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ACHIEVE EUROPEAN GLOBAL LEADERSHIP IN RENEWABLE ENERGY



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EDITORIAL

The European Union's ability to shape and stimulate the Energy Sector has matured since the previous energy directives and the energy and climate objectives set for 2020. With the Clean Energy for All Europeans package adopted by the Commission last November, the Energy policies and goals are revised in an ambitious way to match the accelerated progress and technological development made in recent past. The European Commission is well aware that the current framework needs to be more ambitious to further develop renewable energy sources beyond 2020 and integrate their growing share in the energy sector. It also sets the objective of achieving global leadership in renewable energies. Therefore, as part of its package, the Commission put forwards a regulatory framework to support the development of renewables and proposed a binding renewable target at EU-level of at least 27% by 2030. By 2030, it is estimated that 50% of the EU electricity will be generated by variable renewables.

To implement the Energy Union framework strategy, the Commission is pushing forward the deployment of renewable energies to meet the objectives of a sustainable, secure and affordable energy. It focuses on six areas of action centered on facilitating the deployment of renewables in the Electricity sector, providing Heating and Cooling sectors with mainstream renewable sources, decarbonizing Transportation, all while keeping consumers informed and strengthening EU bioenergy

standards. All of this with the caveat of being cost effective and through timely action plans. This issue of the European Files explores commitments made by the European Commission as well as the pioneering sectors that are crucial to the success of the decarbonisation of the economy and the EU leadership in renewable energies.

This ambitious approach is crucially about taking the renewable market to the next level. As prices fall for installation, the market must be adapted to distribute these new sources of energy. Furthermore, consumers should be able to take full advantage of the savings made as the market develops into a more cost-efficient and transparent one. There is also a security component, as Europe would for instance reduce its dependency on gas imports for Heating and Cooling.

Tackling energy consumption in the transport sector requires a strong strategy involving several pioneering industries and policies. To reduce the overwhelming dependence on fossil fuels, the European Commission is promoting a cocktail of biofuels, electricity, and other low-emission alternatives to bolsters its larger transportation network. This will require a comprehensive action plan to not only reduce the emissions of vehicles as units, but also transportation networks as a flow of these units.

Improving the quality and pricing of energy for consumers is a priority within each area

of action. The new market and its regulation should empower citizens to organize, review, and take full advantage of the renewable networks in development. In addition to the environmental benefits of reduced carbon emissions, the renewables industry is an innovative chain that can support as much as 2 million employees in Europe by 2030, or twice as much as the level of today.

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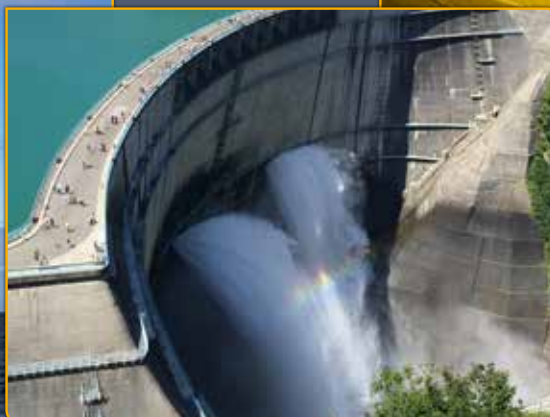
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Achieve European Global Leadership in Renewable Energy

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Achieving European Global Leadership in Renewable Energy



Miguel ARIAS CAÑETE

*Commissioner Climate Action & Energy,
European Commission*

The Paris Agreement represents a historic milestone in the fight against climate change, and its ratification sent a strong signal that the world is moving towards a global clean energy transition, a transition that is already underway and that is unstoppable. During last November's COP 23 in Bonn and during the One Planet Summit organized by President Macron last month in Paris, it was confirmed what we already knew; the European Union will continue to lead the way in the fight against climate change and in the clean energy transition.

And we are leading by example, through some of the most ambitious climate commitments and policies in the world and through continued support to the poor and vulnerable; we can't forget that the EU and its Member States are the biggest contributors of climate finance to developing countries globally. Implementing the Paris Agreement is not only a matter of a responsible climate change policy. It also represents an enormous opportunity for EU businesses to maintain and exploit their first mover advantage when fostering renewable energy, energy efficiency, and competing on the development of other low carbon technology market globally.

Renewables will be the cornerstone to Europe's transition to a low-carbon society. By 2030 half of the electricity generated in Europe will be renewable, and the system should be fully decarbonised by 2050. The transformation of global power markets is already ongoing; in

2015 renewable energy surpassed for the first time coal as main source of power capacity, and the renewable energy sector employed over 1.1 million people in Europe and created a turnover of around € 153 billion¹. We can see that the share of renewables in the EU energy mix continues to rise. With a 16.7% in 2015, we are on track to reach our 2020 target of 20%.

However, whichever way we look at it, the energy system of tomorrow will have to look completely different to how it does now, and this implies very significant challenges to be addressed. Among them, the need for a stable regulatory framework that enables the development of renewable energy at the lowest possible cost.

This is why on November 2016 the European Commission presented the Clean Energy Package for All Europeans. The Package proposes a wide range of measures to keep the European Union competitive as the clean energy transition changes global energy markets. Achieving global leadership in renewable energies is at the centre of this package, setting a target to collectively reach a share of at least 27% renewables in the final energy consumption by 2030.

The Renewable Energy Directive of the Package includes general principles that Member States should follow when designing support schemes. While providing certainty to investors, support schemes must be cost-effective and market oriented. The aim is to ensure their stability, bring down the costs of deploying renewables and make our renewable energy policy a truly European one.

Furthermore, the Directive fosters the mainstreaming of renewables in the heating and cooling sector, and acknowledges that consumers are the drivers of the energy transition. For instance, it enables consumers to self-consume renewable electricity without facing undue restrictions, and ensure that they are remunerated for the electricity they feed into the grid.

The clearer legal framework provided by the new directive will remove uncertainties for investors, and reduce administrative burdens and costs, while keeping us on track to meeting our climate and energy targets. This will bring benefits for producers, investors

and consumers: renewable energy technology suppliers will keep a leadership role; costs of renewables supply chains will be lowered and consumers will see the benefits on their bills. From an economic perspective, this package goes beyond energy: it's an opportunity for investments, growth and jobs.

The negotiations on the Clean Energy for All Europeans Package are advancing and it is now up to the co-legislators to finalise these. If we want to secure a global number one position, we need to remain very ambitious on the Renewables Directive, and this will be the number one priority for the Commission during the negotiations.

Thanks to renewables, Europe could save around € 60 billion per year by 2030 in terms of avoided fossil fuel imports; this is the equivalent to the current GDP of Luxembourg. But if we want to achieve a fully decarbonized electricity system, we have to integrate the growing amount of renewable energy into the electricity grid without distorting the European electricity market. Boosting the necessary infrastructure to assure Europe's security of supply is crucial; and as highways do not stop at national borders, neither should cables.

The main tool for reaching our target of 15% electricity interconnection by 2030 is by rapidly building the necessary cross-border infrastructure links that connect the energy systems of EU countries. Last November the Commission presented its third list of Projects of Common Interest (PCIs), 173 projects, of which 110 are electricity and smart grids projects, that will help better integrating the renewables potential of countries and reduce current barriers to trade with neighbouring Member States. All these projects benefit from accelerated licensing procedures, improved regulatory conditions, and in some instances have access to financial support. The PCI list completes the regulatory proposals of the Clean Energy Package with a clean infrastructure dimension.

As the European Commissioner for Climate Action and Energy, I am deeply convinced that the adoption of all these measures will help us achieve our ambitious decarbonisation objectives. But it will also allow the European Union to lead the renewable energies sector globally.

¹ EurObserv'ER, The State of Renewable Energies in Europe – 2016 Edition

Ambitious targets for a carbon-free EU



José BLANCO LOPEZ

MEP (S&D), Rapporteur for the directive on the promotion of the use of energy from renewable sources, Member of the ITRE Committee

Over the past months, we have witnessed one of the most intense and devastating hurricane seasons ever known. It's also been the season with the strongest hurricane ever recorded in the Atlantic Ocean. On the other hand, July has been the warmest month since records exist. And in the very same Europe we live in, we've suffered in Spain and in Portugal the disastrous effects of severe drought and forest fires.

The estimated annual global cost of natural disasters amounts to some \$500 billion. The number of refugees exceeds 65 million people, 20 million of them due to climate change. If not significant steps are taken to reverse this phenomenon, sea levels could rise by two metres. It's also worth recalling that two thirds of humanity lives in coastal areas.

Some may not want to face the reality of climate change. But its effects beat us. Every day more virulently. Every day more lethally.

We are living at a crucial moment, one of those moments when we have real capacity to determine the future we want for ourselves and for the next generations.

Just two years ago, we sent in Paris a strong message to our fellow citizens: we cannot just carry on. We cannot continue to consume natural resources or to base our development on fossil fuels that threaten the future of our

planet. We must stop global warming and we have to do it now.

That was the message of the Paris Agreement, a historic agreement since it shows all nations' commitment to fight climate change.

Moreover, notwithstanding the United States' withdrawal from the Agreement, the whole world has ratified this commitment, with the European Union at the forefront.

But the fight against climate change is not about big words but about deeds.

I share the philosophy behind the clean energy package. In fact, I strongly believe that it is a comprehensive initiative which tries to face the challenge of climate change. But it falls short.

If we want to boost the energy transition and to reduce our greenhouse gases emissions by at least 40% by 2030, we need to do more.

I believe that the renewable energy directive plays a crucial role in all this, but it needs real ambition. Otherwise, it risks getting outdated before coming into force.

As Parliament's rapporteur for this directive, I think that the 27% target put forward by the Commission taking account of the Council proposal is poor.

First, it does not reflect the sharp drop in costs that renewable technologies have experienced in recent years. Moreover, it is absolutely insufficient to meet our commitments as reflected in the Paris Agreement.

That is also the case in the heating and cooling and transport sectors, which are crucial to achieve the goals in the field of decarbonisation since they concentrate most of the energy consumption.

And more effort is needed in the field of self-consumption. While sharing its recognition as a right, I belong to those who believe that there's more to be done.

That's why I strongly believe that the Industry and Energy Committee has taken a

step in the right direction. On November 28th we sent a strong message by setting a binding target of at least 35% of renewable energy across the EU, backed by a large majority. That's the ambition we need in order to fulfil our Paris commitments, to fight climate change and to lead the energy transition.

The Industry and Energy Committee also wants to reinforce self-consumption as a right –guaranteeing, for example, that self-consumers are entitled to consume their self-generated renewable electricity, which remains within their premises, without liability for any charge, fee or tax–; to bring security and certainty to investors –ensuring, for example, that regulatory changes do not have a negative impact on the economics of the supported projects or, in such cases, guaranteeing a compensation–; to raise the ambition for decarbonising the transport sector –raising the suppliers obligation or the sectoral target–, as well as the heating and cooling sectors –doubling the objective–.

As the International Renewable Energy Agency (IRENA) has calculated in a recent study, the EU can double its renewables share from 17% in 2015 to 34% in 2030 in a cost-effective manner. It could be even higher if we rise our energy efficiency target to 40%, as ITRE Committee recommended.

Studies like this one show that the commitment to renewable energies can no longer be considered in terms of cost, but in terms of investment. Investment with environmental benefits, of course, but also in technological development, job creation and economic growth, energy independence and competitiveness.

Therefore, it's high time to remove barriers, provide legal security and promote renewables.

Let's take advantage of the maturity they have achieved in order to realize the Union's energy transition towards a decarbonized economy which will boost ecological growth.

I hope that the European Parliament, the Council and the Commission will be up to the task.

Business as usual is not an option.

Stronger Together: strong, transparent, multi-layer governance to incorporate the Paris Agreement into EU law



Claude TURMES

MEP (Group of the Greens/European Free Alliance), Member of the ITRE Committee

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. It also requires more structured regional and macro-regional cooperation between Member States. The mobilisation of all forces at sub-national, national and supra-national levels constitutes the multi-layer governance called for by the Parliament in the Governance Regulation.

One of the cornerstones of a new governance of the Energy Union should be carbon budget. Carbon budget states the amount of greenhouse gases that can still be emitted in the atmosphere in order to limit global warming to well below 2 degrees, and even to 1.5 degrees. 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. A "delayed approach" as proposed by the Commission would result in necessary sharper cuts later on, leading to a very steep and unrealistic decarbonisation pathway during the following decade.

Another crucial aspect in the energy governance is a European methane strategy. 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.

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. The Energy Efficiency First principle will remain a key policy instrument, so that energy consumption will decrease despite the rapid growth in renewables.

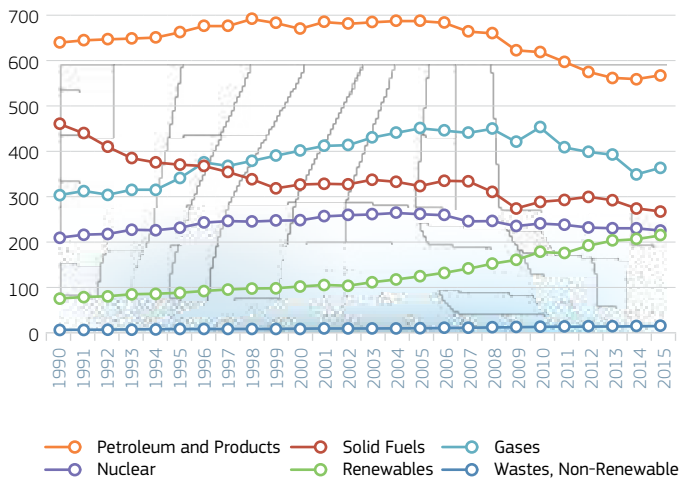
The energy transition does no longer concern only businesses and industry. The new governance mobilises stakeholders from the grassroots level of citizens and cities up to regional, national and EU level. Centralised energy production has prevailed as an energy system for a long time, but the recent 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. These 'prosumers' should be duly recognised and encouraged to self-generate by providing secure assistance such as appropriate support schemes, priority access and dispatch to the grid, and a fair contribution to network management costs. Furthermore, 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. 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.

Finally, one of the most important aspirations of the new energy governance is enhancing cooperation of Member States through macro-regional partnerships. Structured macro-regional cooperation is a catalyst that would favour the completion of a 100% renewable energy system. In the future, there must therefore be strong and highly structured regional cooperation in the areas of Northern Seas, the Baltic Sea, South-East Europe, Central-Western Europe and the Mediterranean basin. The partnerships will identify renewable energy projects of Energy Union interest, which are projects involving at least two Member States gathered in a cooperation and having a significant cross-border impact, and should be supported by a dedicated financial platform and legislation that facilitates working together at regional level.

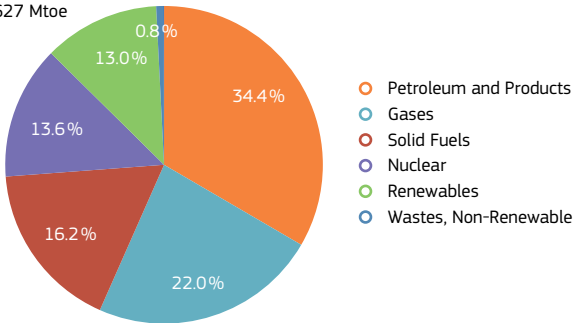
Gross Inland Consumption

BY FUEL – EU-28 – 1990-2015 (Mtoe)



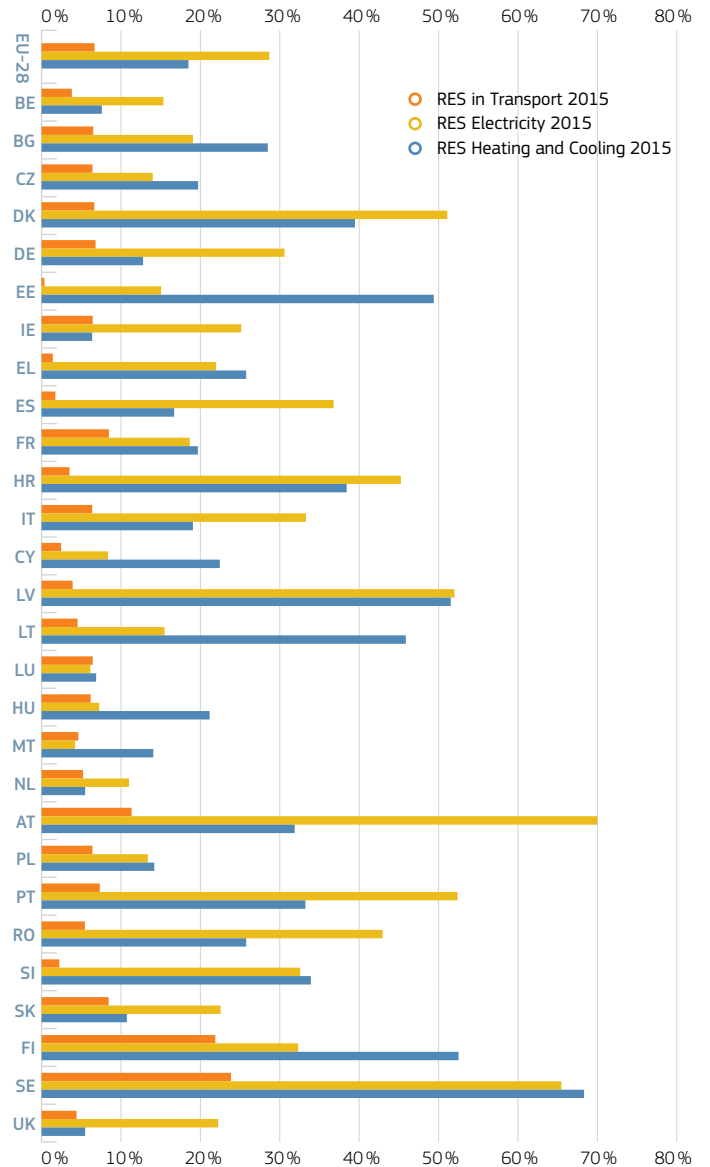
GROSS INLAND CONSUMPTION – BY FUEL – EU-28 – 2015 (% TOTAL)

Total = 1627 Mtoe



Renewable Energy Shares

RES SHARES IN HEATING AND COOLING, ELECTRICITY, AND TRANSPORT – 2015 (%)



* In Gross Final Energy Consumption.

Source: Eurostat-SHARES, March 2017
Methodology and Notes: See Appendix 13 – No 1

Source: Eurostat, May 2017
Methodology and Notes: See Appendix 13 – No 2

Renewable energies: the best competitive option



Dominique RISTORI
Director-General DG Energy,
European Commission

In the context of a successful implementation of the Paris Agreement the energy transition is a clear priority. Indeed, two thirds of greenhouse gas emission are related to the production and use of energy.

Europe is already playing a leading role in the clean energy transition. It has managed to successfully decouple its greenhouse gas emissions from its economic growth. Between 1990 and 2016 greenhouse gas emissions in the European Union were reduced by 23% while the economy grew by 53% over the same period, showing that growth and decarbonisation can go hand in hand.

Beyond the decarbonisation objective, the technology towards the clean energy transition represents an important economic opportunity. It is a source of growth and jobs and it can contribute to the creation of a strong and competitive industrial basis in Europe.

In this context, renewable energies are an important driver and impressive progress has been made demonstrating European leadership in this sector and in the implementation of the Paris Agreement. Indeed, the EU is on track to meet its 2020 energy objectives and the renewable energy sector accounts for almost 1.1 million jobs in Europe representing a turnover of over €150 billion. EU companies have a share of 30% of all patents for renewable technologies.

Renewables are also playing a growing role in the electricity sector and are now representing 30% of the electricity produced in Europe. These positive trends have been supported by the European regulatory framework as well as by rapidly decreasing costs of renewable energy technologies. For instance, the cost of offshore wind set at €150/MWh a few years ago is now around €60/MWh in the Netherlands and in Denmark. Renewable energy projects with tenders relying only on the wholesale price and no longer on subsidies are now being developed in Europe. This is the case for instance of a solar power plant in Ourique, Portugal. In general, the cost of solar power has decreased significantly in the recent past.

But if Europe wants to remain at the forefront of the clean energy transition and maintain its leadership further efforts are needed as other important economies are now developing at full-speed renewable energies.

For this purpose, the Commission adopted the Clean Energy for All Europeans package which is now being negotiated by the co-legislators, with the support of the Commission. This package sets Europe on the right path to modernise the energy system, decarbonise the economy and unlock the growth and jobs potential of the energy transition.

It puts in place the right regulatory framework to incentivise investments towards renewable energies and ensure their secure, competitive and cost-effective deployment and integration in the whole energy system. Such regulatory framework will ensure reaching the at least 27% renewable energy target in the final energy consumption at EU-level by 2030, providing investors' certainty and visibility. It moves away from national targets and contributes to the progressive Europeanisation of renewable energy policy, thus setting the conditions for sustained investments and opportunities in bigger markets going beyond national borders. This is also further facilitated by the proposed measures to adapt support to renewable energy, ensuring its progressive cross-border opening and putting an end to retroactive changes.

The new rules also enable consumers and renewable energy communities to produce, sell or store their own renewable electricity, allowing them to play a central role in the energy transition.

At the same time, it is important to adapt and modernise the electricity system in order to integrate in a secure and cost-effective way the growing share of variable and distributed renewable energy. Indeed by 2030, 50% of the electricity produced in Europe will be coming from renewable energy and already today more than 90% of renewable electricity is connected to distribution grids in Europe. Therefore, the EU proposes measures to adapt the electricity market design so that it becomes more flexible and reacts more quickly. It also facilitates the integration of digital technology to increase the intelligence of the energy system.

This package also seizes the new economic opportunities for renewable energies and ensures their deployment in sectors such as transport and heating and cooling where important potential remains untapped.

Beyond the regulatory framework, the Commission is supporting the development of renewable energies through specific instruments and initiatives. For instance, the Clean EU Energy Islands Initiative will accelerate their deployment in Islands. Islands should become pioneers and leaders of the energy transition and not followers. This will also contribute to boost their economic activity and benefit their local population.

In addition, the Commission is strongly supporting the development of innovative renewable energy solutions such as geothermal, tidal and marine energies that contribute to the EU competitiveness and global leadership in low-carbon solutions. The Commission is setting up a Clean Energy Industrial Forum where industry, research and innovation, social partners and consumers associations will join forces to boost the EU's industrial basis and stimulate investment, growth and jobs in Europe.

In summary, renewable energies represent a clear and profitable economic opportunity while contributing to decarbonisation. It is therefore key to maintain a high level of ambition during the negotiation process of the Clean Energy for All Europeans package if we want to reap all the benefits of the energy transition in terms of decarbonisation, security, competitiveness, industrial leadership and well-being for our citizens.

Renewables and gas: the perfect match for low carbon electricity in Europe



Philippe SAUQUET

*President Gas, Renewables and Power
Total*

The enabling regulatory European framework for 2020-2030 with the Clean Energy package for all Europeans is in its final stage of discussion in the European institutions and 2018 will see it materialize. This coming decade will see the deployment of three major trends:

First, the acceleration in the deployment of Variable Renewable Energy sources (VRE) will require a much more flexible, integrated and connected electric system if the proposed targets for 2030 are to be met. Flexibility will have to come from all components of the system. The retirement of coal power generation from the grid will have to be compensated by low carbon sources essentially gas and renewables. Such combination gas & VRE offers the best electricity mix both in terms of air quality, CO₂ emissions and flexibility management at multiple time scale. Demand side management is certainly a promising source of short term flexibility to be scaled up. The continuous decrease of battery storage costs will also allow the addition of flexibility components at the VRE site but also in the grid and at the consumer home or consuming company site. The development of smart transportation and distribution network will be the final enabler of this future low carbon electricity system.

Second, this transformation will require and trigger innovation in all parts of the energy

system. Technological innovation has already given many impressive results and we expect this to continue for the next decade at least. Solar is becoming the cheapest way of producing electricity in a large part of southern Europe. The scale up of VRE will also depend of the adaptation of financial instruments to the specificities of VRE (Capex upfront, zero marginal cost). But generation is far from being the end of the story. Innovation is also underway in the marketing of electricity. The customer, whether industrial, commercial or residential, needs to receive the right price signal in a much more dynamic way so he may react by adapting its consumption/production/storage profile.

The development of digital marketplace platforms is already providing citizens with a new seamless and user friendly customer experience and services. New players like Total Spring are entering this completely new game without any legacy and transform the scenery. These new generation of players will aggregate the production from multiple sources and multiple technologies and be able to give the best market value to these sources by combining them with production forecast, battery storage, LNG terminals or electrical mobility services.

Finally, this distributed and digital energy revolution is massively shifting the energy perspective for the individual citizen. Now able to gain control on its energy footprint the citizen has new expectations. He is given the new opportunity to decide to produce and consume its own cleaner energy. A lot remains to be done in the fields of hybrid generation and storage, in the domain of the Internet of things (IOT), in the development of the algorithms that will constantly update the network data and the home data, the controllers that will decide where each electron should be sent, and how millions of these smaller sites will be combined to create the virtual power plant that will combine its production with existing centralized power plants

Total has decided to be part of this adventure. We believe that the scaling up in the global energy systems provides opportunities for innovative solutions to be offered to companies and individual customers. Combining the strength of LNG fast developing applications in transportation, SunPower in

cells & module technology, Saft in battery storage systems, Total solar and Total EREN in renewable project development, Total new branch Gas Renewable and Power aims to become a worldwide top player in this global energy system disruptive conversion. Twenty years down the road these new businesses should represent 20% of Total worldwide activities.

Besides, in the renewable, Total is also a large player in the biofuels area: 1st biodiesel distributor in Europe, world class HVO (Hydrotreated Vegetable Oil) producer in La Mède in France as of summer 2018. Moreover we invested more than 500 M€ in R&D and demonstrators on the development of new biofuels based on a wider type of resources (such as forest and agricultural residues), and new type of processes either bio-based (lignocelluloses deconstruction & fermentation) or thermochemical. We are convinced that conventional biofuels, combining all the available solutions in a sustainable way, are already a very important solution to decarbonize the transport to achieve the 2030 European target. The new generation of biofuels is not yet ready to be economically developed and scaled up against the end of the current biofuels. Hence, both are complementary and needed.

To be able to trigger this transformation of our business models, it is essential that the European energy package as it will be decided at the end of 2018 provides the right policy framework with ambitious targets for low carbon technologies and renewables, removing barriers opposing the new model but also we need EU to allow for the right price signal for the CO₂ emissions. Without a proper price for CO₂ emissions, at least 20€/t, in the power generation, the Energy package will not deliver the required pace of transformation as recommended in the One Climate Summit in Paris in December.

Accelerating clean Energy Innovation



Jerzy BUZEK

MEP (EPP Group), Chair of the ITRE Committee

Innovation holds the key to European Union's prosperity and global relevance over the next decades. This is true for all policy areas, but in particular those on which the EU's single market and real economy are founded.

With energy being the "bloodstream" of EU's economy, we have by now put in place the fundamental building blocks of our Energy Union. Thus, as a matter of overarching importance, we now need to accelerate clean energy innovation. On it depends the EU's global industrial competitiveness, sustainable growth and high-value jobs, as well as our success in making the transition to low-emission, high-efficiency economy and strengthening our energy security and independence.

Recognising these horizontal implications, European Commission proposed a comprehensive framework for accelerating EU's energy-related research and innovation deployment. Against EU's current energy innovation landscape shaped by global commitments of the Paris Agreement and the Union's ambitions of an energy transition towards more consumer-oriented, decentralised, digitalized systems, we need to brace ourselves for the profound change not only in the way we produce, transmit, use and store energy, but in the way we live and behave. The challenge of making this far-reaching socio-economic transformation into a true opportunity requires policies and instruments that are future-proof and responsive but at the

same time create predictability and long-term certainty necessary for making a major leap in energy research and successfully deploying innovation.

One of our key tasks in setting the right framework that would boost innovation in this field is to ensure coherence of EU's actions. This is about stable, long-term policy vision that brings together its different strands. With available surveys showing that highest value potential in clean energy innovation for the EU are likely to come from non-technology specific, systemic solutions, it is crucial that our efforts in research, energy, digital technologies, transport, regional policy, services, manufacturing, reindustrialisation and others are mutually reinforcing.

The right policy framework must go hand in hand with targeted incentives, improving legibility of financial instruments and mobilising patient equity capital. We must seek effective coordination of EU and national programmes to avoid duplication and ensure most effective use of existing research infrastructure and resources. All these are crucial for maximising the market uptake of new energy technologies, services, solutions, and by this - EU industry's ability to succeed on global markets.

As Parliament's rapporteur for the 7th Framework Programme I was intent on introducing a strong energy-dimension in EU's research and innovation efforts. This priority has been maintained under Horizon 2020 and must remain so under the next Framework Programme. I am convinced that an ambitious next Framework Programme (2021-2027) must play a crucial role in accelerating clean energy innovation. By saying "ambitious" I mean FP9 with an increased overall budget of at least €120bln and the proposition of energy-related financing increased by no less than 50%.

Naturally, we need also equity capital and we will not succeed without strong involvement of the private sector. Here we face a unique opportunity to look for "out-of-the-box" proposals for financing of energy innovation. Coordinating efforts with global partners, through Mission Innovation as well as the various coalitions and initiatives that were born of the Paris Agreement is one path. Crowdfunding has already proved effective in allowing various

projects to take shape and could also serve as a tool in giving our citizens a more direct role in energy innovation.

This brings me to the most fundamental issue - the role of citizens in energy transformation and in driving innovation. With energy systems becoming more dispersed and centred on prosumers, the energy landscape in general is becoming more democratic. This is true not only in production and consumption, but in new services and solutions, in the way we design and apply energy innovation.

EU's efforts at accelerating clean energy innovation will only succeed if we fully understand the mindset transition that European will have to make. This is no longer a matter of better awareness and understanding of policies and processes. With modern IT technologies and digitalisation fostering decentralisation of systems and opening ever new ways of engaging citizens, all Europeans will also gradually become more actively involved in steering energy innovation. As with all social processes, this will be a long one and we must address it through systemic education and engagement schemes. I am convinced that this process will play an increasingly important role in the coming years.

Effects of the transformation of our energy system will reach well beyond economics. Mobilising EU's unique potential to innovate across all energy sectors, and perhaps particularly in horizontal, systemic solutions, offers the best chance for us to turn the challenges of this transformation into a springboard for our secure and sustainable growth, EU's global industrial leadership, as well as a key building block of an engaged, knowledge-based society of tomorrow. This is what is at stake - sustained prosperity of our Union, and our citizens.

Obsession with targets, resistance against liberalisation



Hans-Olaf HENKEL

MEP (European Conservatives and Reformists Group), Vice-Chair of the ITRE Committee

The Single Market is the greatest achievement of the EU. In fact, without it there would be no EU. The Energy Union, a single market including energy, is therefore exactly the right goal the Commission is aspiring to! But the Commission has also a problem: on the one hand, we want the European internal energy market as it exists with other goods and services, on the other hand, we say that every Member State should be allowed to decide on its own energy mix. This is a contradiction that always comes up in these discussions.

If you want to give up the principle of subsidiarity, because you think you can do it better at EU level, then the Commission has to make a case and prove the added value and

not those who want to maintain the status quo. We believe that the Commission has a good case here with the Winter Package to prove that. We do not want to achieve only more competition and better prices for consumers but also ensure security of supply. In Europe, goods and services are traded across borders. The energy networks, however, are organised nationally. The Commission now wants to work with this proposal for a competitive, better integrated, functioning market. I believe that in the electricity sector, regional and European solutions should be sought that enable Member States to make the most efficient use of combined generation surpluses and prevent risks related to blackouts. But it also needs a coordinated approach at EU level and functioning voting mechanisms and regulatory measures.

Last month's vote on the renewable energy directive (recast) pleased some people with its "higher ambitions" and "increased targets". Yet, this is actually quite irrelevant when you look at the wider problems facing the EU's energy market. We have targets for emissions, efficiency, renewables and interconnectors but when we look around there is nobody shouting in favour of liberalisation! Where are the advocates for liberalisation, self-responsibility and competitiveness in the European Parliament?

In Europe, we are proud of our common market and the four freedoms. Yet, the road to a common European energy market is a bumpy one. We praise the benefits of regional coordination but on our entire continent only a handful countries cooperate. On our entire

continent only Sweden and Norway cooperate on energy and Germany and Denmark do so because they feel forced to do so. Despite our interconnection target, the physical flow between member states remains very low. While working on two legislative energy files, I have seen that regardless of whether we are speaking of Berlin, Paris or Warsaw, to the vast majority particular national, protectionist interest matter most. The physical flow between member states remains very low, as these introduce regulatory barriers or use the "security of supply" argument. A fully liberalised energy market is the only way to create competitive energy prices, phase out subsidies, increase competition and drive investments in new sources of supply.

The Winter Package contains many elements intended to promote the liberalisation of the electricity market. However, the Commission faces strong resistance from the Member States, which continue to protect their own markets through protectionism. The opening up of support schemes to other member states coupled with stronger regional cooperation would be the first step in the right direction! Also, the role and responsibilities of the regional coordination centres need to be defined clearly. Finally, we need a European supervisory authority to ensure proper and fair competition. Let us all progress towards the common goal of achieving an Energy Union with a robust energy mix ensuring security of supply greater regional cooperation and greater competitiveness delivering better prices for our industries and all European consumers.



Clean electricity as a key element of the EU climate strategy



Ignacio S. Galán

Chairman & CEO of Iberdrola

The current energy system, which is based on burning fossil fuels, is the main cause of climate change and air pollution. It also accounts for the European Union's high level of energy dependence, with imports meeting 54% of European energy needs.

There is a general consensus that the solution to this main threat to humanity is to speed up the decarbonisation of the economy, promoting an energy transition towards a renewable-based energy model.

The European Union is right therefore to consider changing its energy model, with a drastic reduction in the use of fossil fuels. It is proposing to reduce CO₂ emissions by 40% by 2030, and between 80 and 95% by 2050. Furthermore, energy efficiency targets are being set out for 2030 (around a 30% improvement), as are objectives for renewable energy promotion (foreseeably greater than 27% of the share of final energy consumption). For instance, the "Clean energy for all Europeans" package, supported by Vice-President Šefčovič and Commissioner Arias Cañete, lays the groundwork for a new, secure, sustainable and competitive energy model, in accordance with the aims of the Energy Union, although its final content must still be adopted by the Parliament and the Council.

Furthermore, with the recent reform of the Directive on the EU emissions trading scheme, which has already been agreed between the Parliament and the Council, Europe is seeking

to reaffirm its climate change leadership by improving the design of the CO₂ market and creating long-term signals to incentivise investments in low-carbon technologies. In the same vein, the Clean Mobility Package, which has been proposed by the Commission, consists of measures promoting more sustainable transport and thus helping to meet the binding targets of the Paris Agreement.

Increasing the electrification of the economy is the main route to covering the expected strong growth in global energy demand whilst, at the same time, also meeting international emissions reduction commitments. Despite being responsible for only 25% of global emissions, the electricity sector has great potential for further emissions reduction. Effective solutions are available to achieve this, such as replacing fossil fuel sources with renewables.

In Europe, the electricity sector is the one with the most rapid progress in the introduction of clean energy. Today, renewables account for almost 29% of power generation, but there is only a 17% share of renewables in final energy consumption, and less than 7% in transport. Nonetheless, renewables could easily account for 35% of final energy consumption by 2030 thanks to a sustained increase of their share in electricity, and may even become the predominant source of electrical power by 2050.

An electrical mix based fundamentally on renewables would also require an increase in energy storage capacity, both large-scale

(via pumped-storage hydroelectricity) and through batteries connected to the grid. Additionally, the deployment of ever more digitised grids will not only enable the efficient integration of renewable energy into the electricity system, but will also provide us with the necessary infrastructure to make progress on the decarbonisation of other industries such as transport (by promoting the use of electric vehicles), or buildings (with the increasing proliferation of smart demand-management technologies). To improve the sustainability of buildings, it will be key to substitute conventional boilers with heat pumps.

To achieve these ambitious goals, it will be necessary to have clear energy policies setting out a vision with long-term signals, including in relation to the future of coal power generation and an orderly phase out of nuclear. It will also be essential to establish a market design enabling the availability of firm and flexible power to guarantee the system's reliability at all times. Likewise, stable and predictable regulation is required to incentivise the necessary investments in grids, along with an electricity tariff system that appropriately reflects the real costs of producing, distributing and supplying electricity to customers, eliminating the current surcharges that are unrelated to supply.

An effective way to appropriately harness and direct the energy transformation across different sectors of the economy would be to implement environmental tax reform that applies the "polluter pays" principle (as



is already done in some European countries). This sort of reform would mean that, via taxes, polluting activities would internalise the costs of the damage they cause to society that they are not paying today, and the resulting revenues could be used to reduce other, less efficient taxes, such as on labour or income.

This development of the energy model will allow better price signals and messages to be conveyed both to investors and consumers, putting the European economy on track to participate in the new global markets of the future. Ultimately, all of these questions will need to be addressed when developing a decarbonisation strategy for the European economy with a 2050 horizon, turning the energy transition into a unique opportunity to advance not only towards a sustainable development model -with environmental, economic and social benefits -but also in terms of public health, thanks to a decrease in the level of air pollution.

Iberdrola is fully committed to contributing to a sustainable and competitive energy model for everyone. Nearly two decades ago, we decided to back strongly clean energy, as we were aware that mass use of fossil fuels was not sustainable. This decision enabled us to become pioneers in the development of renewables, and to position ourselves fifteen years early in a sector that was just finding its feet.

Since then, we have invested tens of billions of Euros in renewable energy – onshore and offshore wind energy and hydroelectric power – as well as in the grids needed to integrate them, and in storage. This pioneering commitment to clean energy has made us one of the world leaders, with a renewable capacity of almost 30,000 MW. We are now the number one wind power producer in the world. We also have a storage capacity of 4,500 MW provided by hydroelectric pumps, which equates to five million household batteries.

To be consistent with this strategy, Iberdrola has closed fifteen coal and fuel oil plants since 2001 all over the world, totalling approximately 7,500 MW, and we intend to continue this process in an orderly fashion over the coming years.

Thanks to this commitment to decarbonise our energy mix, two thirds of our installed capacity does not emit CO₂ into the atmosphere. This has enabled us to reduce our emissions in Europe by 75% since 2000, making our specific emissions 67% lower than average amongst our peers in continental Europe. But we want to go even further, and that is why we have set ourselves the target of a 50% reduction in emissions by 2030 compared to 2007 levels.

We have launched an investment programme of 25 billion Euros until 2020, which



Whitelee onshore windfarm (UK)

is mainly aimed at electricity transmission and distribution grids, hydroelectric storage and renewable energy, with strong support for offshore wind. We will also continue developing business projects that create value for all of our interest groups and seek to maximise our social dividends, as stated in the company by-laws.

The development of this strategy has also made us a leader in sustainable and less costly finance with long-term maturities, having raised 7.2 billion Euros in green bonds, loans

and hybrids which are being allocated to sustainable and socially responsible projects.

At Iberdrola, we will continue proving that the achievement of business objectives, the creation of jobs and wealth for society, and the fight against climate change, are all fully compatible when words are backed up by actions.



Villarino hydroelectric power plant (Spain)

Financing the Energy Transition



Seán KELLY

MEP (EPP Group) Member of the ITRE Committee

In 2015 in Paris, I was honoured to be present as the famous agreement was reached to keep global average temperature increases to well below 2°C and to pursue efforts to limit this to 1.5°C. This was an historic deal and one that has set the tone for our work on climate-related issues in the European Parliament over the past couple of years. There is no doubt that efforts and improvements are required right across the board and across all sectors to ensure we meet this important challenge.

The decarbonisation of the energy sector will be particularly crucial for the achievement of our Paris goal. It is vital that we now accelerate the move away from our current system, which is largely based on fossil fuels, towards a cleaner and more efficient system with a high share of renewable energy. How we drive investments into this energy transition has been a question long associated with this challenge, and through our work in Parliament on the Clean Energy Package, we are attempting to lay the foundations for this to be done.

First and foremost, policy ambition is key to increasing investment in this area. As EPP Group shadow rapporteur in the European Parliament on the Renewable Energy Directive, it is obvious to me that we need to give an ambitious signal to investors that the EU will support the increased deployment of renewable energy up to 2030 and beyond. This is why Parliament is calling for a more ambitious renewable energy target of 35%, compared to the 27% target that was specified in the October 2014 Council Conclusions. This

ambitious target, combined with Parliament's calls for the development of renewable energy communities, the empowerment of citizens who wish to generate and consume their own energy, and a streamlined approach to the renewable energy permit granting process across the EU, will drive investment into the EU renewable energy sector, leading to more and more deployment of the clean technologies we need to meet our Paris objective.

In terms of mobilising finance, the European Fund for Strategic Investments (EFSI) has the potential to really boost the level of investment in this sector. Just recently we approved in Parliament the extension of EFSI up to the end of 2020. "EFSI 2.0" increases the EU guarantee from €16 to 26 billion and EIB capital from €5 to 7.5 billion. This will mobilize investments amounting to €500 billion by 2020. What is particularly relevant for the energy transition is that it has been agreed that EFSI 2.0 should focus even more on sustainable investments across all sectors to ensure that we meet our climate targets. 40% of EFSI projects under the infrastructure and innovation windows should therefore be for this purpose.

I see great potential in EFSI to accelerate the energy transition, and that is why over the last 12 months I have been organising workshops in my constituency for investors to get more information on how to access the instrument. Europe doesn't face a lack of liquidity, but a lack of risk financing - the money is there if we can mobilise it. EFSI can lower the perceived risk of renewables and energy efficiency projects, for example, and so I am encouraging more and more potential investors to capitalise on the opportunities it offers.

A further area in which financing is important is in the area of Research and Development. As we move from Horizon 2020 to the next EU R&D Framework Programme (FP9) it will be absolutely crucial that we keep in mind President Juncker's goal for EU to be the world leader in Renewable Energy Technologies. Today, European companies hold around 40% of all patents for renewable energy technologies. Additionally, we are world leaders in offshore wind, ocean energy and concentrated solar power. If we are to maintain leadership in these technologies, and indeed gain leadership in others, it is absolutely vital that funding is provided to our researchers and experts to develop the clean technologies that we will need in the coming years. It is clear that we will continue to increase the level

of renewables on the grid, and so developing the technologies to keep the grid efficient and facilitate more intermittent renewables is crucial.

We should also remember that the benefits of this investment are not exclusively climate-related; such investment also brings significant job creation. The European Renewable Energy sector already employs around 1.2 million people. Increasing our renewable energy share means new jobs with new skills, and there is huge potential in this regard if we keep the ambition high.

In conclusion, in my view there are several important aspects to be considered in terms of financing the energy transition. Firstly, it is important to note that public support is a necessity at least in the short term. Renewables, particularly less mature forms, face an uphill challenge to usurp market incumbents, and so well-designed, efficient and competitive support schemes should be used to get more renewable technologies to market. Secondly, the policy signals we give at EU level have a crucial role to play in attracting investment into Europe. By adopting an ambitious renewable energy target, we will give certainty to the market, and more installations will be deployed. Thirdly, EU initiatives such as EFSI, which seeks to leverage risk and mobilise investment into the market, and the forthcoming FP9, which will support the development of key technologies, have a vitally important role to play in pushing forward the energy transition.

As work on the Clean Energy Package continues here in Parliament, I look forward to working hard in support of this important objective in the months to come.

Why European buildings hold the key to sustainability



Bendt BENDTSEN

MEP (EPP Group) - Rapporteur for the revision of the Directive for Energy Performance of Buildings, Member of the ITRE Committee

EU imports 50 % of the energy we spend - mainly from Russia and the Middle East in the shape of fossil fuels - meaning we devote more than 1 bio. Euro on energy imports daily.

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 moreover energy inefficient, it is clear that buildings hold the key to turn Europe more sustainable and geopolitically more independent.

Clearly, it also became increasingly relevant to harvest these "low hanging fruits" with the commitments that EU set itself - including the goals of the Paris COP21 agreement of 2015.

Revising the Directive for Energy Performance of Buildings (EPBD) is therefore of significant importance. As a part of the Clean Energy for All Europeans package from November 2016, the Commission proposed a revision of the existing Directive. It was clear that the current framework mainly focused on ensuring highly efficient new buildings, but new buildings only come at a rate of roughly 1 % a year in Europe. By revising EPBD, we want to make sure that existing buildings are also improved.

And, improving the efficiency of existing buildings comes with the added opportunity to create better living and working conditions for Europeans, as well as increasing the value and resilience of our building stock.

The Parliament stands united behind a call to use the EPBD to turn the European building stock both highly energy efficient and decarbonised by 2050.

However, in the current negotiations with Member States, the European Parliament meets national energy ministers who reject most of obvious tools for improvement. For example, the ministers remain convinced that the national long-term renovation strategies should not be too prescriptive nor too committing.

From the Parliament's side, we acknowledge the need for strategies based on national specificities, but we also recognise the importance of investor certainty and long-term planning, so a clear signal of priority is needed. We also notice patterns across Europe that requires actions - such as examples of market failures that stop the needed renovations from taking place, even when the benefits are clear. This concerns, for example, split-incentive households and multi-family dwellings.

And while renewable sources play an important role in the decarbonisation efforts, roll-out of renewables is a two-faced solution. On the one hand, renewable sources are also precious sources and too valuable to be wasted. On the other hand, efforts to become more energy efficient should obviously focus on saving on the least sustainable sources first - that is just good logic.

In Parliament, we aim at closing some of the loopholes in the current legislation that may lead to wasting sources or undermining incentives - for example when a building using renewable sources automatically looks more energy efficient on paper, than it is in practice, simply because of the source. In practice, consumers will - generally speaking - have to pay for their consumption no matter if their consumption is based on green or black sources. Therefore, giving a correct picture of the buildings energy needs and consumption

is at the forefront of the revision, to enable renovations to take place.

Energy efficiency improvements of our building stock is simply good business. And although I have encountered a huge interest in private investor participation - not least from institutional investors such as pension funds and mortgages banks - the clear policy commitment and the tools to bring the money to the market are simply not in place - yet.

To bring the needed change, we in Parliament will continue to use the negotiations to provide a new framework that will deliver the needed change: long-term commitment, investor certainty, clear incentives to renovate and easier access to financing tools. The return from the renovations that will follow is to the benefit of both citizens and businesses in Europe. Increased competitiveness in businesses and growth in the building sector providing non-outsourcable jobs, particularly in SMEs. For European citizens: Lower energy bills, healthier homes and a better climate for the future.

A win-win.

Public Funding for More Energy Efficient Cities



Holger MATTHÄUS

President, Senator for Buildings and Environment, City of Rostock, Germany



Tine HEYSE

President, Mayor for Environment, Climate, Energy and North-South, City of Ghent, Belgium

With some 70% of Europe's population residing in cities, the imperative for climate action on the local level is strong. Revisions to the Clean Energy for All Europeans package have reinforced the importance of cities in Energy Union governance as well as the role they will play in helping to meet European climate and energy goals on renewable energy and energy efficiency. Through the EU Covenant of Mayors, cities are expected to contribute

nearly one third (31%)¹ of the EU's 2020 emission reduction commitment. Unfortunately, increasing pressures on public budgets and shifting political priorities are unnecessarily hampering much needed municipal

¹ EU Invests in the Planet: Ten Initiatives for a Modern and Clean Economy. The Juncker Commission's contribution to the One Planet Summit, Paris, 12 December 2017

climate action. It is becoming increasingly clear that the envisaged ambition cannot be met by public funding alone – a fact acknowledged by the EU's Smart Finance for Smart Buildings initiative. Public spending must be supported by capital and commitments from the private sector. Fortunately, there are a variety of initiatives aiming to do just this.

Local and regional one-stop-shops are, for example, one way to aggregate energy savings opportunities and bundle financial, technical, procurement and contracting advice for energy savings programmes on public buildings and homes. Examples of this approach in practice can be seen in the municipalities of Rhodope (Bulgaria), Murcia (Spain) and Liege (Belgium). Climate Alliance's work with these cities via the Cityinvest project has resulted in concrete guidance and recommendations so that others may follow their path.

Other efforts on boosting public spending potential in the arena of energy savings are being made via the EU Urban Agenda Energy Transition Partnership, coordinated in part by the Climate Alliance member city of Roeselare (Belgium). The Partnership works to overcome barriers to the local energy transition and to gather information on available funding sources.

At European level, funding for cities and regions is also being reinforced. The recent



Ghent

announcement of the URBIS advisory facility is welcome, as is the reinforcement of ELENA technical assistance funding to help cities prepare projects for investment. Support for smaller municipalities to get their sustainable energy investment projects off the ground, however, is lacking.

Remediating this and improving public financing for energy efficiency overall will require a number of changes. The following five recommendations for policy makers, drawn from the experiences of the Cityinvest project, are key to supporting the financing of the energy transition at local level:

To EU leaders | Raise awareness to accelerate take-up of existing funds

Public funds for energy efficiency projects can be of great value to local governments. However, there is too little awareness or understanding of the financial support the EU can provide. More resources should therefore be made available to develop capacity-building and awareness-raising programmes.

To EU Leaders | Make technical assistance accessible for all

Launching innovative financing schemes often requires an increase in local governments' expertise, in order to carry out in-depth studies to apply for grants, for instance. This is very challenging for smaller municipalities, and therefore excludes them from the system. One effective way to get around this problem would be to create small-scale technical assistance facilities to guide smaller towns in their work.

To national leaders | Invest in regional one-stop shops

When there are different energy efficiency projects in one region, it makes sense to have a regional coordinating body to connect the different local governments to the financial market. However, setting up such a structure requires financial resources. At national level, states should fix this by allocating more resources and best practice databases to set up regional one-stop shops.

To national and local leaders | Commit to clear plans to cut CO₂ emissions

Having a long-term strategy is essential when renovating the building stock, as well as a consistent carbon emission reduction policy. In fact, a lack of long-term plans and clear, consistent political commitment can strongly discourage private investors from financing projects



Photo by Héctor Martínez on Unsplash

with longer return on investment periods. A proven commitment to cutting carbon emissions is therefore essential. At the local level, joining initiatives such as the Covenant of Mayors and becoming a Climate Alliance member formalises such a commitment.

To local leaders | Create the ideal environment for people-based initiatives

Renewable Energy Cooperatives (REScoops) are instruments that finance energy efficiency projects via direct contributions by individuals. With the lack of a regulatory framework, REScoops are not sufficiently encouraged by local governments. Towns and cities

should improve their collaboration with REScoops, as they bring both financial and social benefits through active citizen participation.

Local leaders will meet in February 2018 to celebrate ten years of the EU Covenant of Mayors. For the first time, there will be a new Investment Forum event alongside the main ceremony. This will be a key moment for city leaders across Europe to show how they are leading the energy transition and bringing on new thinking about how to finance it. As UN Secretary General António Guterres said at the recent One Planet Summit, "Those who fail to engage with the green economy will be living a grey future".



Photo by Andrea Anastasakis on Unsplash

Renewable future in the energy sector: myths and reality



David BERMAN

Head of Group Public Affairs, Veolia

1. Challenges of greening of the heating sector

As COP 23 and the One Planet Summit just unfolded, it became evident that even with full implementation of current national pledges the world is currently heading towards a temperature rise over the 2 degree pathway mentioned in the Paris Agreement.

Against that backdrop, it is worth noting that up until recently European debates over energy transition have tended to be restricted to the greening of the power sector, while it is clear that **sustainability and low carbon intensity in the heat sector cannot simply be overlooked**. Indeed, according to the European Commission's own estimates, **heating and cooling Europe's buildings accounts for about half of our energy consumption** and energy transition in this specific sector remains a challenge that has yet to be addressed, considering that **renewables only account for 16% of energy consumption in this sector**.

In this regard, buildings need to be a priority area for policymakers, since they are responsible for 40% of the total energy consumption, while space heating and cooling can account for more than 80% of overall energy consumption, in particular in colder climates.

Electrification is often presented as a way to bring Europe closer to a decarbonized building stock. **Yet, electricity-based heating solutions are hardly a silver bullet**. First, the power sector is still facing a decarbonisation

challenge of its own and will also face additional demand especially from the transport sector.

To face the decarbonisation challenge in the heating & cooling sector and particularly in buildings, a wide variety of solutions will be needed. **Urban District Heating networks** are one of these. Even though district heating networks currently provide 9% of the EU's heating needs, this technology, if properly fostered and supported, can contribute to the greening of the heat sector in Europe, simultaneously improving energy efficiency and air quality.

In this regard, Veolia has been consistently investing in increasing the share of renewable energy sources in many of its installations, by converting fossil-fuel based networks to biomass, and integrating other sources of sustainable heat and electricity.

2. District Heating Networks (DHNs) – an optimal transition solution for a successful decarbonization

As opposed to other solutions such as heat pumps, district-based heating is the best adapted to **dense urban areas**. This is all

the more significant that a growing share of the world population lives in cities, including $\frac{3}{4}$ of Europeans. This dynamic is accompanied by expanding awareness of the advantages of district heating among public authorities, including in countries in which it was virtually nonexistent, such as the UK.

Another advantage of district heating technology stems from its flexibility, since **it can be designed or adapted to a diversified energy mix**, which includes biomass, incinerated waste and refuse-derived fuel (RDF), as well as waste heat from various sources processes such as power plants, data centers or even sewage treatment plants. This makes of DHN a particularly precious technological solution, especially in the view of greening the energy sources used, but also contributing to a **local circular economy** and to decentralised energy production.

Often district heating also brings more efficiency if compared to more polluting individual installations. This is because it is often coupled with **cogeneration** technology so as to provide, in addition to heat, a source of stable and local electricity. This cogenerated electricity is increasingly green, as in the last 10 years renewable cogeneration has doubled

In Pécs, a city of 150,000 inhabitants located in Hungary, Veolia turns wood and straw into energy, to power the city's district heating network and generate electricity. 400,000 metric tons of wood and 180,000 metric tons, both locally sourced are used to supply the city's heating network. Each year the city avoids the emission of 400 000 metric tons of CO₂.



and now accounts for 20% of today's cogeneration fuel mix – adding further to the decarbonisation goal. The use of **waste heat** also significantly reduces the final/primary energy ratio in DHN installations – a solution that is much less feasible at a level of individual flats.

More than efficiency, DHNs contribute in a massive proportion to **enhancing air quality**. In Poland, for instance, the gist of so-called “low emissions” comes from the aforementioned individual boilers that use low quality coal. Contrary to DHN installations, those are not covered by demanding air pollution standards stemming from the Industrial Emissions and Medium Combustion Plants Directives.

Last but not least, the use of renewable energy sources, such as biomass, in DHN ensures **security of energy supply** regardless of weather conditions, as opposed to renewable electricity-based solutions. District heating networks can also participate in grid balancing through heat storage.

Veolia's EcoDHN offer encapsulates all these features at the level of districts and cities. It has been successfully developed notably in Spain, Belgium or Hungary.

3. Renewables in the heating sector need an adequate regulatory framework

The November 2016 draft proposal for a recast of the Renewable Energy Directive, as a part of the Clean Energy Package, did indeed include an entire chapter dedicated to heating & cooling policy. It testified to the fact that EU institutions acknowledge the role of district

energy in the future and transformed energy system.

However, the **current triologue discussions will have to strengthen** both the Renewable and the Energy efficiency directive proposals, if the EU aims at having a 2030 policy framework that will genuinely contribute to the block's energy transition.

Regarding the Renewable directive, it is of utmost importance to make sure Member States implement a set of measures that will **systematically increase the share of renewable energy sources in the heating sector**, as proposed by the Commission. This obligation should not be watered down in the final negotiations. Also, in the framework of article 23, it should be possible to **reap the full benefits of waste heat recovery**. It would help substantially reduce CO2 emissions and optimize energy use, fully embodying the circular economy principle. The recast of the Renewable Energy Directive provides the opportunity to encourage equal treatment between renewables and waste heat, and for waste heat to be eligible as part of the measures aimed at increasing the share of energy from renewable sources in the building sector, including the annual target for heating and cooling (be it at level of 1% or 2% per year).

As for district heating and the smooth integration of renewables in their energy mix (article 24), **legal certainty** for both DHN operators and their customers is an imperative. The final version of the Directive should **not allow unconditioned disconnection** from non-efficient networks without disconnecting customers having bear the costs of their decision, and respecting the terms of contracts signed with the operator. Since DHNs are based on the economy of scale, each disconnection results in a higher heat price per kWh for remaining customers. By the same token, **unrestricted third party access to DHN for renewable generators would be equally damaging** for the entire balance of existing networks. It would undermine the optimization of the DHN model since it is first about optimizing the potential of locally available resources rather than serving as a carrier for different types of energy sources. Diversification and greening of energy sources in DHN installations should be carried out without replicating the electricity market model, which is less than adapted to the heat market, essentially local and fragmented in its very nature.

The revision of the Directive has also been an opportunity for the Commission to submit a set of criteria for sustainable production and use of biomass. It is **essential to make sure biomass exploited for instance in the heating sector is responsibly sourced, to limit an increasing pressure on forests** in Europe and globally. This is all the more that

bioenergy offers one of the most capital-efficient transitions from coal to renewables. That is why we favor an approach where biomass to be used for heating production comes mainly from waste products of wood exploitation.

In the Energy Efficiency Directive, an important stumbling block, which could prevent the development of green district energy has to do with the Primary Energy Factor (PEF) for electricity. In its proposal, the Commission had put forward a lower value of PEF - 2.0 (down from the current 2.5). A lower PEF value to take into account the growing share of renewables in the grid electricity makes sense. **Setting a standard PEF at a value of 2.3 would yet be more adequate** considering that the methodology used by the Commission neither adequately account for the role of CHP nor does it properly consider grid losses. A low PEF actually creates a bias towards the use of electricity-based heating solutions, while the Heating and Cooling Strategy was pointing out that a combination of various solutions would be required to successfully transform the Europe's heating sector.

Conclusion:

Electrification of various economic sectors will be key in bringing down Europe's CO2 emissions. However, the reality of the heat sector is that it is inherently different from the electricity market. Hence, the solutions for its decarbonization should be based on a sound evaluation of respective potential of existing and future technological options, rather than replicating what worked for the greening of the electricity grid. District Heating Networks are part of the solution - yet the integration of a variety of sustainable energy sources requires a reasonable regulatory framework, with flexible policy options for all stakeholders involved. The European Parliament and the Council's proposal go in the right direction. We now need to make sure the final deal on both Renewables and Energy Efficiency Directives enables DHNs to play their due role in the EU energy revolution.



Sustainable Investment in Renewable Energy



Patrizia TOIA

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

Today, investing in renewable energy does not just mean saving the planet, it also means saving European industry, jobs and our growth prospects. This is why, in November, at the Industry Committee of the European Parliament, of which I am vice-president, we voted to increase the European renewable energy target to be achieved by 2030 from 27% to 35%. It is the minimum required for the EU to meet its climate commitments under the Paris Agreement. A 10% 'flexibility' margin, included in the compromise amendments, also passed. This means that member states will be able to fall short of their targets in "exceptional and duly justified circumstances".

The first experiments for the production of electric energy with renewable sources date back to the late nineteenth century, but since the 1920s, some companies such as Parris-Dunn and Jacobs Wind-electric have built commercial turbines to produce up to 3 kilowatts. The first photovoltaic panels to commercially available are from Sharp and date back to 1963. Since then, the progress of these and other renewable technologies has been astonishing, as well as the steps forward in their commercialization. The cost of solar and wind power have been reduced by 70% and 25%, respectively, since 2010. Globally, renewables are expected to make up 40% of power generation by 2040. What has changed, however, is also the paradigm of politics. Years

ago renewable energy seemed like a dream for utopians and an investment destined to certain losses, today it is a very concrete industrial challenge on which the world powers of the United States, China and Japan are fighting.

In Europe we have many technological and industrial excellences and we have one of the richest markets on the planet to absorb and make grow these excellences, we just have to be careful not to throw away this heritage to pursue false neoliberalist myths. Technological revolutions are made with massive and courageous public investments, and with careful public policies of incentives and commercial protections.

The Italian-American economist Mariana Mazzucato explains this in his best-selling essay «The Entrepreneurial State». Without the massive public investment in research and innovation today we would not have the Internet, the iPhone, the iPad, the photovoltaic panels, the wind turbines, many of the most common drugs, the biotechnologies or the artificial intelligence. Steve Jobs was undoubtedly a genius who understood both engineering and design. Apple was undoubtedly a nimble innovator. But Apple's success would have been impossible without the active role of the state, the unacknowledged enabler of today's consumer-electronics revolution.

Just look at the exploit of Chinese photovoltaics to understand what is happening. China will install a third of the new solar and wind power in the coming decades. Changes to China's energy mix amid President Xi Jinping's push for an "energy revolution" have the potential to accelerate the global transition away from fossil fuels to clean energy sources, according to a new report from the International Energy Agency. Protesting against Chinese dumping practices is right but is not enough. We need to make a global competitive industrial policy for our strategic industries in Europe too. And to do this it's not enough to approve a measure or two, we need to create an entire ecosystem that favors a real industrial revolution towards a low-emission economy. Today it is not only environmentalists who ask us that, but also the six major European electric utilities, who in recent days have written a letter to the EU to have «higher

and more ambitious objectives», necessary to recover global leadership in the renewables sector and to relaunch «innovation, employment and economic growth». The letter, signed by six companies including Italy's Enel, Spain's Iberdrola and Britain's SSE, called for the current target of at least 27 percent of European Union energy consumption to come from renewable sources by 2030 to be raised to 35 percent. For this reason, in the Industry Committee we have also voted to increase the target of energy efficiency to be achieved by 2030 from the current 30% to 40%. It was a result that was not easy to obtain, as the conservatives of the EPP and the ECR group stood up against. However, the resolution passed with 33 votes in favor, 30 against and 2 abstentions and in January it will be up to the European Parliament plenary to vote. We have been accused by our colleagues from EPP of spreading fake news and of following an "utopian" idea of energy efficiency. I think that is "utopian" to cultivate the illusion that in the future we can continue to live, work and produce as we did up to now without radical changes. We have been very realistic, and we adopted our reports shortly after Commission energy commissioner Maroš Šefčovič admitted that a sharp decline in renewable energy price meant that a 30% target was now "affordable". The truth is that today when it comes to renewables, the real divisions are not anymore between environmentalists and industrialists, but between progressives and conservatives.

New renewable energy rules should opt for gradual moves on biofuels



Giuseppe RICCI

Chief Refining & Marketing Officer, Eni

While it is sensible to phase out first-generation biofuels, the transition to advanced ones must be gradual

After the 2008 economic crisis, the refining industry was an ailing business. The drop in diesel and petrol demand had thrown the industry into a chronic overcapacity, especially in Europe, leading to the closure of 17 refineries. In Italy, consumption dropped by more than 20%.

Instead of following the trend and shutting our plants, we invested half a billion euros and converted two of our historical refineries into bio-refineries, in a first-of-a-kind operation. It worked: today, our plant near Venice produces 320,000 tons of biofuel a year, and Gela, in Sicily, will add next year an extra 560,000 tons, for a total equivalent to roughly 20,000 barrels of oil per day. They can process both so-called first-generation and advanced feedstock.

Europe's encouraging stance on the use of biofuels to cut greenhouse gas emissions in transport was crucial to supporting our decision. In 2009, the Renewable Energy Directive set a 2020 target of 10% of renewable energy in the total energy consumed in the transport sector. Biofuels were the most obvious tool to meet that target. While the rules made no difference in terms of feedstock, they did include a voluntary scheme to certify

their sustainability (our bio-refineries only use certified biomass.)

But that optimism was reversed when the EU began to fear that any benefit was being lost, as farmers around the world were cutting forests and destroying other CO₂-capturing land to produce the feedstock for some of Europe's most popular biofuels. As first-generation biofuels (those whose feedstock can also be consumed as human food, like corn, sugar cane, soybeans or palm oil) turned from friends to foes, in 2015 the EU approved new legislation (the Indirect Land Use Change, or ILUC, Directive) limiting their contribution to 7 percentage points of the original 10% target.

Now, EU lawmakers are leaning on more sustainable biofuels – for example used cooking oil and animal fats – and advanced biofuels – for example algae and lignocellulosic biomass like starch, for which however the technology is not yet available at industrial scale. They are discussing a proposed update to the Renewable Energy Directive that would boost their use, while further limiting that of first generation starting in 2020.

The proposal could radically change the role of biofuels, reversing a policy that in nine years has created a valuable market in Europe and raising the risk of missing the goal of decarbonizing transport.

While it is sensible to phase out first-generation biofuels, the transition to advanced ones must be gradual. Technology to process them is ready – and our bio-refineries are the perfect example – but the feedstock is still too limited to support large scale production.

If they are serious about the EU meeting its decarbonization targets for transport, while preserving a prosperous market that it contributed to create, lawmakers have a few crucial decisions to take.

As they negotiate the text of the new Renewable Energy Directive, they should, first of all, keep a specific target of at least 10% of renewable energy in transport, assuring continuity with the original legislation.

Second, they should keep a 7% cap level for first-generation biofuels in transport over the

course of the period 2021-2030. This would allow building on the investments made to reach the challenging emission reduction targets.

Third, they should remove the cap on certain types of waste and residues as feedstock. Waste oils and animal fats are, as of today, virtually the only widely-available alternative to food crops. The new rules should also be clearer and more flexible on how get a feedstock recognized as advanced, moving beyond the rigid list under discussion today.

Lastly, the new rules should encourage the use of biofuels in other sectors, while providing flexibility on the use of advanced ones. They should for example support more strongly the use of biofuels in aviation.

The transition to a renewable based Energy Union



Pilar DEL CASTILLO

MEP (EPP Group) Member of the ITRE Committee

The transition to a European Energy Union based on renewable energy can be seen as one of Europe's greatest current challenges. This transition is leading to a number of complex situations in the energy sector. In this regard, while the cost reduction of renewable technologies has exponentially increased installed renewable capacities, the friction with the current energy system is becoming evident to the extent that it can be argued that it is currently not fit to accommodate the volume of renewables needed to achieve our 2050 decarbonization targets.

Indeed, we are encountering challenges such as; negative wholesale prices, questions related to fairness and cost-effectiveness, or situations where, due to the fact that the cost of wind

and solar energy has fallen rapidly to levels comparable to those of traditional sources, problems are emerging for many traditional electricity producers across Europe that are, still today, an integral part of the national energy mix and necessary to guarantee the security of energy supply.

Rightly so the transition from a traditional power system, composed by relatively few large generators that feed into the transmission network and the energy is transported down to consumers through the distribution system, into a renewable energy-based power system, constitutes a major paradigm change to which we must adapt. There is no other choice, the transformation of global power markets is ongoing. According to the International Energy Agency, renewable energy surpassed coal as main source of power capacity in 2015. In 2030, half of the EU's electricity generation will come from renewables. By 2050 our electricity should be completely carbon-free.

In this context, and with a horizontal approach, on the 30 November 2016, the European Commission presented a new package of measures with the goal of providing the stable legislative framework needed to facilitate the clean energy transition. Having set the achievement of global leadership in renewable energies, together with putting energy efficiency first, as well as providing a fair deal for consumers, as the three main goals of the package, the 'Clean Energy for All Europeans' proposals (under discussion in the European Parliament at the moment of writing this contribution), must help the

EU energy sector become fit for purpose. Making it more stable, more competitive, and more sustainable to the current and future renewable needs and commitments.

In other words, the transformation of Europe's energy system, and consequently the Clean Energy Package, must take into account factors such as that the typical renewable plant size is much smaller than those of conventional thermal energy plants, and consequently will increase the number of points where energy is fed-in into the system. In addition, a large part of this energy will be fed in at the distribution level, especially the case for solar energy. This, together with the need to deal with foreseen and unforeseen fluctuations in consumption and, more importantly, renewable production, makes a certain level of flexibility needed. Flexibility from, the offer and demand side, and flexibility provided by the adequate infrastructure.

Regarding the need for flexibility on the offer, and while in principle a renewable power system reduces the consumption of fossil fuels, we must not forget that even in high renewable scenarios, fossil fuel plants, such as gas-fired back-up plants may be a cost-effective way of guaranteeing electricity supply during renewable "droughts"..

This is specially the case in a context where projections of alternative to fossil fuel back-up plants, such as bio-fuel based plants are, according to ENTSO-E, still modest

Likewise, large-scale storage capacity mechanisms, such as combined European



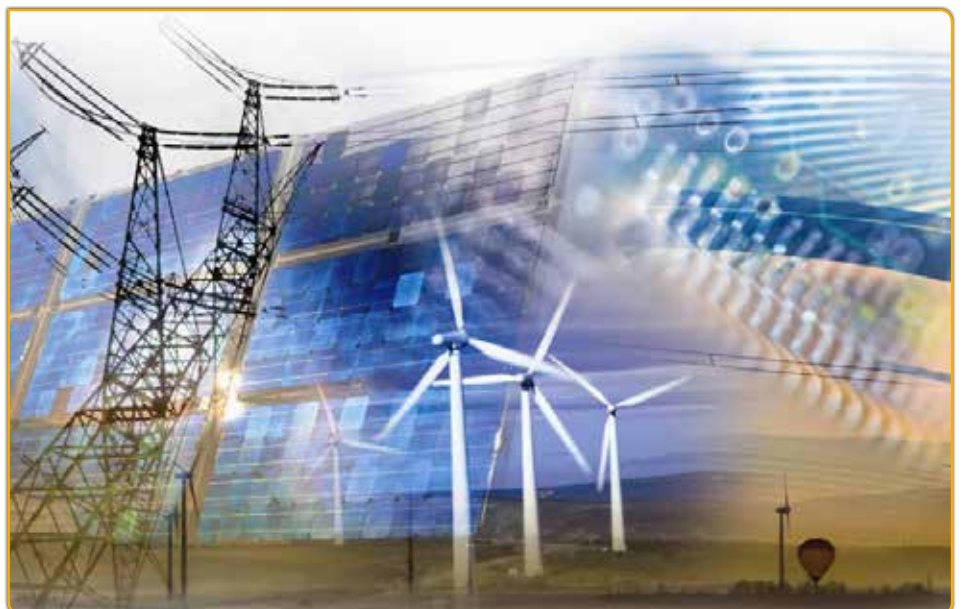
pumped hydro capacity are not sufficient for meeting the very large storage that might be required. Regarding battery storage, while it is considered to have great potential, today the costs, performance and lifespan of commercially available batteries would need to be enhanced further to play a key role in high renewable energy systems.

In order to make the transition to a renewable-based energy system, there is also a need to achieve sufficient flexibility from the demand side. In this regard, the potential of new technologies to create an electricity demand that can be shifted in time to anticipate or react to certain signals, is crucial. Consumers must become the drivers of energy transition. New technologies like smart grids, smart homes, increasingly competitive roof-top solar panels and battery storage solutions make it, already today, possible for energy consumers to become active players on the market.

Thirdly, the flexibility provided by the adequate infrastructure would allow integrating more renewables into the energy markets while at the same time boost security of electricity supply. In other words the European Union must give priority to the European Council conclusions of October 2014 and guarantee a sufficient degree of cross-border electricity interconnections leaving no energy island behind inside the EU.

Indeed strong transmission interconnections can increase the flexibility of the power system and achieve measurable savings in peak capacity needs. Beyond the primary concern of securing energy supply, a truly interconnected EU would increase the efficient management of variable renewable power sources like solar and wind. Indeed renewable energy patterns exhibit considerable variability due to the existing disparity between renewable production patterns and, economic structure and climate across various regions. Surely, for example, linking winter peak-demand regions with summer peak-demand regions, or regions in different time zones, would provide important benefits by smoothing seasonal and daily peak-load variability.

In conclusion, the outcome of the Clean Energy Package will be an important tool in the transition to a renewable based EU that must fully seize the potential that a European Union composed of 27 Member States has to offer by reflecting the need for flexibility. In doing so, it must achieve a more integrated approach where technical and institutional issues are treated in a coherent manner.



Smart Energy for Europe: it's all about the interaction



Frauke THIES

Executive Director, Smart Energy Europe

When Europe established its 2020 objectives for the energy transition ten years ago, much of the debate was focussed on the shift of energy resources, away from polluting fossil fuels towards cleaner renewable alternatives. Only few would have expected the entire sector, and its prevalent business models, to change so fast with it. In fact, when the Smart Energy Demand Coalition set out to establish the demand-side as an interactive part of the energy value chain, the system was characterised by centralised supplies, delivered uni-directionally to largely passive consumers. Electricity, heating and transport were separate sectors with very little interaction. Today, it is commonly accepted that the new energy world is different.

On the technology side, we see decentralised generation go along not only with the rapid evolution of storage technologies, but also the automation of devices, allowing for demand response and technology interaction at various levels. The integration and increasing electrification of transport and heating, so called 'sector coupling', is advancing. Automotive manufacturers are cooperating or even integrating with heating and solar companies to promote interactive solutions. Smart appliances and building automation optimise consumers' energy use, offering both comfort and the ability to adjust to signals from the grid.

Services have moved beyond simple supply. Digitally-enabled business models have emerged from the need for facilitation, aggregation and

market-placement of energy and services from distributed resources. For example, companies specialise in the identification of flexibility resources in large production sites, helping consumers make use of their potentials. Others provide residential energy users with solutions to optimise their local power production or the use of their heat pump. Many of the service providers themselves make use of digital service platforms enabling their business.

Coupled with this, the roles of the different actors can no longer be classified as they were. While network operation remains a contained role, the distinction between generators, suppliers and consumers has given way to new concepts and combinations. Consumers are becoming generators, asset owners may be individuals, communities or pension funds, and new service providers have entered the market. We are seeing traditional energy companies with previous portfolios of coal or gas generation, selling off their assets and investing in the management of decentralised solutions and services. New market entrants like independent aggregators are establishing themselves as important players, and traditional manufacturing, telecommunications and IT companies are entering the energy space.

With the changing realities of the energy system, regulation must also adapt. Decentralised solutions are a central part of the Clean Energy Package currently under negotiation in Brussels. An updated market design that enables the efficient uptake of demand response, storage and distributed generation is on the table, including proposals to open the markets for innovative products and service providers. For example, consumers should have the right to choose dynamic pricing offers or engage in self-generation, buildings should become smarter and be certified as such, aggregators should be given non-discriminatory conditions to provide their services to consumers, and distribution system operators are encouraged to source efficient flexibility services from the market.

A new topography for the energy system?

Is the top-down approach to the energy system now giving way to a bottom-up approach? Some current trends suggest so. Driven by existing market rules and incentive structures, many prosumers using the new opportunities of self-generation and on-site flexibilities, choose to go off-grid or minimise interaction with the system, rather than participating proactively. But make no mistake!

Decentralisation does not require fragmentation and autonomisation. A sustainable, decentralised energy system will build on an integrated perspective: Consumers, prosumers and asset owners should be able to use and sell their energy and flexibility resources wherever they are most valuable at any moment. This means moving beyond silos of demand or supply, local-level or system-level optimisation of resources. In such integrated markets, distributed energy and flexibility supplies and services could be used at every level and purchased by all different actors – Distribution and Transmission System Operators as well as all market participants. For this to succeed, markets and products must be streamlined between the local and regional level, between the provision of services for system operation and energy supplies.

The creation of a smart integrated system also means that taxes, levies and grid-charges must be revisited, encouraging smart interaction rather than pushing users away from the system. If, in many European countries, over two-thirds of a consumer's energy bill consists of flat taxes, levies and charges that are based on the kilowatt-hours consumed, grid defection is a natural reaction. Different options should be explored to overcome this effect: Levies could be linked to the point of fuel consumption, rather than final electricity. Taxes, which have been linked with the volumes of electricity, could instead be based on purchasing price. Finally, if users can earn back part of their network charges or benefit by selling services to the system, monetising their energy and flexibility, they will tend to remain connected, contributing to a sustainable, cost-effective and increasingly decentralised energy system.

In this context, digital solutions will not only support the provision of services to the system, but they are essential also for the operation of markets and platforms. The market integration and evolution of new and innovative products on the power exchanges and the trialling of new approaches to service acquisition by Transmission and Distribution System Operators gives reason to be optimistic for the next steps.

In an increasingly decentralised, decarbonised energy system, we need the digitally enabled interaction of millions of demand and supply assets and solutions. This requires an integrated perspective - and this why the Smart Energy Demand Coalition, SEDC has become Smart Energy Europe, smartEn.

Energy Transition: No new leadership without territorial partnerships



Eckart WÜRZNER

Mayor of Heidelberg and President of Energy Cities

The EU is redesigning its energy policy in a context where its unity and stability have been shaken by the Brexit and are further put into question by regional tensions and identity crises within its member states.

The solution to bring back this cohesion and sense of shared destiny is understanding that the energy transition is not a competition to win. That it is more than an endless race to provide the cheapest greener energy. Rather, it is about writing a new chapter of our socio-economic history, centred on mutual interest and win-win cooperation.

Towards a new economic model

Beyond going on a full carbon or fossil fuel detox, the EU as a whole needs to promote the wide-ranging structural reforms that will accelerate the emergence of a new socio-economic model, most adapted to today's challenges and realities. The shift from an extractive to a redistributive development model presents a whole new set of opportunities. It can help diversify the European economy by involving new market participants and create virtuous economic circles and opportunities relying more on local resources, services, funding and know-how. This is very true in the energy landscape, where local authorities and energy cooperatives manage to avert capital flight outside of their communities by pooling local savings and revenues towards sustainable energy projects.

To give a solid chance for this new economic model to emerge, the EU will need to foster cross-sector partnerships and activities around the energy transition. This notably calls for a support programme for the creation of integrated "Transition Agencies" in the next EU budget. This will provide us cities with much needed spaces for territorial intelligence, partnerships and entrepreneurship around the energy transition.

Why Territorial Partnerships

Over the course of history, technical change and evolution have come hand in hand with a parallel transformation of institutional and governance mechanisms. With renewable energy technologies and other ground-breaking innovations now reaching economic maturity, the next step of the energy transition is precisely to define new coordination processes between various stakeholders at all levels of governance. The decentralisation of energy systems is creating more interdependences between a whole new set of players and institutions. Energy planning itself cannot remain a top-down phenomenon in the present ecosystem but should instead depart from the local potential and solutions first, with more large-scale centralised solutions second, according to a sort of "energy subsidiarity" principle. Putting this principle in motion will require unprecedented alliances between and within territories, between urban and rural areas, between cities and regions, and between national and local governments.

Numerous European cities have started to address this challenge, with urban centres striking contracts with their rural hinterlands, as a crucial part of their plans to go carbon neutral by 2050.

And indeed, Europe's cherished objective of social and territorial cohesion, key to its stability and embedded in the Treaty, should not only be understood as cohesion between EU member states but also very importantly within them. Cities and regions should be encouraged to work as equal partners, mutually reinforcing each other's plans and priorities. Bringing this vision to life will require a deep overhaul of the management and allocation of Structural Funds in the future EU budget, towards genuine "public-to-public" or "public-to-citizens" partnerships, as an essential piece of the new institutional governance that should underpin a decentralised energy transition.

An increased role for cities and citizens

If the European Commission's intention to put citizens "at the core of the Energy Union" is not only rhetoric it would do well to back its vision with a supportive regulatory framework and adequate financial resources. Here again cooperation with local authorities will be crucial, as they are already actively engaged in supporting community energy initiatives as part of their local transition plans, and are best placed to know what kind of policies and instruments are needed to help the citizen energy movement get all the support it deserves.

Cities also need to be able to engage in a genuine dialogue with their national and European counterparts on how they can be supported in taking increased ownership of local energy systems. Every day, new cities are demonstrating interest in copying the German model of remunicipalisation, with various hybrid forms of local energy companies now developing across Europe. Local energy ownership is instrumental in improving citizens' trust towards energy providers and to involve them concretely in the energy transition. As [our latest study has shown](#), local energy operators are often established as part of a broader political vision to sustainable development and climate mitigation, and the profits generated by their activities are reinvested into other green projects, with high leverage effects for the energy transition of the territory.

As the EU steps into a turning point of its history, with the loss of one of its member state and the full reshaping of its energy policy, the time is right to give a new meaning to the founding values of partnership and cooperation.

How citizens can take ownership of the energy transition



Monique GOYENS

Director General of the European Consumer Organisation

Consumers producing renewable electricity brings benefits to all of society: lower carbon emissions, lower costs of the energy system, and stronger security of energy supply. Consumers themselves also gain by lowering their energy bills.¹ As solar panels get cheaper and other technologies such as batteries take hold, the energy transition can move to the next level. No wonder the European Union is looking at consumer-generated renewable energy as a game-changer.

With so much potential for consumers and society, why has the rate of new residential installations dropped off?

A long, winding and risky road to get on board

When considering installing solar panels, consumers need to take often burdensome steps and find answers to several questions:

Where to find all necessary information? Finding reliable information and getting a plan together is not easy. Consumers need to understand the economics of the project, information on the right product and installation and maintenance contract conditions. In a project called CLEAR² (Consumers Learn Engage Adopt Renewable Energy Technologies), a consortium of 8 European

organisations, including consumer groups, developed tools to help with these decisions and to team up for buying equipment. These group purchases led to significantly lower prices.

This project proved to be *very useful for consumers, triggering* over 27,000 PV installations and more than €196m in investments in renewable energy technologies. Consumer organisations are now expanding these initiatives within a CLEAR 2.0 project.³

When will it pay off? Households need electricity when the sun is not shining, and the sun shines when they do not need electricity. Hence they cannot be fully self-sufficient: they need electricity from the grid, and the electricity they provide to the grid needs to be remunerated to make their investment worth it. Ideally consumers would get paid at least at the market price. Despite this, a recent study by the European Commission found that in Slovakia and Spain consumers might not get paid for the electricity they upload to the grid.

Moreover, after drastic and retroactive changes, for example with Spain's new levies, consumers started losing trust and saw investments in solar panels as risky. Although consumers don't intend to become businesses, they are still investors who will only put their money in something if it is worth the risk and the effort.

How much administration does it involve? All consumers need a permit to connect to the grid. This process can be complicated and cumbersome, have high fees and involve a long waiting time. And some connections are denied for technical reasons, with no obligation of the grid operator to provide clear justification, alternatives or a process that is affordable and straightforward to contest the decision. They will also often require a range of other permits, for example building and environmental ones. Enough bureaucracy to discourage many.

I am renting an apartment, can I benefit from solar panels? 150 million Europeans live in rented accommodation and have limited ability to generate electricity on their building's rooftops. They cannot take decisions themselves, and landlords might be reluctant to make investments if they do not benefit from them. Under European rules, Member

States are currently not obliged to give rights to tenants.

Similarly, Member States can choose to provide financial support only for those who own their own house, and leave tenants out of the deal. Germany only started providing support to tenants recently.

Tenants' access to solar self-consumption is not only a question of equal footing with home-owners. It can contribute to combat energy poverty and strengthen the social dimension of the Energy Union.

There's no reason for this long, winding road to continue.

The European Union needs to give consumers a 'bike lane'

The European Commission proposed a new approach as part of the *Clean Energy for All Europeans* Package. For the first time, we are discussing a European definition of renewable self-consumers and their explicit rights. Permitting and grid connection process must become simpler for small generation. Crucially, they should receive fair remuneration for the energy they put into the grid, and the incentives and policies should be predictable, without retroactive changes.

Policy risks ahead: The energy market was designed for larger players, not for millions of electricity-generating consumers in the 21st century. The EU needs to adapt the rules of the game, rather than push consumers to adapt to the current conditions. Otherwise, it's like encouraging people to cycle on a motorway.

To ensure that the transition is consumer-focused, decision-makers should look at the problem from the consumer's perspective and how consumers try to enter the energy market as producers. Importantly, once the rules are set, Member States, distribution system operators and local authorities must all buy into them. Only then will consumers see some of the benefits the energy transition has to offer to them.

¹ Study on residential prosumers in the Energy Union, European Commission (2017).

² Financed through Horizon 2020.

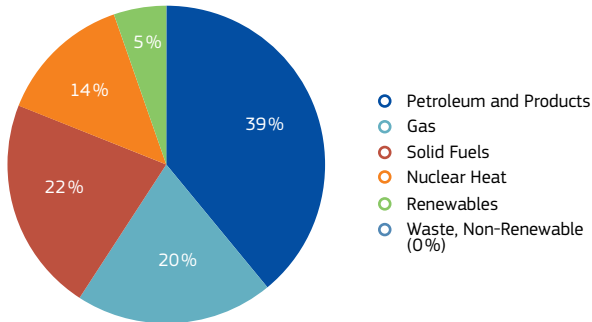
³ Ibid.

EU-28 Gross Inland Consumption

ENERGY MIX (%) – PRIMARY PRODUCTS ONLY

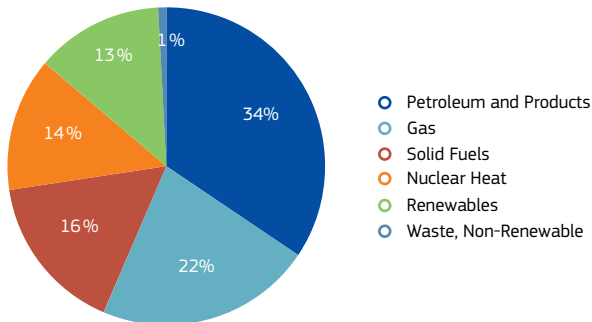
TOTAL PRIMARY 1995: 1 673.2 Mtoe

(Total Primary and Secondary 1995: 1 675 Mtoe)



TOTAL PRIMARY 2015: 1 626.2 Mtoe

(Total Primary and Secondary 2015: 1 627.5 Mtoe)

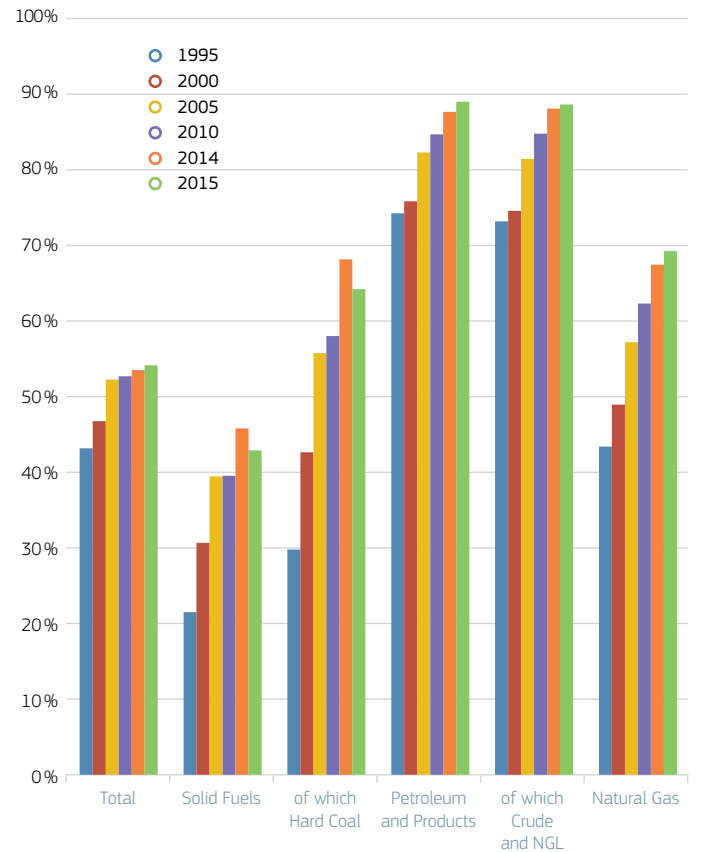


EU-28 Energy Import Dependency

BY FUEL – (%)

	1995	2000	2005	2010	2014	2015
Total	43.1	46.7	52.1	52.6	53.4	54.0
Solid Fuels	21.5	30.6	39.4	39.4	45.7	42.8
of which Hard Coal	29.7	42.6	55.7	57.9	68.0	64.1
Petroleum and Products	74.1	75.7	82.1	84.5	87.5	88.8
of which Crude and NGL	73.0	74.4	81.3	84.6	87.9	88.4
Natural Gas	43.3	48.8	57.1	62.2	67.3	69.1

1995-2015 (%)



Source: Eurostat, May 2017
Methodology and Notes: See Appendix 13 – No 1

Source: Eurostat, May 2017
Methodology and Notes: See Appendix 13 – No 1

Paving the way for more renewables in Europe



Kristian RUBY

Secretary General, Union of the Electricity Industry - EURELECTRIC

With a consistent policy framework, more electrification and tackling of barriers in member states, Europe can reach a higher share of renewables

A new reality is manifesting itself in the European power system. Europe is moving fast towards carbon neutral electricity and the rapid fall in the costs for renewable energy is

triggering a rethink of the EU's energy plans for 2030.

The European electricity sector fully embraces a future with more renewables. In November 2017 National associations and Chief Executives from all major power companies in Europe agreed on a new industry vision where utilities take a leading role in Europe's efforts towards the Paris Agreement.

The core commitment in the new vision is 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.

The sector also reaffirms its plans to invest in clean power generation and other transition-enabling solutions and, importantly, to help accelerate CO2 emission reductions in other sectors through increased use of clean electricity.

Getting bang for the buck

The energy transition is already a reality in the European power sector. 2017 saw more than 57% of electricity in the EU coming from low carbon sources.¹ And renewables

¹ <https://www.entsoe.eu/db-query/production/monthly-production-for-all-countries>

accounted for over a third of total power generation.

However, the investments needed are still significant. Getting maximum effect for each Euro invested is therefore essential. Three elements are crucial in this respect: a well-functioning electricity market, a robust carbon price and a consistent overall framework that provides certainty and visibility for industry and investors.

A market design for the energy transition

With renewables set to cover around half of power consumption in the EU by 2030, it goes without saying that they need to have the same market responsibilities as other technologies.

But the market needs to evolve, too. As variable generation from renewable sources begins to play an increasing role in the power system, flexibility becomes a must. Therefore, open and liquid intraday and balancing markets are key elements of a well-functioning and future-proof power market.

In addition, the power market design should take into account that investments require significant amounts of up-front capital. Long-term investment signals are therefore



essential. And this needs to be addressed in the legislative proposals that are currently being discussed.

A strong carbon price signal

Strengthening the EU ETS is a no-regret option. With a reinforced carbon price signal, additional measures to promote renewable energy sources can be minimised within the ETS sectors.

Although not as ambitious as proposed by EURELECTRIC, the provisional agreement on the post-2020 ETS reform from November this year will strengthen the emissions trading scheme and provide investors with some needed legal clarity that will enable them to take better informed decisions on low-carbon investments.

Certainty and visibility

However, the success of the reformed EU ETS will also depend on ensuring full consistency and coherence between the various elements and targets of the overall 2030 Climate and Energy Framework, as well as developing an adequate governance framework which enables the achievement of these objectives.

Visibility and investor certainty are key here. In order to scale their production and ensure cost reductions, the renewable industries need visibility on the pipeline of projects. And for investors to put billions on the table, they need certainty against retroactive changes of the framework and as much long-term visibility on cash flows as possible.

However, if Member States choose to provide support to mature renewables after 2020, it should be as cost-efficient and market-based as possible. In this context, it should help to maximise the market integration of RES and minimise distortions, including distortions of the merit order.

A world leader in renewable energy - together

The EU aims to become a world leader in renewable energy. The European power sector has been and continues to be a top investor in this field. EI New Energy's Top 100 Green Utilities 2017 index shows five European companies ranked in the top ten that are making concrete breakthroughs in delivering low-carbon power generation.²

But if Europe is to take the role a world leader, the member states must also share



this ambition and play ball. Some of the key obstacles to further deployment of renewables can only be tackled with help from member states. Public acceptance, for instance, must be addressed jointly by companies, governments and local authorities. And permitting also remains a key barrier for development of renewable projects in several member states.

Electrification as a driver

But the perhaps most critical lever for further renewables integration actually lies outside the power sector. And that is electrification of other sectors such as transport, heating and cooling. Shifting away from other fuels in these sectors will be necessary to drive

demand for electricity. And it will come with several benefits: more stability in the power system, cleaner air in cities due to reduced air pollution from transport and lower CO₂ emissions, since electricity is already the most climate-friendly energy carrier today.

In sum: Achieving a more ambitious economy-wide share of renewables at European level by 2030 is within reach. But it needs to go hand in hand with the right framework and increased electrification. And member states must do their part. Under these conditions, the European electricity sector can support a higher share of renewables towards 2030.

² <http://www.energyintel.com/pages/pr-green-utilities-2017.aspx>

The missing link. 750 000 mercury thermometers and the renewable energy



Dario TAMBURRANO

MEP (EFDD Group) Member of the ITRE Committee

In Italy and a mere handful of other places in the world, geothermal power plants produce polluting and climate-changing emissions that are equal to or greater than the emissions produced by thermoelectric power plants fuelled by fossil fuels. It is an exception to the rule according to which renewable energy of geothermal origin is also reputed to be clean energy.

The 34 Italian geothermal power plants are concentrated in two small areas (16 municipalities) in Tuscany. Their mercury emissions are 1.5 tonnes per year¹ - almost 14% of the total mercury emissions Italy declared to the EU - even though only about 2% of the electricity produced in Italy is geothermal in origin.

Emissions from geothermal power plants are not subject to EU limits. Geothermal mercury does not even appear in EU lists of polluting emissions. It is extraordinary that the EU has banned domestic thermometers that

contained just two grams of mercury (grams, not tonnes), while every year in the 16 Italian geothermal municipalities it is as if 750 000 mercury thermometers were broken.

Many other pollutants are released by the Italian geothermal power plants: for example, in a year 16 181 tonnes of hydrogen sulphide and 6 415 tonnes of ammonia. If this situation is not remedied, it could lead to the demonization of all geothermal energy.

The environmental impact of geothermal power plants depends on the technology used and the characteristics of the geothermal fluids. If the fluids remain in a closed circuit, there should be zero emissions. In Italian plants, the fluids come into contact with the atmosphere and therefore release the “non-condensable gases” they contain.

Among the gases, the climate-changing ones stand out in terms of quantity: methane and carbon dioxide. Scientific research, especially the most recent studies, dispel the myth according to which geothermal emissions of carbon dioxide replace the earth’s natural carbon dioxide emissions and instead show how the latter can increase as much as tenfold following the entry into operation of a geothermal power plant².

Carbon dioxide and methane emissions have only been calculated for the Monte Amiata³ geothermal power plants (one of the two geothermal areas): the electricity they produce has a global warming potential equal to 693 kilograms of carbon dioxide per MWh. According to ISPRA (Istituto superiore per la protezione e la ricerca ambientale) - the

Italian National Institute for Environmental Protection and Research, the emissions from the Italian natural gas thermoelectric plants amount to about half the above⁴: 365 kilos of carbon dioxide per MWh.

The acidification potential of the energy produced by the Monte Amiata geothermal power plants, which is associated with the equivalent sulphur dioxide emissions, has also been calculated⁵: it is 2.2 times higher than the electricity produced by coal-fired plants.

Nevertheless, this geothermal energy, which is both seriously polluting and climate-changing, is included in the panoply of tools

⁴ ISPRA (2017), Factors affecting the emission into the atmosphere of CO₂ and other greenhouse gases in the electrical sector.

⁵ Bravi, M., Basosi, R., cit.

² Allis, R.G. (1981), Changes in heat flow associated with exploitation of Wairakei geothermal field, New Zealand. *N.Z. J. Geol. & Geophys.*, 24: 1-19; Armannsson H, Fridriksson T, Kristjansson BR. (2005), CO₂ emissions from geothermal power plants and natural geothermal activity in Iceland, *Geothermics*, 34,286–96; Fridriksson, T., Oladottir, A. A., Jonsson, P., Eyjolfsson, E. I., & Orkugardur, G. (2010), The response of the Reykjanes geothermal system to 100 MWe power production: fluid chemistry and surface activity. In *Proceedings of the World Geothermal Congress*; Rissmann, C., B. Christenson, C. Werner, M. Leybourne, J. Cole, and D. Gravelly (2012), Surface heat flow and CO₂ emissions within the Ohaaki hydrothermal field, Taupo Volcanic Zone, New Zealand, *Appl. Geochem.*, 27, 223–239

³ Bravi, M., Basosi, R. (2014), Environmental impact of electricity from selected geothermal power plants in Italy, *J. Clean. Prod.* 66, 301–308. Beyond this, only CO₂ emissions are known.

¹ The most recent data on annual geothermal emissions refer to 2007 and are to be found in the annexes to Resolution No 344 of the Tuscany Region of 22 March 2010. Mercury emissions (1 494 tonnes) represented 13.8% of Italian emissions. In 2007 there were 32 geothermal power plants producing 1.77% of Italian electricity, while the current 34 geothermal power plants produce 2.18% of Italian electricity. For the period subsequent to 2007, only ‘occasional data’ on geothermal emissions are available (the mass flow measured during the checks) that cannot be used as the basis for producing annual estimates.



that the EU deems useful for limiting global warming. It benefits from renewable energy incentives and is even factored in to offset Italian carbon dioxide emissions.

The European Parliament realized the serious environmental problems that may be associated with the production of geothermal energy during the discussion on the Renewable Energy Directive within the ITRE Committee (on Industry, Research and Energy).

The report approved by ITRE, which will be voted on in plenary, recognizes that geothermal energy can lead to the emission of greenhouse gases and harmful substances; hopes that investments will be directed towards geothermal energy with low environmental impact and with lower climate change emissions compared to fossil fuels; expresses the wish that the European Commission assess

by 2018 the need to regulate emissions from geothermal power plants.

This is not just a national problem. The geothermal fluids in the Aegean area contain significant amounts of “non-condensable gas”. When at some point in the future, Greece may choose to exploit its rich geothermal resources, it may encounter the same problems as Italy. And Turkey’s problems should not be forgotten, where emissions reach 1.3 tonnes of carbon dioxide per MWh, which is much higher than coal-fired power plants.

Italian geothermal power plants are equipped with abatement filters, and emissions measured downstream of these. However, these filters break down regularly. The photo shows the emissions of the Bagnore 4 geothermal plant when the filters are out of order.



Flexibility for smart distribution grids: key to achieving the energy transition



Christian BUCHEL

Chair of EDSO for Smart Grids and Deputy-CEO, Chief Digital & International Officer (CDIO), of Enedis

EDSO for Smart Grids

The energy transition is not a future question but happening right now. An ever-increasing number of renewables such as wind and solar power are being deployed, which is great news from a climate perspective. However, this development urges a fundamental transformation of the electricity system to cope with unprecedented levels of variable and distributed generation. Already today, more than 90% of renewables are connected to the distribution grid ([Reuters](#)) with the potential to cause local congestions. Flexibility is therefore becoming increasingly important at the distribution system level, which is the one to be mostly affected by these challenges.

What is flexibility?

Traditionally, distribution system operators (DSOs) have dealt with congestion by planned extensions of their networks and upgrading distribution system components. This will also be necessary in the future. Nevertheless, grid extensions are costly and take time. The rapid uptake of renewables requires additional solutions, one of which is flexibility. It can be defined as the modification of generation injection and/or consumption patterns, on an individual or aggregated level, to provide a service in the energy system or to maintain grid stability ([EG3](#)). There are several ways to activate flexibility, including technical

solutions such as grid reconfiguration and storage but also other solutions, including smart network tariffs, connection agreements with customers, market and rules-based solutions.

Why the need for flexibility?

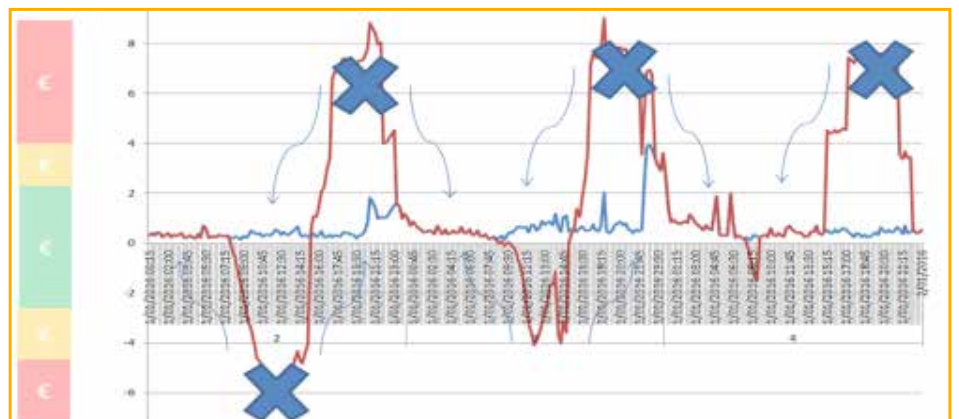
Renewable energy production within the EU-28 increased by 70.2% between 2005 and 2015, with an average annual growth of 5.5%, according to [Eurostat](#). This trend will persist, given the EU's climate and energy targets and global efforts to curb carbon emissions. At the same time, we are witnessing a progressive electrification of the transport and buildings sectors. According to the [International Energy Agency](#), the global stock of electric cars almost doubled in 2015 compared to 2014, reaching a number of 1.3 million units, and in the buildings sector the numbers of heat pumps, used for heating and cooling, is growing fast.

Yet, in the face of this rapid change, DSOs are expected to maintain the system at least as reliable as it is today, and provide for an efficient network operation that is cost-efficient for society. In this more decentralised energy system, flexibility therefore can provide a valuable solution. The use of flexibility can help DSOs to adjust demand profiles to the supply of energy and grid capacity, and prevent voltage and other network problems. This is paramount as more renewables alone will not enable the energy transition. System constraints must be acknowledged and addressed.

Different flexibility solutions – the role of the DSOs

DSOs should be enabled to use all forms of flexibility, including both technical and market based solutions. Technical solutions are for example grid reconfiguration and grid-scale storage. DSOs use supervisory control and data acquisition (SCADA) systems that help them to acquire data, monitor the grid and control some grid assets. With the availability of more data, for example weather and smart metering data, DSOs can better forecast congestions and if possible alter the predicted energy flows. In addition, DSOs should be able to own and operate grid-scale storage facilities as integrated network assets for their own technical needs. DSOs use their own storage to solve local grid constraints, for example in emergency situations. However, DSOs shall never provide services to the market by trading storage services or energy volume.

Other flexibility solutions include smart network tariffs which can be designed in such a way as to incentivise grid users to use the networks more efficiently, for example by shifting their consumption to off-peak hours. This can also be seen in the illustration below from Belgian DSO ORES, which shows a typical three-day measured load for a traditional customer (blue) and for the same customer equipped with an electric car, PV and heat pump (red). System costs increase due to the new appliances but could be offset by the use of flexibility (blue arrows). Another solution is the conclusion of connection agreements



between DSOs and their customers. Based on financial incentives, for instance cheaper connection costs, customers could agree to limited access when there are constraints. Such contracts are explicitly optional. As a general rule, DSOs should be encouraged to use the most efficient solution in order to keep the system costs as low as possible. This can be achieved by setting appropriate incentives within the regulatory framework, including both flexibility and network reinforcements.

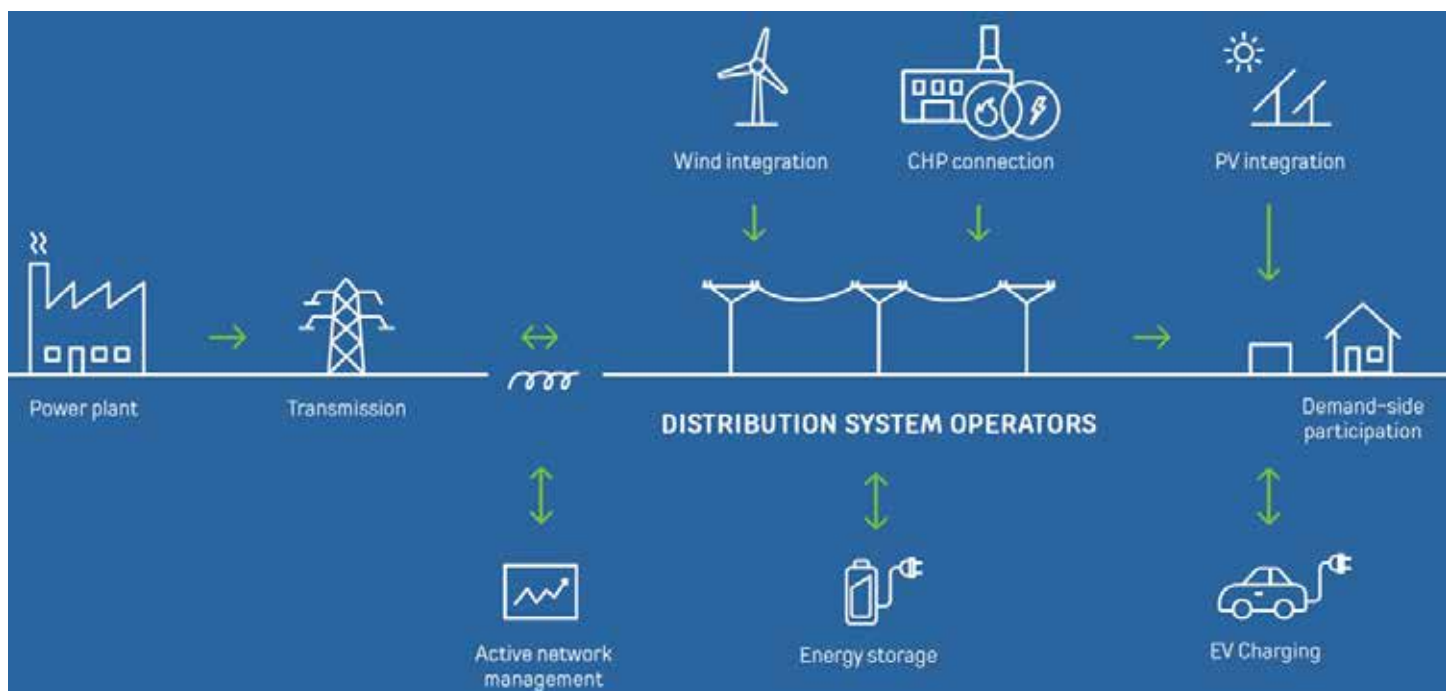
Accessing flexibility from an integration distribution system perspective

There are three players that can activate flexibility, namely market parties (including customers), DSOs and transmission system operators (TSOs). One should keep in mind that DSOs and TSOs are regulated entities and as such not directly involved in but rather enablers of electricity and flexibility markets. Since the activation of flexibility by one of these three parties has implications for the others, coordination is key. Acting as neutral market facilitators, DSOs need to be able to oversee the impact on their networks and act on potentially problematic situations in order to ensure the stability of their systems. For example, if there is a lot of wind and sun, a DSO might plan to use local storage capacity from a commercial party. At the same time, another market actor might want to use this capacity for trading purposes. Proper coordination between the market parties and the DSO is needed to prevent grid problems.

DSOs' objectives are to enhance system security, but also to perform a neutral market facilitation role in engaging customers and



facilitating new markets, including flexibility markets. It is at this intersection of ensuring reliable and efficient system operation, while facilitating new markets, that DSOs will play a crucial role in the energy transition.



Fuel switch to renewables in the heating sector



Philippe DUMAS

SECRETARY GENERAL of European Geothermal Energy Council (EGEC)

Since the crisis in Ukraine and the following geopolitical tensions with Russia, the issue of energy security is back to being a top priority for European leaders. Europe, the largest energy importer in the world, has suddenly discovered that it is vulnerable to external shocks, and that it wastes more than 1 billion a day in imports. Policy-makers have started to realise that heating and cooling is its largest single source of energy demand and needs to be addressed. The main institutional response was the new Energy Union, launched in February 2015 to “reset the European Union (EU)’s energy policy”; energy security is the first of five pillars.

EU gas imports from Russia are mostly used to cover its extensive heating demand which accounts for almost 50% of its final energy consumption; for instance, 40% of the natural gas consumed in the EU is used in residential and tertiary buildings. Oil and coal are also used for heating purposes. This means that the vast majority of the energy supply for heating and cooling is generated by burning fossil fuels, which is unsustainable from an economic, environmental, and social point of view.

The current policy framework foresees an increase in the use of renewable energy in the heat sector up to 21.4 % in 2020. However, with current policy initiatives, post-2020 the sector is destined to remain dominated by imported fossil fuels.

To address this issue, it is of crucial importance to understand the characteristics of the heating demand. Heat users quite often have specific demand profiles comprising issues of temperature, capacity, and timing. Therefore, a variety of applications and sources are required to cover this demand. Technologies used should match as closely as possible the temperature levels of the thermal energy demand. Geothermal and other renewable heating and cooling (RHC) technologies are already competitive under certain conditions and are available to supply the low-temperature heat demand for space heating/cooling, domestic hot water, and for certain industrial processes.

In 2015, the consumption of heating and cooling from renewable energy in the EU amounted to 94 Mtoe, representing 18.6% of the total heat consumption¹. According to the National Renewable Energy Action Plans (NREAPs), in 2020 renewables will make a total contribution of 111.2 Mtoe, or 21.4% of the total heat consumption projected for that year. Assuming this additional renewable energy consumption substituted imported natural gas, the EU would reduce its fossil fuel imports from third countries by the equivalent of 15 Mtoe annually from 2020. With average import prices amounting around 16.2 Euro/MWh², this would save the EU more than € 5 billion.

However, it is worth highlighting that with clear enabling policies it could be possible to generate 148 Mtoe from renewable heating and cooling technologies. By the end of this decade we could therefore produce some additional 54 Mtoe from RHC compared to 2015. By applying the same assumptions as above, the EU could save every year as much as € 20 billion in reduced fossil fuel imports compared to 2015.

To make this fuel switching possible, it is important to remove the barriers that still hinder the development of renewables in the heat sector.

First of all, a level-playing field between RHC technologies and fossil fuels must be ensured. This can be done by phasing-out of fossil fuels subsidies, by introducing support measures to renewable sources of heating in countries where the heating sector is not covered by a carbon tax, and by guaranteeing a full competition in the heating sector as in the electricity and gas markets.

Another important driver is finding solutions to the challenge of financing the consumer’s upfront investment, which is currently a huge barrier for integrating RHC into buildings and industrial processes. Financing tools must include risk capital, guarantees and grants.

Special attention should also be paid to the implementation of existing energy efficiency and renewable energy legislation, and in particular of articles of the Renewable Energy Directive dedicated to renewables in buildings, to the reduction of administrative barriers, to improved information for consumers, and training of installers. Member states must launch large national information campaigns to increase awareness of citizens on the benefits of switching from fossil fuels to renewable heat and facilitate access to information regarding suppliers and installers.

Finally, the EU should continue to foster research, development, and innovation (RD&I), to ensure that Europe retains its status as a world leader in manufacturing and design. More attention should be paid to the energy system as a whole, to the development of smart thermal grids, and to new industrial processes which are able to decarbonise the non-ETS sectors.

The solution to decarbonise Europe’s energy demand must be sustainable as well as economically viable in the long-term. It requires a holistic approach, structural reforms and political courage. In a nutshell, the solution lies in improving energy efficiency together with fuel switch to domestic

¹ Eurostat, shares 2015.

² In January 2017. Source: Quarterly Report Energy on European Gas Markets Market Observatory for Energy-DG Energy, Volume 10 (issue 2; second quarter of 2017)

Financing Clean Energy as boon to the Economy



Fredrick FEDERLEY

MEP, (ALDE Group), Member of the ITRE Committee

We might very well be in the beginning of something that will fundamentally change our economy for the future. The industrialization was to a large extent made possible by the access to fossil energy. It powered the factories and the transport infrastructure needed to deliver materials to the factories and products from them. We are now at the beginning of a period where we will change the energy needed for our economy from fossil to renewable. A change which will bring big opportunities for Europe in creating new jobs and be more energy independent, but it will also create challenges for workers and societies alike when we are transitioning to the post fossil era.

During just the last years the cost for investing in renewable energy has rapidly decreased making it more viable not only for big energy companies but also for small businesses and consumers which now have the possibility to also become energy producers. Solar panels on the roof or perhaps a small wind mill on the farm together with bigger wind project both on shore and at sea. We see how production processes become better at using production generated waste to also produce on site energy, which we can see in many paper mills and biorefineries. Innovation and people seeing opportunities in being part of the energy system is the very foundation for

the financing of the needed transition towards renewable energy that we now see.

Besides the merely market driven signals we now have a Paris Agreement in place that will require a lot more renewable energy in order to be able to meet the goals set. The EU is more or less finalizing the climate legislations for post 2020 and we are half way through the negotiations on the clean energy package. For Europe all these pieces of legislation are crucial and much more important than any public investment fund or public support scheme. These set the regulatory foundation for all the investments that will come in renewable energy.

For Sweden we have several projects that is now on hold waiting for what rules that will govern their investments. If we are not managing to create a system of rules that can give stability and regulatory security no amount of public money can mitigate that. Are you investing billions of euro in a renewable energy installation you really need to be able to calculate that the investment will pay off in the end.

Will we not be able, in the EU, to deliver long-term stability for investments we are deliberately delaying this much needed transition away from fossil fuels and the only ones that will be happy about that is the ones that still want to make money out of a fossil dependent economy.

At the moment the EU has big opportunities to develop more renewable energy and be the global leader, but if we do not manage to set the regulatory scene for this others will soon take the leading role instead. Globally investments in renewables is the future and in many places we see more and more pressing needs to change the energy system. In China clean energy is needed in order to get cleaner air in the cities. In many developing economies smaller scale renewable installations can be a better way to get the needed energy instead of building a big plant with big costs in building up a grid system.

We, the EU, cannot afford to miss this chance to lead in the development of renewable energy. Leading this transition is not only about being the world climate leader

it is also about providing more and new green jobs to Europe, in all fields from development to production. Because the transition from fossil to renewable will unavoidably also be a challenge for workers and communities dependent on the jobs provided by the fossil fuel sector. Providing new jobs and future opportunities for those who, initially, will not personally benefit from the shift to renewable energy will be a component in the work for the years to come – this will put pressure on our labor markets, education systems but it will also need political leadership. A leadership which is clear on the direction we are taking for the future, but also has a plan for all society on how to get there.

Me myself, I am not claiming to be that political leader with the great plan. But I am a politician which sees all the opportunities that a green economy powered by renewable energy can give. But if this green economy shall be a success we all need to work together. Politicians from all fields with society and business. If we do that I am convicted that this will be a success.

To start I think one of the best gift we politicians can give in terms of financing clean energy is regulatory certainty and long term stability. Something that will be a win both for the EU Member States budgets and the ones planning big investments. So let's start there and let that be the guiding principle for the work on the clean energy package.

Regulators please be brave



Bertrand PICCARD

Initiator and Chairman of the Solar Impulse Foundation

Each time we want to change something in our world - be it business, technology, politics - we must observe what is the paradigm that prevents us from moving ahead, and change that paradigm. As I learned with Solar Impulse, the impossible only exists in people's minds, not in the reality of what we are trying to achieve.

Why are we so demanding for the latest smartphone and yet so laid back for all the new technologies that have to do with energy. Today we have technologies that can make an airplane fly day and night without fuel, but also technologies to electrify transport, to properly insulate houses, to massively reduce energy wastage and even develop much more efficient industrial processes.

These technologies do exist but are stuck in startups, labs, universities, and sometimes even in big companies, not ever reaching final users. Why is this?

It's partly because of the focus on only *pushing* innovation by using public money to provide subsidies. While still good, it can only bring good ideas so far. If they don't fulfil a need, they will founder once they come into contact with the market. If we continue to allow people to pollute as they do today, most of the innovations in this field will remain unused. So conditions must be created to not just push but *pull* innovations to market, and

one way to do it is to have ambitious regulations to help make that happen.

So we must observe what is the paradigm that prevents us from moving ahead, and change that paradigm. In this case, we have to understand that our liberal system, which is so regulation averse, will benefit from a legal framework that will oblige people to use more innovative and efficient technologies. Not only to protect the environment, but also to create jobs and boost economic development.

We can do this by recognizing that protection of the environment has now become profitable. This is another paradigm shift. When it was not, people have simply ignored it. That means that it is financially viable to introduce a regulatory framework for the use of energy efficiency and renewable energies demonstrating that these technologies are not expensive or bad for industry, but are in fact just the opposite.

For example, today there is a new power plant built in Saudi Arabia, where the electricity from photovoltaics will be 1.8 cents per kWh. Mexico will have 1.77 cents. That is 10 to 15 times less expensive than what we pay here in Europe for dirty electricity.

As for energy efficiency, it is so incredibly profitable - estimated at \$25 tn worth of infrastructure investment over the next decade and a half - that even those companies that pay a carbon tax are going to be more profitable than those that do not, because they are obliged to be more efficient, to save energy, to implement new technologies.

Replacing the outdated systems with clean, modern, efficient systems represents the biggest market opportunity for industry this century.

However, markets enjoy two things; certainty and - particularly in such massive industries as energy - the status quo. Thus they resist the disruption and uncertainty that innovation brings. And the lack of a comprehensive regulatory system that promotes clean economic growth may actually be feeding uncertainty. Companies know legal frameworks that will put a price on carbon are forthcoming, but they don't know what they

will look like or how much it will cost. So they are taking a wait-and-see approach, remaining resistant to change. And the market is stuck, and innovation with it.

Consider the Nash equilibrium - the theory by mathematician John Forbes Nash Jr. - that helps to explain why every player in a market will make the best decision for themselves, based on what they think the others will do, and no player has anything to gain by changing only their *own* strategy. But if regulators can create laws that accurately reflect the cost of using old, dirty and inefficient technologies, and demonstrate the potential for clean solutions, regulators have the opportunity to quell this uncertainty and create the conditions to pull innovation to the market.

The science is sure, the technologies exist, the finance is increasingly in place and the political will is largely there. Now we need measures to make it happen.

Forward-looking companies are already taking the initiative by themselves; almost 1400 have set internal carbon prices to materially affect investment decisions and drive down GHG emissions in anticipation of a price on carbon, including more than 100 Fortune Global 500 companies with annual revenues of US\$7 trillion. But these are the brave ones moving forward despite uncertainty. Regulation must capitalise on this momentum.

It can be quite paradoxical to ask for more regulation to spur economic growth. But when it can pull innovation forward and can help people to be more in the future than in the past, I think it's worth it.

So my call is for regulators to be brave, and to make the legal framework in accordance with the evolution of the technology, and change the rules of the game. And what will happen when regulations that are really ambitious in terms of energy policy and protection of the environment are implemented? All the innovations, all the solutions, all the new technologies will be pulled, arrive on the market, and be put to good use.

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Dr. Bertrand Piccard, Initiator and Chairman of the Solar Impulse Foundation

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