from renewables and a bigger potential for sector coupling, overall enhancing system efficiency.

For how we move

Road transport emissions in the EU were 17% higher in 2014 compared to 1990 and the Paris agreement requires the sector to decarbonise by more than the current Commission's goal of 60% emission reduction by 2050. Without ambitious actions, the transport sector will be the biggest emitter in the EU by 2030. With a high degree of electrification of transport in combination with smart charging, Europe can have an overall net benefit.

This is already happening. 2017 was the point of no return for electrification of passenger cars. In 2018, electricity will prove its potential in areas we had not thought possible even a few years back. A quiet electric revolution has already begun in Asia where millions of scooters are shifting to electric. The big brand name motorcycles are on it as well: Harley Davidson just announced an all-electric motor cycle in January. Several cities in Europe will accelerate their shift to electric buses. Short-haul maritime is already seeing the beginning

of a shift to electric. But electrification will move beyond small ferries. Hybrid solutions with electric elements will find way into long-haul maritime transport as well. The wave of electric flight start-ups and pilot projects from 2017 will continue and trigger concrete business plans and strategy announcements in 2018. The first one already came in January from Norwegian Avinor, which announced all short-haul flights to go 100% electric by 2040.

Battery electric vehicles (BEV) are almost 4 times more energy efficient than internal combustion vehicles (ICE) in a tank to wheel perspective. The moment to get the transport rules right for the next decades is now, via the Transport Package.

For how we produce things

Last but not least, the question of how to decarbonise the whole industry in the EU. Expect to see new application of electric power for heavy industrial processes. Vattenfall just announced a pilot project for green steel fuelled by hydrogen from fossil-free electricity. Others will follow. Several sectors - both using low-temperature and high-temperature heating industrial processes - are trying to answer the strategic question of how to make their plants low-emission while keeping their competitiveness high at international level. Besides the technology barrier, the industry in the EU is facing a balance sheet problem as decisions need to be made now on which type and how much new capacity to build in the next two decades. The electricity sector teams up with the heavy industry in asking decision makers to come up with a plan on how to finance the transformation to a decarbonised industry in the EU, following an integrated approach and dedicated areas of financing.

Electrification is already happening at different degrees in several sectors, as the technology is here. A more ambitious deployment of electric-based technologies will translate in massive efficiency increases (energy savings) and overall system efficiency.



Ecodesign and Energy Labelling

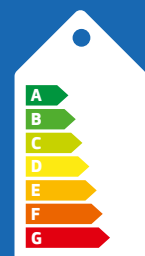


Benefits for Consumers

Ecodesign policy means

€490 Savings

On household energy bills each year



Energy Labelling



Ecodesign



Nearly **half of the energy savings target** set by the EU for 2020



A **quarter of the emissions reduction targets** set by the EU for 2020

Energy Savings



Existing Measures:

Energy savings equivalent to the primary annual energy consumption of Italy by 2020



New Measures:

Energy savings equivalent to the primary annual energy consumption of Sweden by 2030

Benefits for European Industry

Potential for creation of
€55billion
in yearly revenues by 2020



Energy Security

Reducing imports
by equivalent to
65 million barrels
of oil each year



Energy efficiency first means citizens first



Morten HELVEG PETERSEN

MEP (ALDE Group), Vice-President of the
ITRE Committee

Lower prices for consumers, a safer energy supply and better health are all powerful reasons for the EU to focus on energy efficiency. The energy ministers in Council should approve of Parliament's level of ambition in the months to come.

The European economy is finally back on track after a decade of low and inconsistent growth. However, across our union, citizens still struggle to make ends meet. Energy costs remain one of the key concerns, as many citizens spend approximately 10% of their income on paying energy bills - even when winters are warm and supply is stable. As climate change entails more extreme weather conditions that accelerate the demand for heating and cooling, consumers' energy costs are likely to remain high.

Research shows that buildings account for 40% of European energy consumption. Therefore, all new buildings are already required to follow high standards of energy efficiency. However, this does not suffice: In 2050 more than three quarters of our current buildings still stand, most of which are not energy efficient at all. Renovating our existing building stock in an energy efficient manner is therefore crucial, if we are to reduce the energy costs for Europeans.

Investments in better insulation, accurate temperature control and improved heating

and cooling are not only sound economics. Society overall benefits, when consumer get more money to spend on goods and services, which in turn improves economic growth and helps reduce unemployment.

These ambitions require policies in order to become reality. In the EU, we already took the first important step, when we finalized the Energy Performance of Buildings Directive earlier this year. It focuses on energy efficiency of both public and private buildings, and sets new standards that will reduce energy consumption and costs. In order to take the next step, it is crucial that the Energy Efficiency Directive is signed using the same ambitious ink.

Neither free nor fair

This is not only about the money. It is also about our freedom and independence. In the EU, we have come a long way securing the safety, health and well-being of our citizens, who have never lived longer, better and more affluent lives than now. However when we look to the east, we see troubling signs of aggression and uncertainty that we need to remedy.

The government of Russia consistently threatens our infrastructure, including recurrent attacks on our IT-systems. Domestically press freedom is under pressure, corruption is the order of the day and peaceful civil society organisations are banned. It was hardly surprising that Mr Putin's re-election was neither free nor fair.

However, the criticism of Putin's Russia would not be as relevant to this publication if it were not for our reliance on the country's energy. Several EU Member States remain almost entirely dependent on Russia's oil, gas and coal. Looking at how this dependence has been used as leverage against European countries in the recent past, it is of utmost importance to curtail this trend.

While the EU has been remarkably consistent in its sanctions against Russia, it was the low oil prices that hit the Russian economy the hardest. This works as a useful reminder of what Europe needs to do, if we are to properly sanction the actions of the Russian government: stop buying Russian energy. As

Russia's number one, two and three on its list of exports, reducing the consumption of oil, gas and coal will be at least as effective as any set of sanctions.

The good news is that we already have the tools to do so. By investing in energy efficiency, we can significantly reduce the reliance on Russia. Thereby we improve the safety of our citizens, who no longer need to worry that their energy supply depends on the Kremlin.

The green toolbox

While Putin remains a security risk for our citizens, the main causes of premature deaths in the EU relate to respiratory disease, heart diseases and cancer. While these have many different causes, air pollution and bad indoor climate are definitely two of them. As traffic jams in cities worsen and the consumption of fossil fuels increases, this problem is unlikely to diminish. Therefore, we need to reduce our consumption and reform the way we live and organize our societies.

Fortunately, the green toolbox is already available. By investing in insulation, temperature control and better heating and cooling, we do not only help save our planet for the next century. We also help make a difference for our struggling friends and neighbours this year. Thus, energy policy is not merely about economics and safety, but fundamentally about the health and well-being of our citizens.

Earlier this year the European Parliament confirmed its commitment to higher targets for energy efficiency. Currently the ministers in Council are reluctant, citing high costs and political scepticism. There is no doubt in my mind, that Council should embrace this opportunity to provide citizens with lower costs, safer energy supply and healthier lives.

Energy efficiency of buildings should help to structurally reduce fuel poverty



Simona BONAFÉ

MEP (S&D Group), Member of the ENVI Committee

Climate change and energy security are among the biggest challenges of our times. Besides posing several threats in terms of environmental, geopolitical and economic impacts, requiring a coordinated, rapid and effective response at European and international level, these challenges give us the opportunity to tackle specific societal problems from a new perspective.

This is notably the case of “fuel poverty”, also known as “energy poverty”. Energy poverty is a multi-dimensional phenomenon, representing a particular form of poverty linked to the impossibility - especially for the most vulnerable consumers - to pay their energy bills and meet their basic energy needs, including the ability to warmth or cool their homes properly and maintain an acceptable level of indoor air quality. The range of effects deriving from energy poverty is extremely wide, with severe consequences on people’s physical and psychological well-being, having an indirect impact on array of different policy areas - from health, to environment and productivity.

With the number of people at risk of poverty and social exclusion in the European Union estimated around 23.7 % in 2015, and the correlation between poverty rates and fuel poverty-related aspects widely recognized, the topic has become more and more central on the European agenda.

Indeed, despite the lack of a common European definition of the problem, which varies significantly among Member States and the different geographical areas, awareness about the issue and the urgency to address it properly have been constantly growing. In this sense, the European Commission has recently launched the EU Energy Poverty Observatory, established as a platform to support Member States in their fight against fuel poverty through the provision of comparable data, measuring and monitoring tools, as well as the share of knowledge and best practices. Besides offering, for the first time, a comprehensive overview of the situation relating to the problem, the Observatory aims at facilitating public and private engagement as well as informed decision-making by the relevant national, local and EU authorities.

At the EU-legislative level, several pieces of legislation, currently under revision with the “Clean Energy for All Europeans” Package, address the issue. Starting from the *Energy Union Governance Regulation*, that should include provisions according to which Member States will have to monitor and report on energy poverty and the progress made in this area within their national energy and climate plans, to the *Energy Performance of Buildings’ Directive* (EPBD), the first legislative file finalized under the Package. The new EPBD text, approved by the European Parliament Plenary in mid-April, specifically mentions energy poverty when referring to *Long Term Renovation Strategies*, establishing the obligation for Member States to develop policies and actions to alleviate this phenomenon, with a focus on the worst performing segments of the national building stock.

Cost-effective renovations of buildings and the overall improvement of their energy performances are surely key in this respect. A study published by the Buildings Performance Institute Europe already in 2014 identified energy efficiency retrofits as the most sustainable solution to fuel poverty, providing for long-term and multiple benefits, especially when compared with possible alternative options, such as energy subsidies or direct financial support for household heating. Among the advantages offered by energy efficiency improvements, we can certainly mention CO2 emission reduction, the

cost-effectiveness and economic sustainability of measures, the push for innovation and the creation of new and more sustainable jobs.

Energy efficiency can be delivered in many different ways, according to the specific needs and circumstances. This represents a critical aspect when dealing with energy poverty, as energy-efficiency improvements allow, indeed, to tackle the phenomenon through several alternatives and complementary options. These spans from low-cost measures, focusing on behavioral change, to others actions targeting social housing or multi-residential buildings, either through energy saving measures for new dwellings or cost-effective renovations of existing buildings, to be implemented, for instance, through energy performance contracts. Besides guaranteeing a determined level of energy savings, the latter can provide, indeed, a viable solution to the always-compelling financing issue.

Nevertheless, direct support for energy efficiency upgrades from financial institutions, along with the creation and promotion of ad-hoc financial products, such as green bonds, is pivotal. Recently, the ECON Committee of the European Parliament in its own-initiative Report on sustainable finance, building on the HLEG final report of January 2018 and the Commission’s Action Plan on “Financing Sustainable Growth”, highlighted this. In this sense, the Report mentions innovative financial products as for instance, “green mortgages”, encouraging new householders to invest in the energy efficiency of their home with a long term saving perspective.

Finally, the active engagement of consumers through proper information is certainly crucial. In order to be able to save energy and money on their energy bills, consumers need indeed to track their actual energy consumption and to assess the performances, for instance, of their home appliances. For this reason, the use of smart meters, transparent bills, effective building automation and monitoring systems, as well as clearer energy efficiency labels enabling consumers to make informed choices when evaluating the products they wish to buy, are key elements to move towards a more efficient and just access to energy for European citizens.

Cogeneration - putting Energy Efficiency first across the whole energy value chain in Europe



Hans KORTEWEG

Managing Director of COGEN Europe, the European association representing the simultaneous generation of electricity and heat (cogeneration).

In November 2015, Heads of States from around world met in Paris and **pledged to keep the global** temperature rise to 2 degrees Celsius above pre-industrial levels. For Europe, delivering Paris Agreement goals means reducing its greenhouse gas emissions by at least 80 percent compared to 1990 levels. In the decarbonisation efforts, a key step is to stop wasting energy. To that end, boosting energy efficiency has been made a key objective of the European Union's (EU) Clean Energy Package (CEP), which also aims to make Europe leader in renewables and put energy consumers at the centre of the energy transition. Yet, energy efficiency falls short of being addressed comprehensively in today's negotiations on the package, despite its clear benefits to facilitate the energy transition.

Energy efficiency is a no brainer: by using energy more efficiently, European citizens and businesses can lower their energy bills and CO₂ emissions, reduce their reliance on imported oil and gas, and help protect the environment. Energy efficiency helps decarbonise the economy and unlock the growth and jobs potential of the energy transition.

Yet in Brussels, the current debate about energy efficiency has mainly focused on end-use efficiency measures – i.e. more efficient appliances and building renovation. The enormous potential for energy savings in the entire energy value chain before

consumption – in energy generation, transmission and distribution – has been broadly ignored. In fact, astonishingly, there is more heat wasted during electricity generation in Europe than is required to heat all buildings on our continent, according to Eurostat. Unlocking this potential via cogeneration and district heating is more complex to achieve, but well worth it.

The latest [Eurostat data](#) also confirms that Europe is falling short of meeting the EU 2020 Energy Efficiency target, given the 2% gap for final energy consumption but a 4% gap for primary energy consumption. At a time where electrification is envisaged to decarbonise key sectors like heating and transport, it will be important to apply energy efficiency consistently across the entire energy value chain, not only at the point of consumption but in generation, transmission and distribution, where most of the losses occur. This will ensure that the "Efficiency First" principle goes beyond just a political "slogan".

Cogeneration, or combined heat and power, is the energy solution which puts energy efficiency first across the entire energy value chain, thus reducing CO₂, ensuring security of energy supply and safeguarding the competitiveness of industry and better energy for citizens. Cogeneration produces heat and electricity simultaneously from a single energy source, offering energy savings of more than 25% compared with the separate generation of heat and power. State-of-the-art cogeneration plants can reach efficiencies up to 90%, while a conventional power plant only uses around 40% of the energy input to produce electricity, with 60% of the energy being wasted in the form of heat released into the atmosphere. What is more, electricity and heat from cogeneration are produced and consumed locally, which further reduces electricity grid losses, estimated at around 10% of electricity generation.

Cogeneration also facilitates the integration of more renewable energy in the system, either directly, by improving the efficiency of bio-energy fuels, as well as indirectly, by producing electricity when and where it is needed, thus supporting a resilient electricity system. As electricity supply will be increasingly variable (i.e. wind and sun) and at the same time

electricity demand will increase, both demand side and supply side flexibility will become increasingly valuable. Storage, especially seasonal storage via green gas or hydrogen injected into the gas networks, will also be key. Cogeneration will be the backbone of a resilient and renewable energy future along other renewable energy solutions, ensuring that valuable energy is not wasted and that renewable energy use is maximised.

For these benefits, cogeneration is embedded across the entire economy: installed in the premises of more than 100,000 homes, businesses and industrial sites or providing heat to more than half of the district heating networks and electricity to many more communities across Europe. Cogeneration is widely used by European industry and tertiary sectors (i.e. in the chemical, food and drink, paper and metal industry), to decrease their emissions, meet their significant demand for secure heat and electricity and boost their competitiveness. Cogeneration also supplies energy to hospitals, hotels, public buildings or domestic consumers, via district heating or micro-cogeneration in homes. One iconic example of a public building using cogeneration for its benefits is the Berlaymont office building, which houses the headquarters of the European Commission in Brussels, Belgium.

Today, cogeneration generates 11% of all electricity and 15% of all heat in Europe. This saves Europe 200 million tonnes of CO₂ every year. By 2030, cogeneration could nearly double these numbers and produce 20% of all electricity and 25% of all heat in Europe. This would mean an additional 350 million tonnes of CO₂ saved. The potential is huge, yet it needs to be realised with the right policies and political will.

The EU's CEP offers an opportunity to do realise this potential. But for cogeneration to fully deliver its benefits, energy efficiency first will need to be applied consistently across the entire package. The proposed Governance Regulation, which takes an integrated approach to energy and climate policy, will be instrumental to do so, ensuring that the identified potential for energy efficiency, including cogeneration, is realised in synergy with the renewable energy and decarbonisation objectives.

In the ongoing review of the Energy Efficiency Directive, ambitious targets will be needed, which must be complemented by equally ambitious measures that target supply side efficiency improvements via cogeneration and district heating, to ensure that efficient buildings and industry are supplied with efficient heat and electricity. In addition, clearly signalling to consumers inefficiencies across the entire energy system will be important to create a level playing field for all energy efficiency solutions. A good example of distorting this level playing field is the currently proposed 2.0 value for the [EU Primary Energy Factor for Electricity](#) (PEF), which underestimates losses on electricity grids, offering consumers and businesses an inaccurate picture of how efficient their electricity consumption really is.

Other examples of applying consistently the Energy Efficiency first principle include maximising the efficient use of renewables (solar, wind, biomass or green gas) and better recognising efficiency gains of locally produced

and (self)-consumed heat and electricity when revising the EU's electricity rules. The latter can be achieved for example through fair grid tariffs acknowledging the reduced need for costly grid reinforcements, when electricity is produced and consumed locally without contributing to grids overload.

As Europe moves towards a more decentralised, efficient and integrated energy system, taking an integrated approach is essential. Cogeneration will be a central solution to deliver this integration at local level, connecting the electricity, gas and heat networks and allowing households, communities and small businesses to generate and consume their own low-carbon energy while reducing their energy bills. Supporting such examples of integrated solutions will be key to deliver the necessary emission reductions to meet Paris goals, boost the global competitiveness of EU industry and ultimately enable a cost-effective energy transition from which Europe's citizens and industry can benefit.



Unlocking investments into energy efficiency – on the need to match policies to the reality



Kenth KARHOG

Head of Group Communication at Danfoss

We are at a turning point in the energy transition. An important delivery of the regulatory framework is to accelerate investments from the private sector in “energy efficiency”. Energy efficiency will reduce the costs of the energy transition because it is about creating more economic output from each unit of energy. Simply put, it is about doing far more with far less. In Danfoss for example, we have improved our energy productivity by 70% in the last 10 years.

At Danfoss we see five reasons why policy makers should adopt at least a 35% binding energy efficiency target flanked with a strong energy efficiency obligation scheme¹.

1. The market is much more mature than it was ten years ago when we adopted the 2020 targets. The number of Energy Services Companies (ESCOs) has increased and most utilities have embarked in the energy transition completely revamping their business model around energy services. Capital costs have never been lower. The financing sector has opened their eyes on the business potential of energy

efficiency² and we will see a significant reduction of transaction costs.

2. The awareness of the attractiveness of energy efficiency investments has increased and the perception of risks related to such investments has decreased.

Facts show that investments in energy efficiency are much more reliable than usually perceived. Danfoss provided real life projects into the data base of 8000 projects gathered on the Derisking Energy Efficiency Platform (DEEP)³ which demonstrate the attractiveness of investments in energy efficiency. The median avoidance cost of saving energy is below EU energy prices with an average payback time between 2 and 11 years (11 years for deep renovation projects in buildings).

3. We have the technologies, know-how and solutions to meet the target.

Decision makers should not underestimate the amount of solutions and innovation that are underway to unlock the potential of energy efficiency. We have joined for example an initiative launched by Bertrand Picard (Solar Impulse) that will release 1000 energy efficiency solutions by COP24. It is crucial that policy makers open their eyes and base their decisions on the technologies which are already available.

4. A huge untapped potential is waiting to be grasped.

We are already today able to turn the drinking and waste water treatment sector energy neutral which represent the equivalent of 3,5% of the EU's electricity consumption (payback time 2-5 years)⁴. We can reduce the final energy demand in the EU buildings stock by 30% with optimized automation and controls (payback time 2-5 years)⁵. We could cover

the equivalent of all the EU space heating demand with excess heat... The examples are countless.

5. The opportunities for significant savings by focusing on energy efficiency are still untapped.

A good example is the penetration rate of drives in electric motor systems: It is possible to reduce the consumption of electric motor systems by 40% thereby reducing global electricity consumption by 8%, the payback time is 2-3 years⁶ and yet, 80% of installed electric motors are still not equipped with drives.

So we have five convincing reasons to support a strong and binding trajectory in support of energy efficiency. The benefits are countless: If we exploit the invisible reservoir of energy efficiency that still lies in Europe, we will support new business models, we will accelerate the uptake of clean technologies, we will reduce gas imports, we will do more with our renewable energy supply, we will reduce peak loads and system costs, and we will support a competitive economy.

² As exemplified by the recent letter of the Institutional Investors Group on Climate Change : http://www.iigcc.org/files/publication-files/180419_CEP_letter_to_Ministers_-_Informal_Council_-_FINAL.pdf

³ <https://deep.eefig.eu/>

⁴ <https://www.iea.org/newsroom/news/2016/november/world-energy-outlook-2016.html>

⁵ <https://www.ecofys.com/en/news/optimised-energy-use-of-technical-building-systems-could-unleash-significant/>

⁶ IEA estimate, see footnote 4

¹ Or the alternative option as set out in Article 7 of the Energy Efficiency Directive

Energy efficiency market will invigorate the EU economy, boost growth prospects and benefit European citizens



Patrizia TOIA

MEP (S&D Group), Vice-Chair of the ITRE Committee

The cheapest energy is the one we don't use. By now everybody knows and agrees on that. What is less consensual is that to reduce our use of energy we have to invest money in new technologies, [renewable sources](#) and in renovating buildings. That's why we talk of having more ambitious targets in energy efficiency and it is not always easy to convince stakeholders. And yet the investments in energy efficiency are a big opportunities for our economies.

According to the European Commission by encouraging cross-border cooperation and mobilising public and private investment in the clean energy sector (it is estimated that EUR 379 billion will be required each year from 2021 onwards) the proposals of the Clean Energy for All Europeans package have the potential to be good for economy, generating an estimated 900 000 jobs and an increase of up to 1% in GDP over the next decade. The European Energy Efficiency Industries estimate confirms that the market for low-carbon products and services is growing globally and within the EU represents revenues of over €150 billion each year. The EU has flourishing skills and industries in this sector but these industries need a strong home market in which to continue to develop, compete and grow. Producers and service providers are also active on the global market, contributing to Europe's export revenues.

According to the International Energy Agency (IEA), if EU countries were to fully exploit the potential of energy efficiency, overall GDP would grow by up to 1.1% per year. The European Commission estimated additional GDP growth of up to 4.45% by 2030 if 40% energy savings could be achieved. Construction, for example, is a strong engine of the European economy. Investment in the energy efficiency of buildings robustly supports this sector which contributes nearly 10% to EU GDP and accounts for 18 million jobs.

That's why in April we approved the Energy Performance of Buildings Directive (EPBD), which is the first of 8 legislative proposals part of the Clean Energy for All Europeans package brought forward by the European Commission on 30 November 2016. The new legislation requires member states to develop national long-term strategies to support cost-saving renovation of public and private buildings, with a view to reducing emissions in the EU by 80-85% compared to 1990 levels. Copenhagen Economics estimates that by harvesting the investment opportunities provided by energy efficiency renovations in the existing building stock, EU Member States can stimulate economic activity which can bring net benefits to GDP of up to €291 billion. This corresponds to between 1.2% and 2.3% of EU GDP. Furthermore increased energy efficiency investment in the buildings sector would bring a high density of new local stable jobs where they are most needed. On average, an investment of €1m in the buildings sector creates 19 new jobs.

Investing in energy efficiency means to boost industrial competitiveness. High dependency on international energy markets exposes companies to price shocks which reduce the predictability of returns on investment. Sudden price increases cannot always be passed on to the market and undermine companies' profitability. Due to increases in worldwide demand and the introduction of energy taxes, energy prices are expected to rise over the next decade. Energy efficiency measures can decouple energy prices from energy costs for companies. Furthermore, the European Commission's scenario modelling also sees a direct link between energy consumption in Europe and international energy prices. If energy efficiency gains of 40% were achieved by 2030,

gas prices could be 8% lower and oil prices 3% lower than in business-as-usual scenarios. The energy efficient operation of industrial plants in the EU makes them more competitive thanks to already existing solutions. Energy Efficiency Services Companies (ESCOs) deliver overall management of energy demand to energy end-users, providing operational, design maintenance and management of equipment services and leading to optimisation of energy consumption.

Energy efficiency is a driving factor for innovation in the manufacturing and services sectors. The development of the ESCO market is particularly important for optimising and modernising the EU's infrastructure. The global market value of ESCOs is estimated at €12bn in 2010. Our industries create centres of innovation led by major European companies and foster knowledge economy working with academia, supporting research and developing new areas of economic activity. However, innovation centres will only stay in the EU if the legislator is able to provide an ambitious long-term framework demonstrating the political will to realise energy saving potentials. The creation of local skilled jobs is an absolute imperative for the EU. It is widely recognised that ambitious energy efficiency measures lead to significant net job creation. The European Commission states that the number of jobs could be increased by up to 3% by 2030 if a 40% energy savings target were implemented. In other words more ambitious targets on energy efficiency will boost our economy and the competitiveness of our industries, but will also have direct beneficial consequences for European citizens. About 10% of them are considered fuel poor. Many governments spend more money on fuel subsidies than on reducing energy bills sustainably through energy efficiency measures.

At the end of the day energy efficiency is one of the smartest investment we can make and a win win move for industries and citizens. All we need is a daring and forward looking approach.

Renovation and retrofitting: the priorities of construction SMEs and crafts



Patrick LIÉBUS

President, European Builders Confederation EBC

The construction sector is one of the main pillars of the European economy and offers a lot of innovative solutions to engage with the social, climate and energy challenges we are facing today. In 2016 it recorded an annual turnover of 1,278 billion, accounting for 8.6% of the total GDP of the European Union and thus making it the single largest industrial contributor. There are about 3,3 million enterprises active in the sector, of which 93% have less than 10 workers. In total about 43 million workers in the European Union directly or indirectly depend on the construction sector and the micro and small enterprises engaging in it, adding to the sector's vital importance for our society.

However, the construction sector with its SMEs and craftsmen were severely hit by the financial crisis, suffering from the double-dip recession close in on the meltdown in 2008. It took the construction sector until 2014 before growth was slowly starting to kick back in again. The sector seems nowadays to be back on track to reach the pre-crisis output levels, benefiting not just the sector as such, but the European Union as a whole. This is because every job created in construction results in two additional jobs elsewhere, as a Commission analysis claims¹, and thus construction offers a great opportunity to tackle the high

unemployment rates, still existing in some of the Member States.

Renovation and retrofitting still play an essential role in the recovery of the construction sector and its good performance in recent years. In fact, renovation and retrofitting measures in the residential market of the European Union grew by more than 10% since 2005². One of the main reasons behind this was the governments' responses after the economic and financial crisis. The recovery measures implemented were primarily related to energy efficiency improvements in the building stock and boosted the reliability of the renovation market, especially in residential housing, which is the most important market for the majority of construction SMEs and crafts. One of these measures was the application of reduced VAT rates to labour-intensive services in the construction sector, such as renovation. EBC is a strong supporter of this policy measure and encourages Member States to make further use of it in order to renovate the building stock in the European Union and at the same time support their local SMEs.

Given that about 75% of the EU building stock is considered energy inefficient and the energy use in buildings (residential and commercial) is responsible for about 40% of final energy consumption in the European Union, energy efficiency renovation represents a promising long-term growth possibility for the EU construction sector. In addition to this, energy efficiency in buildings forms an integral part in reaching the goals set within the 2030 framework for climate and energy and in achieving the COP 21 commitments. It is vital that buildings move towards being "nearly-zero carbon".

In 2015 energy efficiency improvement works were worth about EUR 100 billion, roughly equalling 15% of the total turnover of construction activities in the EU³. The vast majority of this turnover was created in residential housing. Thus a continuous increase in the coming years can potentially boost the

EU's energy performance and at the same time increase employment, especially among young people in local areas – jobs that cannot be moved to other countries. It is estimated that in 2015 alone, energy renovation works directly employed around 882,900 people³.

Numbers by EUROCONSTRUCT suggest that by 2020, the renovation sector will see a stronger growth than new construction for the first time since 2014³. There are huge opportunities for our SMEs within this frame not only to drive the sector, but the whole European economy.

However, as much as a thriving energy efficiency renovation market can boost the business of the more than 3,27 million construction SMEs in the sector, it also inherits specific challenges.

The sector suffers from a lack of skilled workers in general, while energy efficiency renovations even necessitate additional competences and qualifications. The evolution of technologies and materials requires continuously reconsidering and updating our knowledge and skills. Lifelong training is thus a crucial issue for our enterprises. In order to keep training and VET as a priority area, the European Union and its Member States should keep supporting training initiatives with appropriate financial means.

Energy efficiency is a top priority for our construction craftsmen and micro to medium-sized companies. For this reason, and in the context of the 2018 European year of cultural heritage, EBC has decided to devote its annual conference to the issue "Energy efficiency in historical buildings". I invite all interested parties to meet in Paris on 29 June to discuss this topic matching tradition and innovation!

1 Communication from the Commission "The Competitiveness of the Construction Industry", COM(97) 539 of 4/11/1997

2 OpenExp study "Transformation of the EU Building Stock", 2016

3 EUROCONSTRUCT press release "Construction sector set to grow in all 19 EUROCONSTRUCT countries in 2017, 14/11/2017

Energy-efficient buildings, renovation of buildings consequently reduce bills for consumers, fight against social inequalities



Theresa GRIFFIN

MEP (S&D Group), Member of the ITRE Committee

The European Commission has estimated that nearly 11% of its citizens, more than 54 million people, live in energy poverty. The true figure is likely much higher than this given that as many as 80 million people live in damp and leaky homes. It is, therefore, clear that ambitious action on buildings' renovation and the recognition of energy efficiency as the first fuel are essential to move people away from energy poverty and fight against social inequalities.

Action on energy efficiency requires both renovation of existing buildings and legislation to ensure new builds are to the highest energy efficiency standards. This dual strategy will help to tackle energy poverty, but also offers solutions to address energy security concerns, at a time when the EU is highly dependent on foreign energy suppliers, at a cost of 400 billion euros every year.

Our strategy to improve energy efficiency, particularly in buildings, requires cross-border and cross-Parliament committees, industrial policy, and the redesign of products, transport and buildings. Yet, whilst action needs to be taken across all of these sectors, building stock seems to be the lowest hanging fruit. The building sector is the largest energy consumer in Europe: its share of total final consumption was 40% in 2012, making buildings responsible for 36% of the EU's total CO₂ emissions. Energy renovation of buildings in the EU is a win-win

for the EU economy as a whole and will help address the issue of energy poverty.

For every 1% improvement in energy efficiency, 3 million homes can be properly renovated and 7 million people lifted out of energy poverty.

The governance framework of the Energy Union also needs to be both bottom up as well as top down. The major challenge is therefore to link local and regulatory frameworks effectively. Energy transition will only happen if there is a change from the bottom. Cities and local government have to act as catalysts or conductors to accelerate this change. Both the challenges of and solutions to energy transition can be found at local level and where good practice exists on a regional or national level, the European Institutions should act as a conduit to disseminate information across the EU.

Access to finance is also key - making sure that energy efficiency projects across Europe access the money they need. Europe has created opportunities: €38 billion of the European Structural and Investment Funds (Cohesion fund) for the period 2014 - 2020 are dedicated to investments in Energy Efficiency. The European Commission has also put in place the "Smart Financing for Smart Buildings" initiative and previously Commissioner Moedas promised that €194 million would be specifically dedicated to energy efficiency projects within the Horizon 2020 programme.

Which is all good news, but, barriers still exist.

Too often it's the poorest who live in the leakiest housing stock or are treated in the most energy inefficient hospitals. People are not always able to invest to refurbish their households. So, we need to work with local authorities and innovative local schemes and spread the message that building renovation projects can be rapidly deployed and will be economically beneficial in the long-term. Specifically, we also need to tackle contradictory interests that can exist between renters and owners, lack of information at an individual level and the uncertainty over potential help from the banking sector.

For regions, cities and local authorities, we need to promote the exchange of best practice but also facilitate projects coming together to access energy efficiency finance. At national level, it is essential to ensure that existing directives dealing with energy efficiency are properly implemented and that investment plans, with identified finance, are developed for both the public and private sector.

There is considerable scope for increased targeting of energy efficiency programmes towards vulnerable consumers. Priority should be given to retrofitting low quality accommodation and social housing. Public funding should be used to reduce the cost of the initial investments, which can often be seen as a barrier for vulnerable consumers. In short, my prescription for tackling social inequalities through building efficiency and switching to renewables, can be summed up in 5 principles:

1. Reform the energy market so that vulnerable consumers are not disadvantaged by a system designed to cater to active consumers.
2. Put energy efficiency at the centre of energy policy – because the most efficient fuel is the fuel that never needs to be used in the first place.
3. Recognition that support for renewable energy is not in contradiction with lowering energy costs, but rather the only way of sustaining cost-effective energy into the future, while understanding that environmental damage hurts the poorest most.
4. That support and additional funding is needed for regions with a high dependency on fossil fuels or the fossil fuel industry, to reskill those communities and ensure a 'Just Transition'.
5. Ensure that no matter what proposal is put forward, the needs of our poorest and most vulnerable citizens are always at the forefront of our thinking.

If these principles are followed when crafting social policy, then we can maximise the benefits to all our citizens, particularly our most vulnerable. Because in 2018, no-one should have to choose between heating, cooling, or eating.

Energy Efficiency policy: improving public health and environmental protection



Jytte GUTELAND

MEP, (Group S&D) Member of the ENVI Committee, ENVI Rapporteur on the Energy Efficiency Directive

Late night desk lights will shine in many an office this week, as the negotiating teams prepare for the next negotiating round of the Energy Efficiency Directive. It's crunch time.

Until now, the interinstitutional talks have been fruitful and conducted in a constructive spirit. Both the European Parliament and Member States have made concessions on many issues in order to find compromise and a common way forward. But the smooth sailing might very well be over, I think we all expect the going to get tougher from now on.

The negotiations are finally honing in on two major elements where institutions are still far apart; the overall energy efficiency targets and annual saving obligations for Member States until 2030. In many aspects, these are the single most important aspects of the entire Directive. When considering the total effects of proposed targets and annual energy savings, the differences in ambition between the diverging positions are stunning. While the European Parliament's positions constitute an overall increase in ambition compared to the Commission's proposal, the Council's General Approach would instead cut ambition significantly short. It is no exaggeration to say that we stand at a crossroads and the outcome of the negotiations will decide which route Europe will pursue in the coming decade. Either we assume our responsibilities and align

our energy efficiency policies with the Paris Agreement and a sustainable future. Or we fail to do now what is necessary and kick the can further down the road. Needless to say, to me the right choice is obvious. Europe needs to step up its commitments on energy efficiency, we have no time to waste.

Increasing energy efficiency is a win-win situation. The benefits of a cleaner and smarter way of producing and using energy are manifold. Naturally, the interplay between energy efficiency and the economic development is an important aspect. The success of energy efficiency measures in Europe have shown that not only is it possible for energy consumption to fall during economic growth, but that energy efficiency measures can actually significantly contribute to growth. Final energy consumption has been falling since 2010, while EU GDP has been rising. It is safe to say that Europe has successfully decoupled economic growth from increased energy consumption.

But increased energy efficiency can also enable enormous wins for public health, the climate and the environment. Let's start with the climate. Energy efficiency is one of our primary tools in decarbonising Europe's energy supply, buildings, transport and industry. With a sufficiently ambitious legislation, the EU has a great possibility to ensure that our greenhouse gas emissions will shrink both faster and more than today, putting us on track with the requirements under the Paris Agreement. Europe's climate protection and energy efficiency targets must be mutually reinforcing. Today, more of half of the energy that we use is imported, at a cost exceeding €1 billion per day. Much of this energy is fossil and leaves a grave carbon footprint. By increasing our energy efficiency, we can reduce these fossil energy imports and reduce both emissions and costs. It is evident that such measures are required in order to reach net carbon neutrality by 2050. I want ambitious and strong energy efficiency policies to continue to play a central role as the European Union leads the way in the global transition to a decarbonised and sustainable society.

An ambitious energy efficiency policy will also deliver on the environment. Already in the Commission's Impact Assessment it was made

abundantly clear that the higher the targets, the greater the environmental benefits. And when including in the assessment also the environmental impacts of material consumption and on water and land used by the power sector, the case for a higher energy efficiency target is strengthened further.

Last but definitely not least, cleaner energy and more effective consumption will also improve public health. For the many citizens that every year fall victims of illness and premature death due to air pollution in urban centres and industrial areas, improving energy efficiency is literally a matter of life or death. The European Parliament's negotiating position would increase life years by many million, thanks to vast improvements in air quality. As the elected representatives of citizens, all Members of the European Parliament have a responsibility to fight for this goal.

When the going gets tough, the tough get going. As ENVI Rapporteur and member of the European Parliament's negotiating team, I look forward to doing my part in the upcoming negotiations and defend the best interests of Europe's citizens, our economy, health, climate and environment.

Energy Efficiency: A crucial policy to fulfil our climate commitments



Seán KELLY

MEP (EPP Group), Member of the ITRE Committee

Increasing Energy Efficiency is a clear 'no-lose' policy option, both for economic and environmental reasons, to the ever present need to meet our environmental targets. Reducing our energy use means lower energy costs for consumers, it means less dependence on external energy suppliers, and it means a reduced carbon footprint by cutting our Greenhouse Gas (GHG) emissions. Furthermore, the jobs created in the construction sector by increasing the demand for energy efficient building renovations makes it evident that benefits of striving for a more energy-efficient system are multiple. Our commitments under the Paris agreement are clear, crucial, and non-negotiable. We simply must ensure that this target is met and that Europe takes a leadership role in the fight against climate change. It is therefore imperative that we are ambitious in our 2030 goals, and energy efficiency has a key role to play in this.

The EU building stock represents a clear opportunity to make big strides towards improving the efficiency of our energy use, and action is badly needed. 75% of our buildings are currently considered inefficient - this represents an enormous amount of avoidable emissions and, in very simple terms, an enormous waste of energy. Buildings account for 40% of final energy consumption in Europe; at a time when we are striving to make significant cuts to emissions, it is not acceptable to have such a high level of inefficiency in a sector that is responsible for such a large proportion of them. The recent

agreement on the Energy Performance of Buildings (EPBD) is an important one in this regard, and I commend my EPP Group colleague Bendt Bendtsen MEP for his tremendous work and dedication over the past year to get the file over the line.

The agreement reached in the EPBD strikes the right balance between being cost-effective for citizens, and seeking to address the huge efficiency problem in our building stock that I have mentioned above. The provisions in the Directive will improve the efficiency of our buildings and encourage renovation by requiring the Member States to each establish a long-term building renovation strategy and ensure that we move towards a highly efficient and decarbonised building stock by 2050. These plans will be crucial to the meeting of our targets for 2030 and beyond, and I encourage Member States to push aside the natural tendency towards caution and to be ambitious in setting these plans. Energy efficiency is one of the cheapest and most effective ways of cutting emissions, while at the same time delivering new jobs and potential for businesses to grow. The EPBD, in combination with the revised Energy Efficiency Directive, which is now being negotiated and will set out the overall energy efficiency target for 2030, will be crucial in the coming years to ensure that the required emission reductions are achieved.

For a number of reasons, investment in energy efficiency has not been as high as we would like it to be. The relative longer payback time of an Energy Efficiency investment, along with difficulties in accessing finance, and indeed the general lack of awareness of the benefits these investments can bring in the long term, has hindered progress on this issue. It is clear that we have a problem in Europe in that investments such as these, which are sensible and economical, are still not being made. Despite the various EU funding instruments available, with their higher perceived investment risk, investments in energy efficiency just do not seem to be as attractive as they might be and as a result, such an undertaking may seem not worthwhile to the typical homeowner.

Something that can really help this issue, and we are seeing examples of it pop up around Europe now, is the idea of an on-bill repayment scheme. In this system, a customer would

be able to have the energy efficiency work undertaken on their home, often without an upfront cost, while the payment is made over time through the utility bill. I think these types of schemes need to be made more available and we need to better promote them. In Ireland, for example, a recent study showed that almost half of Irish consumers would consider taking out a loan to pay for energy efficiency improvements. This pay-as-you-save idea is an important one to generate interest in such investments. Member States, as part of their building renovation plans, should work to ensure that such possibilities are made available to their citizens.

In terms of mobilising finance, since it was announced in November 2014, I have been extremely interested in how the European Fund for Strategic Investments (EFSI) could be used for energy efficiency investments, particularly in buildings. For this reason I am excited by the new EFSI-backed EIB funding for an Energy Efficiency project in France. Under this project, funds put up to trigger the needed investment for energy efficiency renovations for private homes in France on a large scale.

Regions in France will set up specialised companies to provide assistance and packaged solutions to homeowners for the retrofitting of their homes, and it is reported that up to 40,000 flats and houses will be able to benefit. I truly hope this initiative is a resounding success as I think it could provide the blueprint for similar projects across Europe.

If EFSI is taken full advantage of by Member states, the potential benefits are endless. I think this model, the grouping together of smaller schemes for funding under EFSI, has the possibility of truly empowering citizens to address their own Energy Efficiency levels thereby benefitting themselves and the environment in the long run, both economically and environmentally. I hope to see Ireland as a key player in utilising this model in the not too distant future.

I think it is clear that employing active Energy Efficiency measures is a key way forward if we are to meet our 2030 targets. At a time when Europe seeks to lead the way in climate ambition, there is no better time than now to highlight to our citizens this crucial topic and the important role it has in the fight against Climate Change.

How innovation will help reach the Energy Efficiency directive target by 2030



Diego PAVÍA

Chief Executive Officer, InnoEnergy

In order to achieve European targets on Energy Efficiency, innovation needs to be at the forefront of the EU's efforts. By embracing technology, implementing energy efficiency measures and making the most of alternative energy resources, we can accelerate progress towards achieving this goal. A collective effort from EU Member States, energy companies, businesses, and consumers to embrace innovation will see energy used more efficiently at all stages of the value chain.

On 30 November 2016, the European Commission presented the Clean Energy for All Europeans package, which aims to help the EU energy sector become more stable, competitive, and sustainable. In order to encourage investment in the clean energy transition, the package has three aims: to put energy efficiency first, to achieve global leadership in renewable energies, and to provide a fair deal for consumers.

Regarding energy efficiency, in October 2014 the European Council prioritised the revision of the existing legal framework, stressing that: "an indicative target at the EU level of at least 27% is set for improving energy efficiency by 2030. This will be reviewed by 2020, having in mind an EU level of 30%".

In November 2016, the European Commission adopted a proposal, introducing the revised Energy Efficiency Directive which included a binding target involving a 30% reduction of energy consumption by 2030, compared to the business-as-usual projections.

The revised Energy Efficiency Directive, which is still under negotiation, also contains the provisions that EU countries have to set up in order to reach these targets. The main instruments are energy efficiency obligation schemes (or alternative measures). These schemes or measures require energy distributors and/or retail energy sales companies to reduce the volume of energy sales to final customers by 1.5% annually. Other provisions of the directive take care of metering and billing information, public procurement, renovation obligations, mandatory audits etc.

Regardless of the final result of negotiations, such a piece of legislation will require a substantial amount of innovation to be effectively translated into concrete results. In the meantime, new obligations made to Member States would also help boost business opportunities for innovators. In working towards achieving these aims, EU countries will play a vital role in leading the clean energy transition, fighting against climate change, creating jobs and fostering growth and competitiveness in the EU.

As a matter of fact, existing solutions such as providing wall and roof insulation, and installing double glazing for windows can help make buildings more energy efficient. EU countries can also offer financial incentives to companies that make use of energy efficient technologies. Similarly, energy taxes could be introduced and additional energy labelling schemes could be used beyond what is currently required under EU legislation.

At InnoEnergy, we believe that innovation is key to achieving the Energy Efficiency Directive target. We work closely with a network of

partners, building connections across Europe, with the aim of bringing innovators and industry together. We work across three areas within the field of innovation.

In education, we help to create an informed and ambitious workforce that understands the demands of sustainability and the needs of the energy industry. Our innovation projects encourage collaboration with the aim of creating commercially attractive technologies that deliver real results to customers. We also work with businesses, entrepreneurs, and start-ups who are working towards expanding Europe's energy ecosystem through innovation. By bringing these disciplines together, we're able to create a measurable impact in a short space of time.

With our network of more than 360+ partners from industry, universities, research centres, and venture capitalists, we have supported almost 100 projects with 170.5 million euros of funding. Our cumulative investments into sustainable energy have resulted in 77 patents and 3 billion euros of forecasted sales. Until now, we have also supported the growth of almost 200 European start-ups that develop innovation to ease the energy transition.

More specifically, several of our assets are already actively contributing to the European ambitions in terms of energy efficiency. As an example, InnoEnergy supports [Energency](#), a French start-up providing industrial manufacturers with real-time web analytics accessible through mobile devices. At the intersection of digital and energy, Energency operates big data algorithms, machine learning and



predictive analytics that continuously scan all the information systems in factories that relate to production, maintenance, and energy, allowing manufacturers to control their own energy management system and create energy savings of up to 20%.

In the same vein, [Ecotropy](#) provides a simple and accurate system which combines energy simulation software and on-site instrumentation to analyse the energy performance of a building. With its solution, Ecotropy can accurately accompany building managers during retrofitting works and certify the energy performance of buildings afterwards.

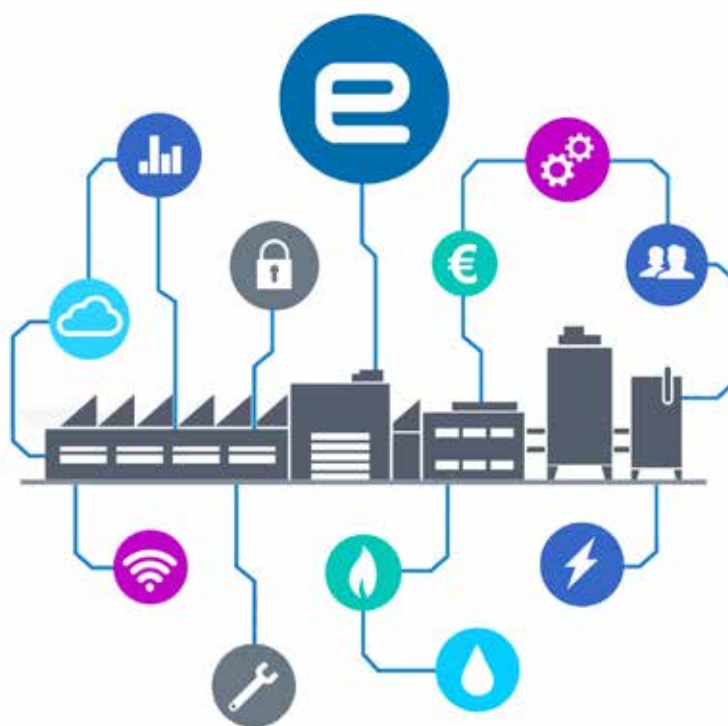
InnoEnergy also supports innovative SMEs which provide hardware solutions to make European economy more energy efficient. For example, [Flue Gas Recovery Sweden AB](#), which develops a solution to enable heat producers to recover waste energy, currently lost through exhaust pipes of today's heating systems. The technology leads to a thermal efficiency increase of around 20%, for systems between 100kW and 1 MW.

Finally, Swedish start-up [Greenely](#) is committed to empower consumers and to facilitate their active participation in the energy transition. Applying behavioural science, and based on already deployed smart-metering infrastructure, Greenely develops a personal coach to guide users and provide them with tips and tricks to optimise their electricity consumption. With its solution, Greenely can improve customer engagement while providing meaningful insight to nudge and motivate consumers towards adopting efficient and flexible behaviour.

Having an active participation of consumers is indeed an essential dimension of the energy transition. Consumers can play an active role in the energy system, notably by being able to generate, self-consume, store or sell electricity, but also by using electricity in a conscious manner, and by altering their own consumption towards efficiency, conservation and flexibility. The latter notably facilitates the penetration of variable renewable energy sources and thus contributes to the transition. For this reason, InnoEnergy develops and invests in Societal Appropriation, aiming at raising people's awareness about energy to progressively lead them towards playing a steering role in the energy transition.

By embracing technology, implementing energy efficiency measures and making the most of alternative energy resources, we can accelerate the development of market-ready innovations that will play a vital role in reaching the Energy Efficiency Directive target by 2030. As a European public-private partnership, it is also our duty to support European public policies and contribute to the concrete implementation of the "Clean Energy for All Europeans" package in the field of energy efficiency.

InnoEnergy supports and invests in innovation at every stage of the energy journey – from classroom to end-customer. With our network of partners, we build connections across Europe, bringing together inventors and industry, graduates and employers, researchers and entrepreneurs, businesses and markets.



System Efficiency – hydrogen: enabling a decarbonised, stable and resilient economy



Jorgo CHATZIMARKAKIS
Secretary General of Hydrogen Europe

Europe is moving towards a low carbon energy system with the ambitious aim of a more sustainable society. With this goal in mind, hydrogen will be a key component of Europe's decarbonised future. Hydrogen is an energy carrier, a fuel and a chemical feedstock, which if produced adequately can reduce greenhouse gas emissions (GHG), strengthen energy independence and mitigate the challenges posed by variability and intermittency of renewable energy systems. It offers a clean, sustainable, and flexible option to convert renewable electricity into an energy carrier based for use in mobility, heat and industrial applications. As the "gaseous form of electricity", it is an enabler for sectoral integration.

Renewable power generation is characterised by variability and intermittency. As the renewables' penetration increases, the problem of balancing supply and demand for operators of electricity networks also rises. Periods of non-consumption-oriented production of renewable energy are usually managed by curtailing renewable power sources because the electricity cannot be sold at the time of generation. Hydrogen provides valuable advantages in this context, as it offers emission-free grid balancing and energy storage capacities and the possibility to satisfy demands for heat, transport, power or industry achieving high utilisation rates and absorption of energy through sectoral integration.

Hydrogen technologies in a power system integrating high penetration of renewables

can operate throughout long periods of non-consumption-oriented production of renewable energy by feeding hydrogen into one or more energy sinks (e.g. the gas grid, the storage tanks of hydrogen refuelling stations, and salt caverns). Production of hydrogen for injection into the natural gas grid is usually referred to as power-to-gas (P2G). It is currently being demonstrated at approximately 15 sites across Europe. As a major energy conveyor, the gas grid offers an extant energy sink for renewables and, unlike the power system, has a large inherent storage capacity in the TWh scale. Therefore, power from the electricity grid can be transferred readily to the gas grid via P2G.

The ability of Power-to-Hydrogen to access and integrate each sector of the energy system opens up the opportunity for deploying and utilising renewables to a much greater extent. Whereas electricity derived from renewables provides the power sector with a profound decarbonisation pathway, the heat and mobility sectors as well as industry do not yet have decarbonisation pathways of equivalent significance. The versatility of hydrogen enables these sectors to be integrated and to contribute to Europe's energy transition.

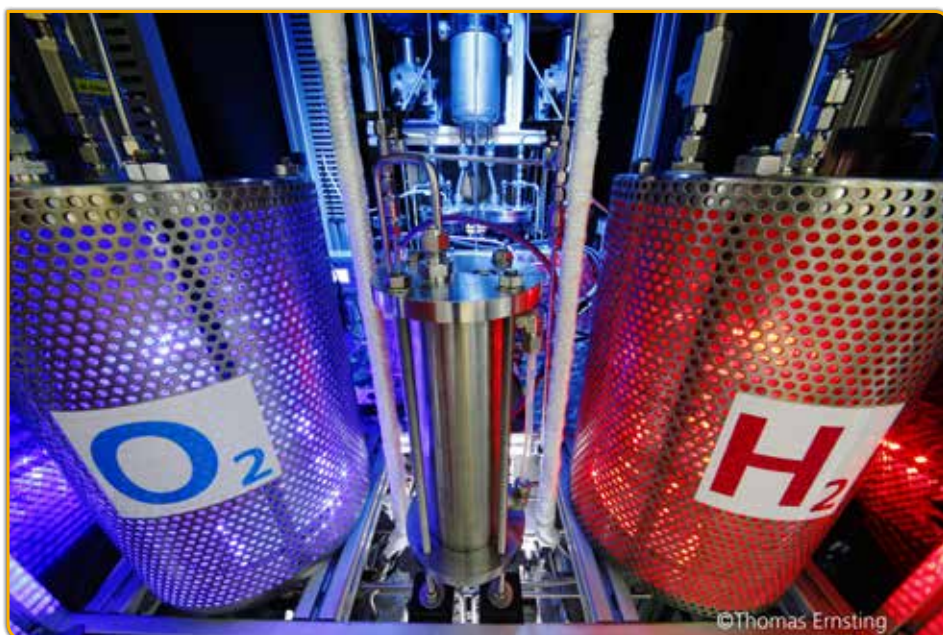
Hydrogen technologies will allow for the efficient use of Europe's world class energy

infrastructure safeguarding Europe's competitiveness while protecting consumers access to reliable and affordable energy. For example, the decarbonisation of the gas grid: because heat is by far the largest energy demand and has the greatest seasonal variation, P2G can be applied to decarbonise gas networks and ultimately store excess renewable energy produced in the summer for release in the winter.

Moreover, Hydrogen can be used in Fuel Cell Electric Vehicles (3-5min refuelling time with a 500km range) as these penetrates the European vehicle market or be blended in the refining process and thereby contribute to an immediate carbon emission reduction in the 120m internal combustion engine diesel vehicles on European roads taking advantage of the existing retail fuel distribution system.

Today, global hydrogen production is at 55 million metric tons annually with $\pm 50\%$ from SMR. Out of this, $\pm 40\%$ is consumed at refineries¹. Utilising green hydrogen could therefore have a significant beneficial effect on the overall system decarbonisation. Fuel

¹ Ball, M. and Wietschel M. (2009) *the future of hydrogen – opportunities and challenges*. International journal of hydrogen energy 34 (615-627)



Electrolyser- the key technology to produce hydrogen from renewables.
Credits: DLR, © Thomas Ernsting

producers are obliged to reduce CO₂ in their supply chain. This CO₂ reduction can be achieved by using green hydrogen in the refinery process. Although the more costly green hydrogen doesn't compete yet economically with hydrogen produced from fossil hydrocarbons, it does compete with biofuels. To achieve this, regulations should provide non discriminating rules that allow the use of hydrogen in the upstream fuel processes in a fair competition (both in price and GHG mitigation potential) with biofuels to fulfil the obligations for the renewable share in liquid fuels, therefore helping to reduce the dependency of the European Union on natural gas whilst contributing to the reduction of palm oil consumption.

Hydrogen can also be used for greenhouse gas reduction in the industry, for instance, a process to produce steel is to use hydrogen for the reduction of ore, so-called Direct-reduced iron (DRI), which avoids the use of carbon altogether. Several initiatives are on the way in Sweden (HyBRIT project), Austria (H2Future

project) Germany (SALCOS project); partly supported by European funding.

Lastly, Hydrogen can be used as a green synthetic substitute for many different applications in the fuel and chemical sectors. Methanol, for example, is a liquid chemical with many different possibilities of application. Many projects are underway, globally, to assess and scale-up the potential of such synthetic fuels/chemicals such as the MefCO₂ (synthesis of methanol from captured carbon dioxide using surplus electricity) and the Carbon2Chem (utilisation of steel mill waste gases) projects.

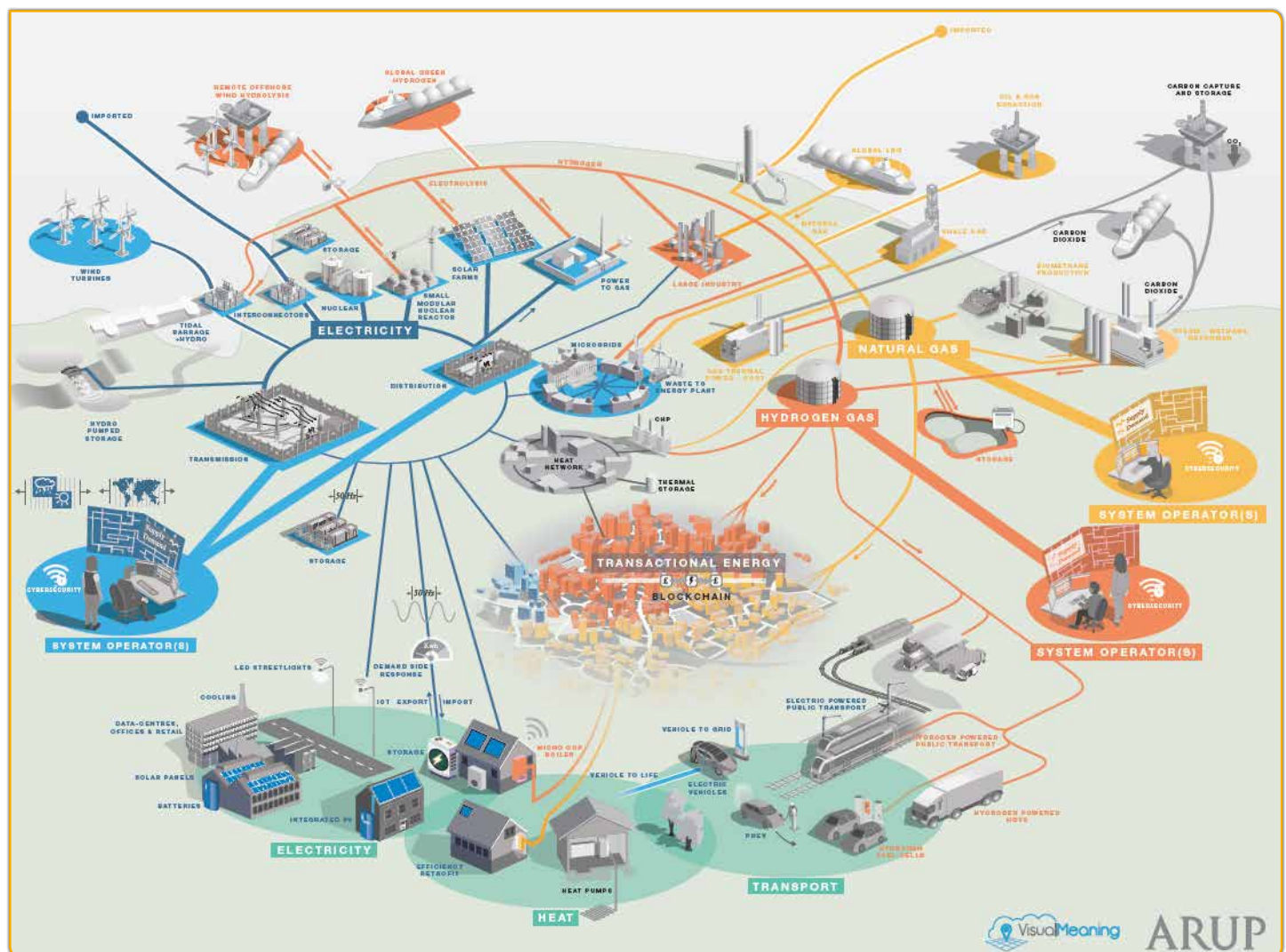
It is time that Europe not only gets away from the silo thinking of sectors but also from the old way of thinking that pushed for individualistic sector targets, e.g. energy efficiency increase in cars. The future system needs to be fully integrated to be truly efficient. The main issue is how does the whole system benefit from either using direct electricity or convert from it to hydrogen which can then be, for example, injected into the European gas grid.

This would allow Europe to not only keep its vast and integral assets functioning but also to use this gas to decarbonise energy-intensive industries such as steel, cement or refineries and increase its energy independence. Hydrogen, by enhancing grid balancing, can be a systemic factor in a deeply decarbonised society. It is, therefore, an integral part of the grid and, hence, of system efficiency.

Hydrogen Europe

Hydrogen Europe is the European Hydrogen and Fuel Cell Association. It currently represents more than 115 industry companies, more than 65 research organizations as well as 11 National Associations. The association partners with the European Commission in the innovation programme Fuel Cells and Hydrogen Joint Undertaking (FCH JU).

For more information, please visit www.hydrogeneurope.eu.



Future energy system

Credits: "Energy systems: A view from 2035 What will a future energy market look like?", ARUP

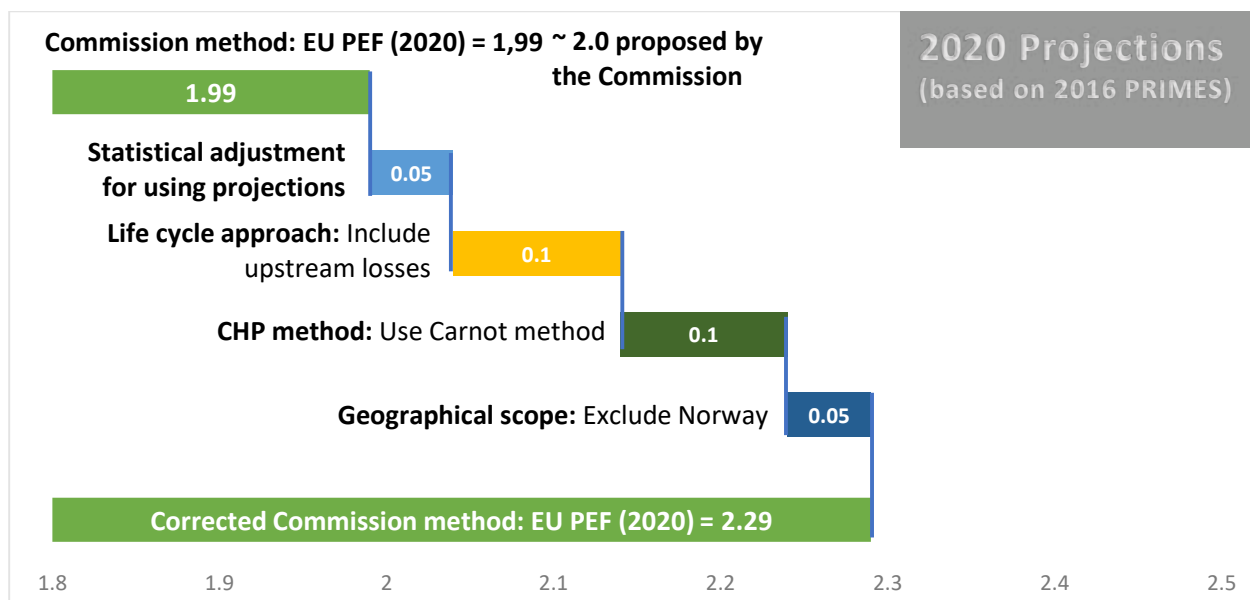
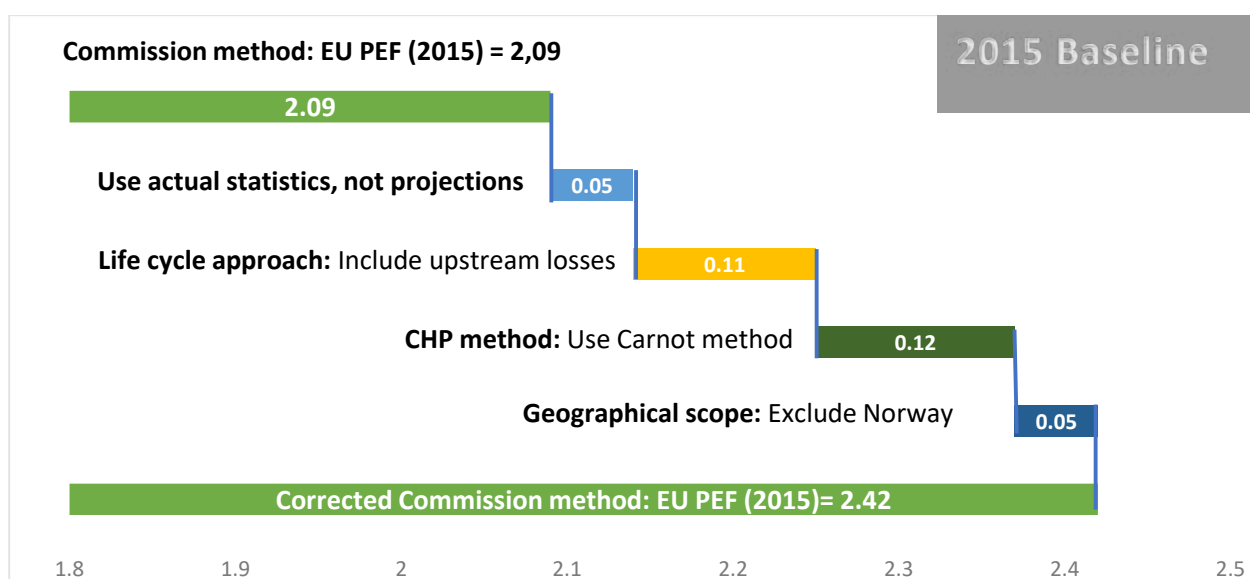


EU primary energy factor for electricity – Getting the methodology right

27 March 2018

The EU Primary Energy Factor for Electricity (EU PEF) value of 2.0, proposed by the European Commission in the 2016 review of the Energy Efficiency Directive (EED), reflects several inaccurate methodology choices, disregarding recognised standards and undermining the ultimate objectives of the EED to deliver energy savings across the entire energy value chain.

Below are showed the impacts on the proposed EU PEF when improving the Commission's methodology:



While recognising that methodologies to calculate the EU PEF may differ, corrections performed for key assumptions in the European Commission methodology reveal that **2.3 is a more appropriate value for the average annual EU PEF in the EED** than the 2.0 proposed by the European Commission.

Outside the EED, i.e. for legislation related to buildings and space heating, an adapted approach and a dedicated impact assessment will be needed to determine the appropriate PEF, in order to account for the seasonality of heat and the marginal impact of additional electric heating in the energy system.

Corrected Commission assumptions leading to a revised EU PEF in EED from 2.0 to 2.3

- **Using statistics will always be more accurate than projections (2.0 corrected upwards by 0.05 or more):** to calculate the PEF, the Commission chose to use the 2016 PRIMES projections for 2020, instead of the latest statistics. Using the latest statistics accompanied with a regular update of the EU PEF will better reflect the actual energy mix. Correcting for the gap between projections and statistics would account for at least an additional 0.05 in the EU PEF.
- **Including upstream energy losses (2.0 corrected upwards by 0.10 or more):** Upstream energy losses (before the point of generation) should be included for a more accurate assessment of the whole energy system efficiency. This will allow for more exact choices by policy-makers, consumers and better planning for energy savings. The Commission excluded from its final analysis upstream losses (e.g. approx. 10% for fossil energy sources and approx. 15% for biomass sources), despite established European standards documenting these losses¹ and despite the fact that these losses were included in the analysis done by the consortium appointed by the Commission to assess and propose a revised EU PEF in EED². The application of the upstream chain also ensures that there is a fair differentiation between fossil fuel energy sources (PEF of 1.1 upstream) and non-combustible RES, e.g. PV, hydropower, wind, normally associated with no losses (i.e. PEF of 1.0)
- **Using the recognised Carnot method to account for cogeneration in the mix (2.0 corrected upwards by 0.10 or more):** The allocation of energy savings from cogeneration must fairly account for the efficiency gains from the electricity produced by cogeneration. The Commission chose the Finish method, against experts' advice, which over-allocates energy savings delivered by cogeneration installations to the electricity output compared to the heat output. Also, the Finish method cannot be correctly applied to the different cogeneration technologies included in the Eurostat data. Because it ensures better allocation of efficiency gains from the use of cogeneration, the Carnot method benefits from wide industry recognition and is legally backed by Annex 6 of the Renewable Energy Directive recast.
- **Clarifying the geographical scope (2.0 corrected upwards by 0.05):** Additional resources were allocated to include Norway in the EU PEF calculation, as Norway is not normally included in the PRIMES projections and an extra database was required. This choice seems arbitrary at best, given that EU countries engage in cross border electricity trade with several non-EU countries. In addition, in Norway 97% of the electricity mix is based on hydro-power (equivalent to a PEF of 1.0), so this country should be treated as an outlier. Otherwise all non-EU countries connected to the European Continental Synchronous Area (e.g. Serbia) should also be included for consistency reasons.

In addition to the above corrections resulting in a EU PEF of 2.3 in the EED, when carrying out comparison among heating technologies a seasonal marginal PEF is more appropriate instead of the annual average PEF in the EED.

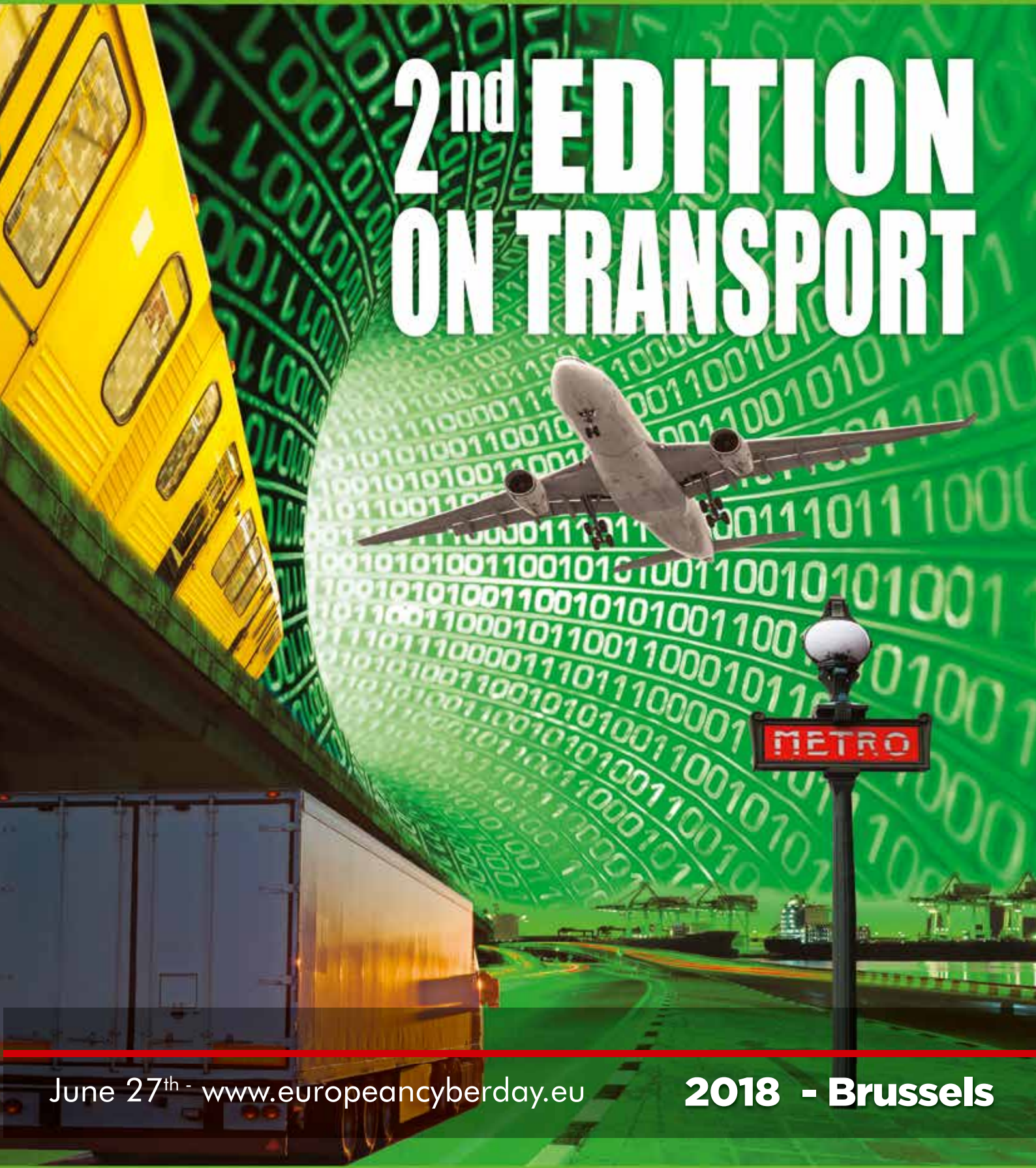
- **Seasonal instead of annual PEF (2.3 corrected upwards):** The electricity supplied for electric heaters coincides with the winter peak demand (heat consumption is at least 2 times higher than average electricity consumption) and thus a seasonal PEF is more appropriate for space heaters.
- **Marginal instead of average PEF (2.3 corrected upwards):** When switching to electricity-based heating, the additional electricity demand will not be covered by renewable energies and base load power plants, but mainly by (marginal) less efficient and more polluting peak load plants (mostly gas and oil turbines), which will adjust their power generation accordingly. Therefore, the marginal PEF is more appropriate for space heaters to reflect the use of a less efficient energy mix.

¹ ISO 52000-1 on the calculation of the energy performance of buildings, CEN mandate M/480 implementing EPBD

² Consortium Led by Fraunhofer ISI. See Discussion paper for the REVIEW OF THE DEFAULT PRIMARY ENERGY FACTOR (PEF) REFLECTING THE ESTIMATED AVERAGE EU GENERATION EFFICIENCY REFERRED TO IN ANNEX IV OF DIRECTIVE 2012/27/EU AND POSSIBLE EXTENSION OF THE APPROACH TO OTHER ENERGY CARRIERS, 19/05/2016

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