Confrontations Europe – Energy Transition Group

8 February 2017 Breakfast

"The Evolution of the Electrical Network in the Energy Transition"

This briefing summarizes the contributions of the five panelists:

- **Katrien Prins**, Networks and Regional Initiatives Unit, Directorate-General for Energy, European Commission
- **Bendt Bendtsen**, Member of the European Parliament, Danish Conservative People's Party, European People's Party
- **Michel Derdevet**, Secretary-General and member of the board of directors, ENEDIS
- **Matthias Dürr**, Director of European Affairs, AMPRION
- **Hervé Laffaye,** Director of European and International Relations, RTE

This text is a summary of their introductory presentations, their answers to participants' questions, and participants' contributions.

The session was attended by Marcel Grignard, President of Confrontations-Europe; Anne Macey, Chief Executive; and Carole Ulmer, Director of Studies. The meeting was organized by Alexandre Ferrafiat, Policy Officer for the Confrontations-Europe Brussels Office; the debates were moderated by Michel Cruciani, Climate and Energy Advisor.

INTRODUCTION

On 30 November 2016, the European Commission published its Winter Package, "Clean Energy for All Europeans," comprised of the introduction and revisions to eight pieces of legislation concerning renewable energy, energy efficiency and building energy performance, the electricity market and the security of the electricity supply, and finally, the rules for a system of governance for the Energy Union.

Thus, the European Union has fulfilled its promise to make 2016-2017 "the year of energy." With this packet, the Commission asserts that it will pursue two targets:

- **Decarbonization:** Give the market the tools and resources to expedite the energy transition towards a low carbon economy.

- **Europeanization:** Accelerate the transition from a national approach to a regional approach, prefacing an entirely European approach. The majority of subjects discussed would be an improvement for European regions, regrouping several countries (cross-border interconnection, a capacity mechanism, the support for renewable energy, etc.). The makeup of these regions is sometimes referred to technical bodies, such as ENTSO-E.

In the context of this Europeanization, the role of electricity transmission and distribution system operators is paramount. The 8 February 2017 breakfast enabled a comparison between the positions of the European

Institutions and the expectations of TSOs and DSOs on a variety of topics including finance mechanisms, investment incentives, and the challenges and barriers related to regulation and innovation.

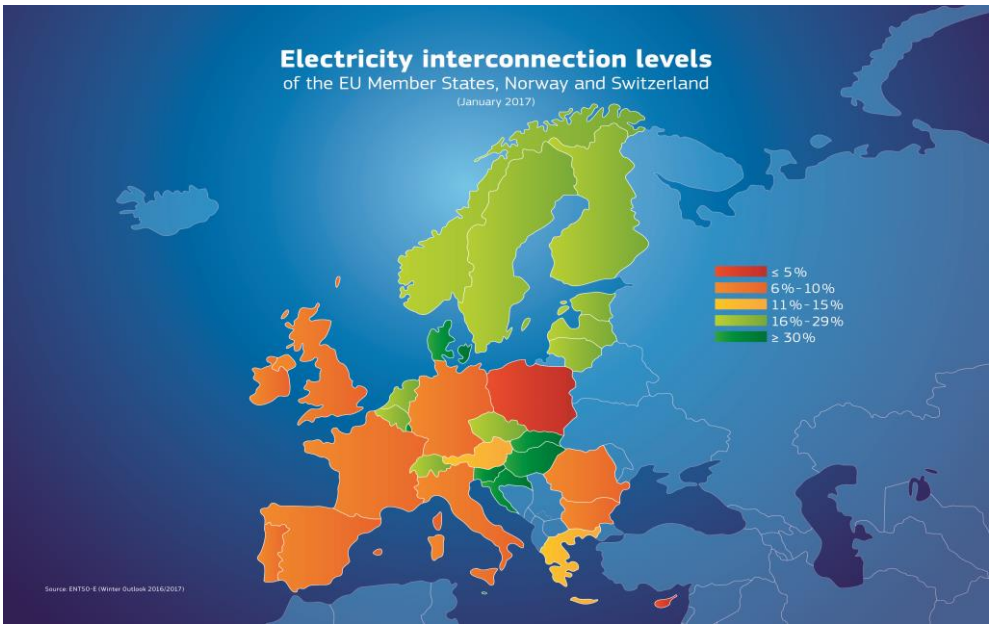
THE APPROACH OF THE INSTITUTIONAL ACTORS, THE COMMISSION AND PARLIAMENT

a) The Priority Given to Network Infrastructure:

Regulation 347/2013, on guidelines for trans-European energy infrastructure, assigned a threefold mission to the development of the European network: contribute to increasing the security of supply, to competitiveness, and to sustainability. With the Energy Union project, a political vision was added; the electrical network is perceived to be the tool that will, one the one hand, make it easier to integrate renewable energy and, on the other, erase the borders between national systems by balancing supply and demand at a European level (or at least at regional ones).

The goal set in 2009 should be achieved by nearly all countries. It asked each member state to boost its capacity for interconnection with its neighbors to at least 10% of its total installed capacity by 2020. A group of high level experts is now studying the feasibility of a target of 15% for all member states by 2030; they will present their findings at the end of the current semester. Yet at the present stage, a single goal seems unsuitable considering networks' structural diversity and that each project will undergo a cost-benefit study.

The map below shows the level of interconnection for each member state:



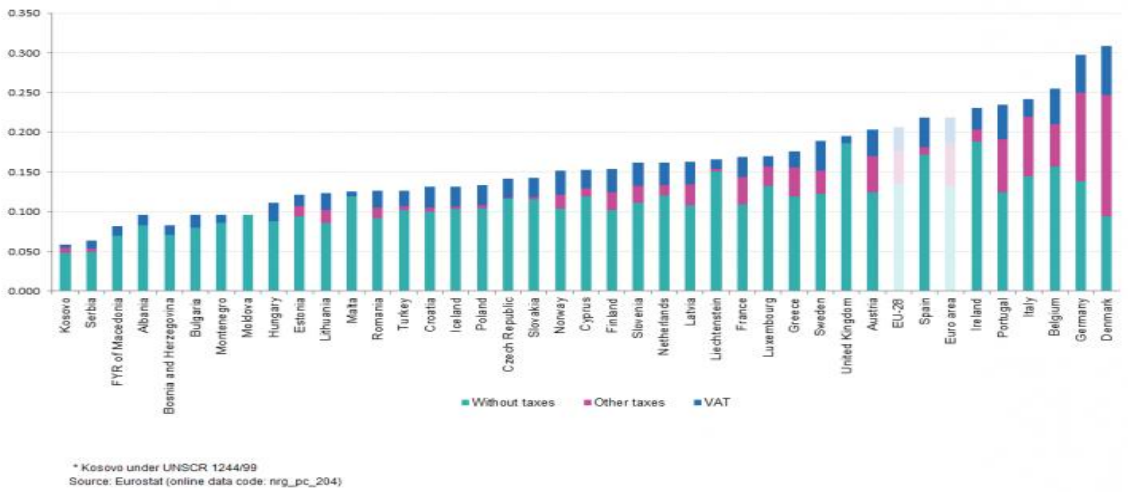
Source: ENTSO-E, winter outlook 2016-2017

In a context where energy efficiency is prioritized, the planned extension of the electrical network raises questions. If there is less need for energy, infrastructure investments run the risk of ending up with stranded assets. However, a high target for interconnection is justified if security of supply and competition issues are prioritized since it would encourage renewable energy use and reduce dependence on hydrocarbons imported from Russia and the Middle East. It would also make it possible to access the cheapest power station on the network at any given moment, thus reducing consumer costs.

Is there not risk of increasing the divisions between well-connected European regions and peripheral regions? This question has already been asked within multiple countries with greater geographic diversity. Many of these countries mitigate disparities by applying a single transmission tariff, equalizing costs across consumers. This is especially the case in Denmark, which uses tariff equalization for network costs.

The well-connected Danish market has a high degree of competitiveness, all consumers having the option to buy from either domestic or foreign companies. The graph below shows that the share of supply and transmission costs in domestic consumer costs in Denmark is among the lowest of the EU-28 (represented by the turquoise bar). It should be noted however that residential consumers are highly taxed (represented by the pink bar) and that the VAT is high.

The table below indicates the price of electricity (€/kWh) for residential consumers in the 28 member states in 2016. The price in Denmark observably hovers around €0.30 per kWh, of which 50% comes from taxes. In comparison, the price in France is around €0.15 per kWh.



Source: Eurostat - Electricity prices for household consumers, 2016s1 (EUR/kWh)

b) Financial Aid:

The magnitude of the investment requires prioritizing projects. The European Union has defined its network development priorities. They include all infrastructure projects that help member states physically integrate their energy markets, that allow them to diversify their supply sources, that contribute to ending energy isolation between certain states, and that promote the diffusion of renewable energy. Infrastructure projects that satisfy these prioritized needs on a European scale can receive the “projects of common interest” (PCI) label if they meet certain conditions:

- Accelerated procedures for planning and licensing (a binding period of three and a half years), with a single authority designated for all authorizations.
- Low administrative costs thanks to faster and more efficient environmental assessment methods.
- A published procedure manual improving the project’s transparency, enabling more public participation.

If all the criteria are met, the project becomes eligible for financial assistance from the Connecting Europe Facility (endowed with €5.85 billion in current prices for 2014-2020) in the form of either grants or available financial instruments, in cooperation with financial institutions (for example, the EIB). This aid remains modest in comparison to production costs, but nevertheless reassures investors. There are currently 195 PCIs helping to achieve Europe’s goals relating to energy and the climate and playing a decisive role in the fruition of the Energy Union.

This fund can be illustrated with a recent example: on 21 February 2017, the European Commission authorized the allocation to €4 million in financial aid from the Connecting Europe Facility for the next phase of the Celtic Interconnector project between Ireland and France, led by EirGrid and the French TSO RTE.

The fund contains some weak points however. Few smart grid projects are labeled PCIs or receive the associated benefits; it would seem that this fund favors transportation projects. However, in the context of increasingly decentralized energy production, the role of smart grids will continue to grow. The European Commission admits that only three smart grid projects have so far obtained the PIC qualification, but it promises that the following list will include more.

- **European Governance:**

Within the Commission and Parliament, interconnections are considered to be a key link in moving towards the Energy Union. Setting goals is certainly necessary, but remains insufficient if member states don't fully commit themselves. To illustrate, the interconnections between Germany and Denmark are operational, but administrative and political obstacles sometimes prevent their being used to their full potential. In Brussels, the protectionist approach taken by certain member states is found worrisome; for example, it's wondered if the obstacles to links between France and Spain are the result of political maneuvers to curb Spanish solar energy's penetration into the French market.

National protectionism constitutes a challenge that needs to be addressed through proper European governance. In this spirit, market reforms in the Winter Package stress opening national systems: capacity mechanisms' eligibility will apply to all technology and will allow for participation from cross-border producers.

THE APPROACH OF SYSTEM OPERATORS

Representatives of transmission and distribution system operators (TSOs and DSOs respectively) have likewise expressed their commitment to the fulfillment of the Energy Union. They welcome the continued advancements in the package, "Clean Energy for All Europeans," but nonetheless warn the Commission and Parliament of the technical and economic challenges they confront.

a) A Changing Business Model:

Three phenomena affect system operators:

- The development of transmission systems doesn't solely depend on the national circumstances. National networks have to be adapted more and more often to the developments occurring in neighboring countries and even at the European level. While networks have so far focused on the boom in consumption, they now focus the growth of power stations. By 2030, the installed capacity of renewable energy will probably be ten times greater than what it was in 2000, also implying a ten-fold increase in corresponding infrastructure. The total capacity of European power stations will double from 1TW in 2016 to 2TW in a few decades, while consumption could stabilize.

- Production is increasingly based in decentralized units. For example, in France, 95% of new renewable energy capacity is connected to distribution networks, which, in 2016, already managed 330,000 production sites. In the new configuration of the electricity market, DSOs will play a major role, increased still by the connection of charging stations for electric cars and by the installation of smart meters in consumers' homes. As a result, DSOs have expressed satisfaction in soon being associated in the governance of the European electricity system with the creation of an entity giving them a voice in debates.

- The digitalization of systems modifies the operating conditions for infrastructure projects. It allows for an improvement in the quality of service and for sophisticated investment planning. In regards to collected data, DSOs appreciate the clarification provided by the Winter Package, recognizing them as “neutral managers” of this data. This function will take on considerable importance; in France, by 2020 ENEDIS, with 35 million smart meters, will be collecting a volume of data 4,000 times larger than it does today.

b) A Growing Financial Constraint:

The Commission estimates that there is need for a €1.1 trillion investment in infrastructure over the course of the next 10 years, of which €400 billion will be needed for distribution networks and €200 billion will be needed for transportation networks. In this regard, TSOs and GSOs welcome the European Commission’s commitment to support investment in the network, notably through the projects of common interest and the Connecting Europe Facility. On the other hand, they express their reservations about the repeal of Directive 2005/89, which included investment incentives, as seen in the Winter Package.

The magnitude of the sum required calls for extra attention in order to create an attractive legal framework for investors by: reducing the number of actors and improving the coordination between them (governments, regulators, territorial authorities, system operators, etc.), stabilizing regulations and becoming more transparent in order to lower the risk premium, and finally searching for new available capital. On this last point, one source would be to channel private savings through a European savings account specifically intended for energy transition infrastructure projects.

The 30 November 2016 package brought up two concerns on the topic of managers’ own resources:

1. In the first place, the text predicts the convergence of transmission tariffs. This seems relevant in regards to transportation; the convergence of the methods used to determine tariffs is moving in the right direction under the supervision of ACER. It seems less justified at the distribution level, considering the disparity between different countries’ distribution zones. Whatever the calculation method, for both transportation and distribution, tariffs should generate income high enough to allow operators to invest. Special attention should be paid to the ratio between income tied to the volume of energy delivered and that coming from the power contracted by consumers (also called fixed premiums or subscriptions).

2. In the second place, the proposed revision of regulation 714/2009 would require that the interconnection congestion pricing could only be allocated to cross-border connection enhancement. This requirement may be counterproductive. Financing infrastructure work is generally based on a proportion of 40% company funds to 60% loans. Currently, company funds come in part from congestion pricing; by depriving TSOs of this income, their borrowing power is restricted and so is their ability to enhance infrastructure upstream of an interconnection. Their ability to use this income in other ways is also limited (like to lower tariffs or reduce operating costs) which would be beneficial to the market. Finally, an interconnection financed by resources outside of the TSO doesn’t earn anything in normal operation, yet it can be costly, notably in the cases of high-voltage, DC production, involving specific technological risks, or of re-dispatching during a surcharge period.

c) Acceptance of infrastructure work:

To better lead the development of interconnections and national networks, educating the public remains crucial. All TSOs and DSOs agree that local acceptance is a large constraint. Projects often face reticence from local residents; environmental advocates want lines to be underground, but farmers and stockbreeders oppose this idea…

It's been noted that the European dimension of a project as justification has been rejected with comments like, "London traders will be the ones profit." Local populations are more receptive to messages promoting the security of supply, solidarity, and the fight against global warming.

The challenge is enormous, but the establishment of regular channels of information to the public seems relevant. On this subject, RTE launched an experiment which demonstrated that during surcharge periods in the network, distributing information resulted in private and civic actions to save money. In summary, an approach based on quality information promotes public support.

In addition to efforts to increase project transparency, it could be conceivable to implement a compensation fund for the affected areas, or even make these areas joint owners of infrastructure work. Involving local actors would establish a bottom-up approach. Finally, TSOs hope that gaining local acceptance will be recognized as an externality in cost evaluations.

d) Development and Innovation:

In this phase of the transformation of the electricity market, it's only right to wonder if certain developments will have serious consequences.

This is the case with storage. System operators bemoan the Commission's desire to prohibit them from owning, developing, and managing storage units. However, multiple experiments (such as Nice Grid, supported by the EU in the Grid4EU program) have shown that the use of storage by local networks leads to economic optimization. Beyond that, storage can reduce the need for maintenance or at least delay it. For example, during strong winds in Germany, the electricity produced becomes too much for local networks to handle in certain regions. Temporary storage avoids the production losses.

The aforementioned experiments indicate that storage units are only profitable enough if valued by "system services." By authorizing system operators to manage storage units to this end, storage could see faster development in Europe than if their usage is restricted to unregulated single actors. Considering the global lens on research, giving authorization to TSOs and DSOs could promote the development of a European storage industry.

Self-consumption poses another challenge. The package, "Clean Energy for All Europeans," will promote the local community electricity experiments. There are already about a thousand micro-networks using this model in the United States and they notably all remain connected to local distribution networks.

No one envisions a closed system, enjoying an energy autarky. It's therefore necessary to quickly develop a tariff adapted to these connections, which act as insurance, otherwise consumers outside of these communities will bear the bulk of network costs.

More generally, the European energy sector will not be composed of isolated micro-territories, that is, unconnected. On the contrary, we're going to have growing metropolises and rural areas at the center of renewable energy production. To articulate these components, a reflection on the role of networks is now needed.

We are at the beginning of an era of technological breakthroughs; consequently, a sustained research effort remains indispensable, and this R&D should happen at the European level. Global competition demands a European outlook on R&D. By increasing R&D efforts, we can hope to achieve substantial gains in current activities. For example, an optimal distribution of electricity flows in the transmission network prevents the need for repairs on saturated lines; this solution is obviously more economical and more accepted by local residents than doubling the existing channels, as has sometimes been suggested by other actors.

e) Enhanced Cooperation:

In order to insure that the profitability of planned long-term investments, cooperation and dialogue between actors appears more essential than ever. This is especially true between the leaders of system operators, with approximately 2,600 DSOs in Europe and 40 TSOs. But increased cooperation between them also implies coordination with national regulators, under the direction of ACER. The more competition there is, the more regulators with the financial means and technical expertise are needed.

The purpose of increased collaboration between TSOs and DSOs is manifold. For one thing, it could define technical boundaries, for example the management of bi-directional flows from one network to another. These boundaries vary substantially from one country to the next; currently 90% of electricity from renewable resources produced in Germany is managed by TSO, while the opposite proportion is seen in France. For another, collaboration could facilitate maintaining the line frequency and voltage. Frequency is monitored at a national or even European level; voltage remains largely at the local level. For these physical characteristics, system operators propose creating a European indicator, which would facilitate the development of “system services.”