**Confrontations Europe – Energy & Climate Group**

Seminar of the 10th of October 2018

**WHAT FUTURE FOR THE ELECTRICITY MIX?**

The present note summarises the discussions between the following panellists:

- **Maurizio BOELLA**, Advisor to the Deputy Director-General, DG Energy, European Commission
- **Alain TACCOEN**, Head of Stakeholders Relations-EU Strategy, EDF
- **Oyvind VESSIA**, Head of European Affairs, Orsted
- **Patrick ADIGBLI**, Vice-President for Regulatory Affairs, Restore

The debate was moderated by **Michel CRUCIANI**, Senior advisor on climate and energy issues for Confrontations-Europe.

## INTRODUCTION

The topic of this seminar lies at the very heart of the political debates on energy, just at the end of the public consultation launched by the European Commission, after the publication of the Intergovernmental Panel on Climate Change (IPCC) special report and before the COP24.

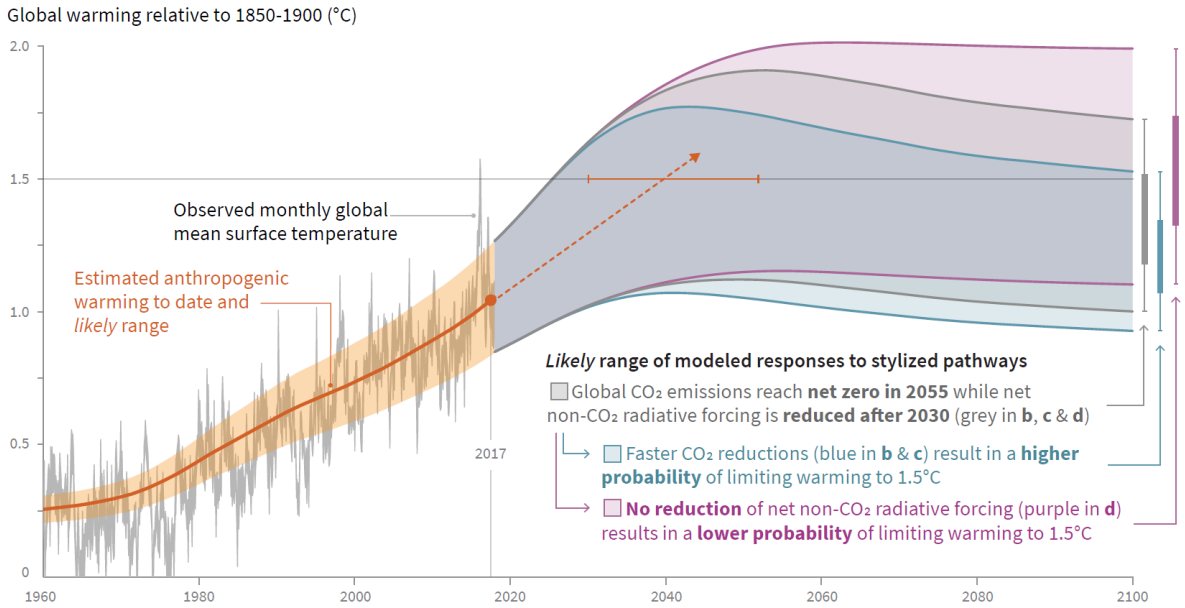
A leak from the European Commission's working staff document regarding the Long Term Strategy for reducing GHG emissions for 2050 shows that, in all the modelling exercises, there is an increase of electricity supply within the energy supply of the EU (from +43% up to +120% compared to 2020). This means that electricity will be at the very heart of European final consumption by 2050.

The question is therefore: which electricity mix should we have by 2050?

## CONTEXTUAL ELEMENTS

### The public debate is now focused on the ambition

The context in which this discussion on the future of the European energy mix takes place is characterised by several global mega trends: climate change, demographic expansion, technological evolution, security of supply etc. Each of these represents a challenge for our society. The COP21 in 2015 was a major milestone in the construction of the collective response to climate change, and since then there has been always more scientific work done proving that climate is changing, and that action needs to be taken urgently. The public debate is now focusing on the objective, and the ambition, and how to get there. In this perspective, the recent Special Report of the IPCC is a key scientific contribution strongly stressing the difference of the consequences between a 2°C and a 1,5°C rise of the global temperatures. This report further elaborates on the different scenarios and to which extend each of them could help limiting the global rise of temperatures, as the graphic below illustrates. This report will feed the debate at the COP24 in Katowice.




**The European Union on track with its climate ambition – Stricter targets for 2050?**

The European Union has been a leader in climate policies. The EU is currently on track to achieve its 2020 targets, that is to say a 20% greenhouse gases (GHG) emissions reduction and 20% share of renewables in the EU final energy consumption.

Currently in the final line of discussions, the Clean Energy Package put forward by the European Commission proposed new policies to reduce GHG emissions by at least 40% by 2030, and set up higher targets to improve energy efficiency levels (32.5%) and to enhance the use of renewable energy (32%). Regarding the remaining files, most initiatives have been approved, and the legislative process is on track to deliver.

Furthermore, following up on a public consultation, the European Commission will publish a Long Term strategy for 2050 that will be based on the principles of the Paris Agreement, but that will also look at what goes beyond 2030. Finding a common line at the EU level is already a challenge, at this stage the outcome of the discussions on whether Europeans adopt even higher emissions reduction targets remains largely unpredictable. The Governance regulation should be a tool to better monitor trajectories towards common targets.

Clean Energy for All Europeans package - state of play (4 December 2018)

| | **European Commission** Proposal | **EU Inter-institutional** Negotiations | **European Parliament** Adoption | **Council** Adoption | **Offical Journal** Publication |
|---|---|---|---|---|---|
| **Energy Performance in Buildings** | **30/11/2016** | **Political Agreement** | **17/04/2018** | **14/05/2018** | **19/06/2018 - Directive (EU) 2018/844** |
| **Renewable Energy** | **30/11/2016** | **Political Agreement** | **13/11/2018** | **04/12/2008** | - |
| **Energy Efficiency** | **30/11/2016** | **Political Agreement** | **13/11/2018** | **04/12/2018** | - |
| **Governance** | **30/11/2016** | **Political Agreement** | **13/11/2018** | **04/12/2018** | - |
| **Electricity Regulation** | **30/11/2016** | Ongoing | - | - | - |
| **Electricity Directive** | **30/11/2016** | Ongoing | - | - | - |
| **Risk Preparedness** | **30/11/2016** | **Political Agreement** | - | - | - |
| **ACER** | **30/11/2016** | Ongoing | - | - | - |

**WHAT ARE THE OPTIONS FOR THE FUTURE OF THE ELECTRICITY MIX?**

Independently from the scenario that will be decided for 2050, it was clearly stressed by the speakers that most of the solutions and technology needed to reduce GHG emissions already exist and are used today. As was summarized by one panellist: "*There is no need to invent a breakthrough technology, but we should rather count on what is already working*".

Several options to decarbonise the electricity sector have been outlined, most of them being classically located on the generation side. However, the demand side is increasingly attracting attention and seems to have a huge potential. Research should help enlarging opportunities; a special effort will focus on intelligent systems in the coming years.

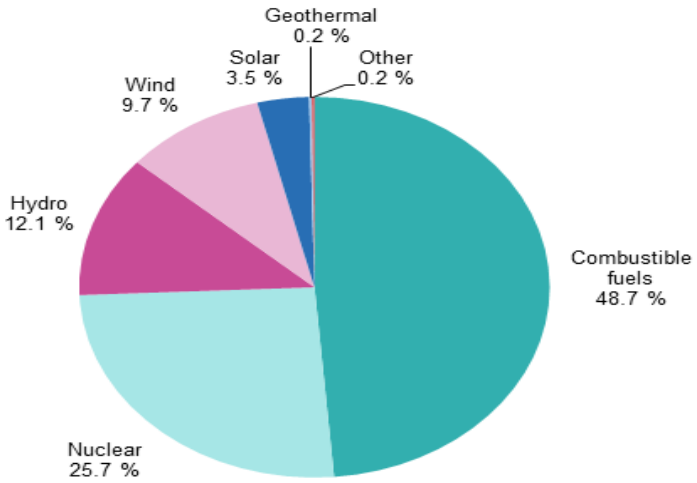
**On the generation side: boosting renewables sources of energy**

Hydropower plants, solar panels, wind onshore and offshore… renewable energy sources (RES) can be declined in many variations depending on the environmental conditions of the territory. A country like France is already relying on a large share of RES within his electricity mix. Hydraulic energy is the largest source with a fleet of hydropower plants that were built in the 50s. These infrastructures will have to be maintained in the long run to make sure that France keeps a high capacity in the future. However, this energy source does not have unlimited capacities and a country like France has nearly achieved its maximum potential.

Solar is another largely used source of RES, where tremendously decreasing costs have been experienced in the last decade. This source can be developed much more largely than hydraulic power, and energy producers are already massively investing in it.

Another very interesting illustration of how RES are scaling up fast is offshore wind. The potential of offshore wind of the North Sea is of 2600 TWh, which represents almost 80% of the EU electricity consumption expected in 2030. It is clear for all actors that wind will have a major role to play in the decarbonisation of the power generation.

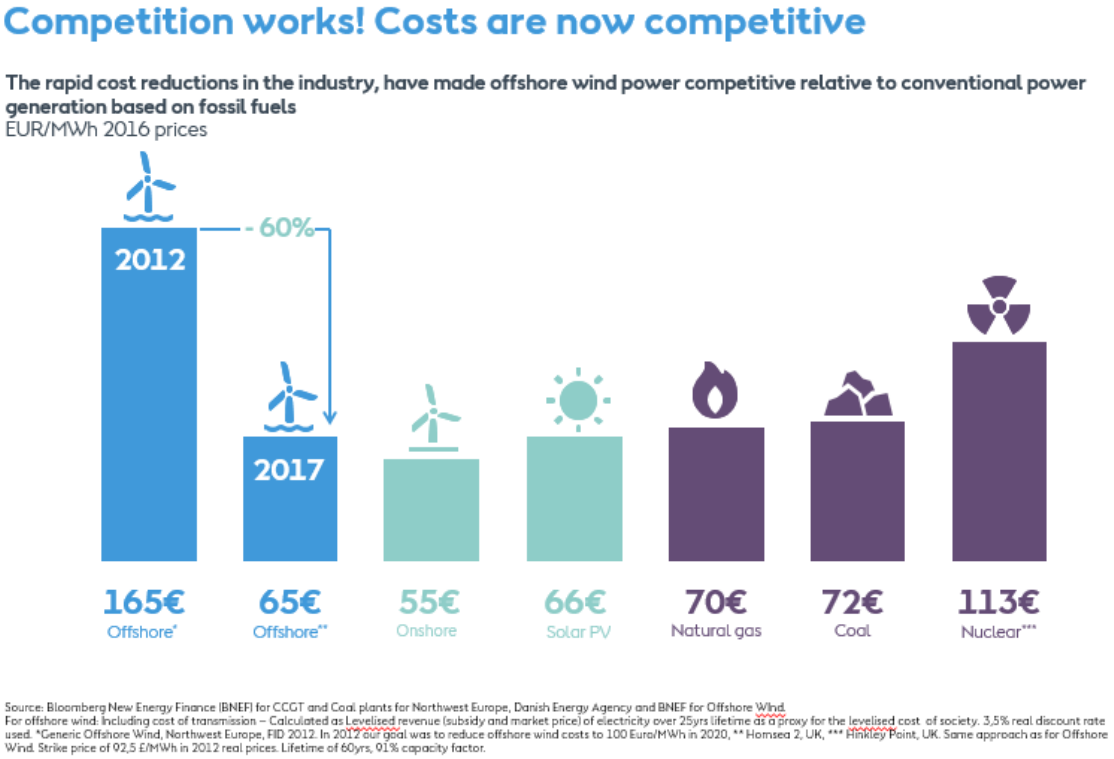
**Net electricity generation, EU-28, 2016**
(% of total, based on GWh)




*Source:* Eurostat (online data code: nrg_105a)

eurostat

The massive developments of RES have been driven by the fast-decreasing costs of these energy sources, which have made RES competitive on the energy market. "*RES are now on par, or sometimes even cheaper than conventional energy, […] this is a major change*" underlined a speaker. Indeed, as detailed by this graph, back in 2012 an offshore wind project would cost 165 euros per MWh, while today it costs 65 euros, including connection grids on land, which represents a reduction of 60% in five years.




The figures keep decreasing, a situation which already caused issues in terms of policy making in the past, and remains a difficult challenge for institutions: in the latest draft version of the European Commission' strategy for long term GHG emissions by 2050, the figures taken to estimate offshore costs are already lagging behind.

But will this trend maintain itself in the future? While recognising that many factors could potentially lead to an increase of RES prices, such as a rise of borrowing costs, or the affirmation of national approaches opposing to a deepening of the European energy transition, most speakers are rather confident that such an increase is highly unlikely.

**The role of nuclear and other technologies in the future**

Another source of decarbonised energy is nuclear. There are on-going debates in several Member States about what should be the role of nuclear in the future of the national energy mix, a question that also touches upon the extension of the duration of life of the power plants. For example, the French government decided that the share of nuclear in the electricity generation will be reduced to 50% by 2035 (in a country where it currently amounts to more than 72%), meaning that nuclear will still be here after 2035.

Other technologies such as carbon capture and storage are likely to play a role in the future energy mix, even if this role still has to be confirmed. The same remark applies to hydrogen; it will be useful for transport and can also be used to store electricity on the condition that it is decarbonised first.

## CHALLENGES AHEAD

### Phasing out fossil fuels vs balancing and grid stability

The transition to a low carbon emission society implies a massive transformation of the power sector. Phasing out fossil fuels to make room to a bigger share of RES also means that electricity generation will be increasingly intermittent and decentralised. Indeed, wind and solar are highly intermittent energy sources, and wind turbines and solar panels are multiplying the generation location points. These changes in the way we are generating electricity, although still minor at the moment, have at least three major implications for our electricity systems in Europe:

1. Because of the RES inherent intermittent nature, balancing the grid will be increasingly difficult in the future, both for the grid operator and balancing responsible parties.
2. Security of supply, if not paid close attention to, could be threatened on the long run, which is a major concern for peak consumption periods. Indeed, RES contribute to decarbonise the energy mix, but how can we be sure that security of supply is guaranteed in a sustainable and cost efficient way?
3. The integration of an increasingly important share of RES will lead to an increased congestion of the grid if the grid expansion is not keeping track with the energy transition, which means building the new lines needed to convey large amounts of electricity from the generation points to the consumption centres. For instance, in Germany only 11% of the total grid deployment plan that was announced in 2009 has been constructed. Congestion has then to be managed through re-dispatch, a service that will be increasingly costly, and whose cost is transferred to consumers.

Solution must be found at the European level in order to guarantee a constant supply of electricity to consumers and industries at a reasonable cost. All speakers showed a clear optimism on our capacity to implement these solutions, for the simple reasons that most of the needed technology to reduce the emissions in the European energy mix already exists, and can be built upon.

## PROMISING TECHNICAL SOLUTIONS ALREADY EXIST

On the side of energy producers as well as aggregators, storage offers a very promising technical solution not only to mitigate the intermittence of renewables but to provide an increasing range of services that will add flexibility to the electricity system as a whole.

### Storage will add flexibility on the production side…

A speaker stressed that "*the first way to manage intermittence is storage*", underlining the role of decentralised storage such as pumping units, that need to be maintained and used at full potential in order to be fully beneficial. Another form of decentralised storage, already widely used in France, is hot water, a solution with huge capacities that represent up to 3 GWh every night. According to EDF, this solution has an important potential and should be replicated everywhere around Europe.

Storage solutions are therefore destined to play a key role in the integration of RES in the electricity mix.

### … but also on the consumer's side

As stressed by some speakers, development of storage also shifts the focus from the generation side to the consumer side, where an important potential to increase the flexibility of the grid is still waiting to be unfolded. Indeed, most players strongly believe that batteries will be available in sufficient quantities in the near future to manage the flexibility in the power system: batteries of electric vehicles will be used to store energy for short durations (for instance during the night, when

the car is staying still in the garage or on a parking spot). EDF currently operates 5 000 charging stations for EV in France and aims at operating 75 000 of them in France, Italy, the UK and Belgium before 2022.

Demand response is even at the core of some actors' business-model. Such flexibility is already used especially in the industrial, residential and commercial sectors in countries like Spain, Italy, the US and the UK, where 10% or the peak load is shaved. Moreover, the potential of demand response in Europe is huge according to the European Commission; several Member States share the view that demand response is reliable and comparable to generation plants.

Speakers also mentioned the "Internet of Things" as another key factor to help managing the intermittency by adjusting the needs of the population remotely.

Networks are essential to connect national energy markets, “mutualise” energy generation and better integrate RES, while ensuring grid stability and security of supply. A study of the French RTE illustrates the importance of the network: if the whole world was interconnected, there would be no difficulties to supply the entire planet with wind and solar-produced electricity.

On a more realistic level, we can see the example of Denmark, a country where wind energy is booming. Improving the connections between Denmark and Germany would therefore be highly relevant. Some speakers insist on a stronger cooperation in Europe to improve interconnections as well as a more pragmatic approach on this issue.

All and all, a mix of the solutions seems to be the road to go.

**BUT POLICY REFORMS ARE STILL NEEDED**

All speakers advocated some reforms:

- A better $CO_2$ pricing should be the priority of policy makers, in order to see the end of subsidies for renewables. The ETS development over the last decade has not been smooth, which has made the business case for solar panels or wind power difficult (fluctuating $CO_2$ prices do not create the price signal that is needed for investments with a payback time of 15 to 20 years). A carbon floor price seems a good idea for a long term strategy to 2050.
- Another important barrier is the limited access to balancing and wholesale markets in demand response. While a lot has been done on the side of policy making, the full potential of demand response is still limited by a number of regulatory barriers: artificial biding zones, exclusion of markets by default, inability to participate to wholesales markets etc.
- In addition, legal uncertainty regarding the status of storage has been pointed out: who has the ownership of batteries between the market, the DSOs, and the consumer? This question has important impacts, because the lack of legal clarity and harmonisation leads to double taxation of storage in some countries.

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