IFRI Energy Roundtable

EU Electricity Infrastructure Coordination and the Energy Transition

Brussels, June 30, 2015

State of play

Unbundling of generation and network operation has become a major feature of European electricity market liberalisation - Full unbundling for transmission, partial for distribution.

When the liberalisation directives were drafted, distributed generation was not significant. Therefore, European regulation of distribution is rather loose yet. Conversely, due to their role in fostering competition between suppliers, European regulation applying to transmission networks is very precise.

Injection of large volumes of electricity from renewable sources (E-RES) requires expanding and strengthening all networks. Investments are usually estimated at 150 B€ for transmission and 400 B€ for distribution (2012-2030).

In October 2014, the European Council backed a Commission proposal to ensure the achievement of a minimum target of 10 % of existing electricity interconnections by 2020 and 15 % by 2030.

Source: See slide 15

Key messages

The general belief is that reinforced networks and interconnections will:

1. **Allow for an ambitious target of renewable energy by 2030: 27 % on average, 45 % for E-RES.**
2. **Drive price convergence and lower the cost of supply.**
3. **Improve security of supply.**

According to the present study, the social benefit of reinforcements may have been overestimated. Several factors invite to reconsideration:

- **Assumptions related to costs seem disputable.**
- **As a consequence of energy efficiency policies, an overcapacity of grids is likely, leading TSOs and DSOs having to increase their tariffs.**
- **National choices induce major sources of disparity which limit price convergence.**
- **Member States could be reluctant to let the market ensure security of supply.**

Assumptions on social benefit

The social benefit* refers here to the gain obtained by the collectivity when a product or service sees its cost decreasing without alteration of inputs.

In most cases, the social benefit is assessed in comparing prices on wholesale markets with / without network reinforcements.

The result of the assessment depends on a series of assumptions related to the costs: fossil fuels, CO_2 allowances, economic growth, etc. These assumptions are not always detailed.

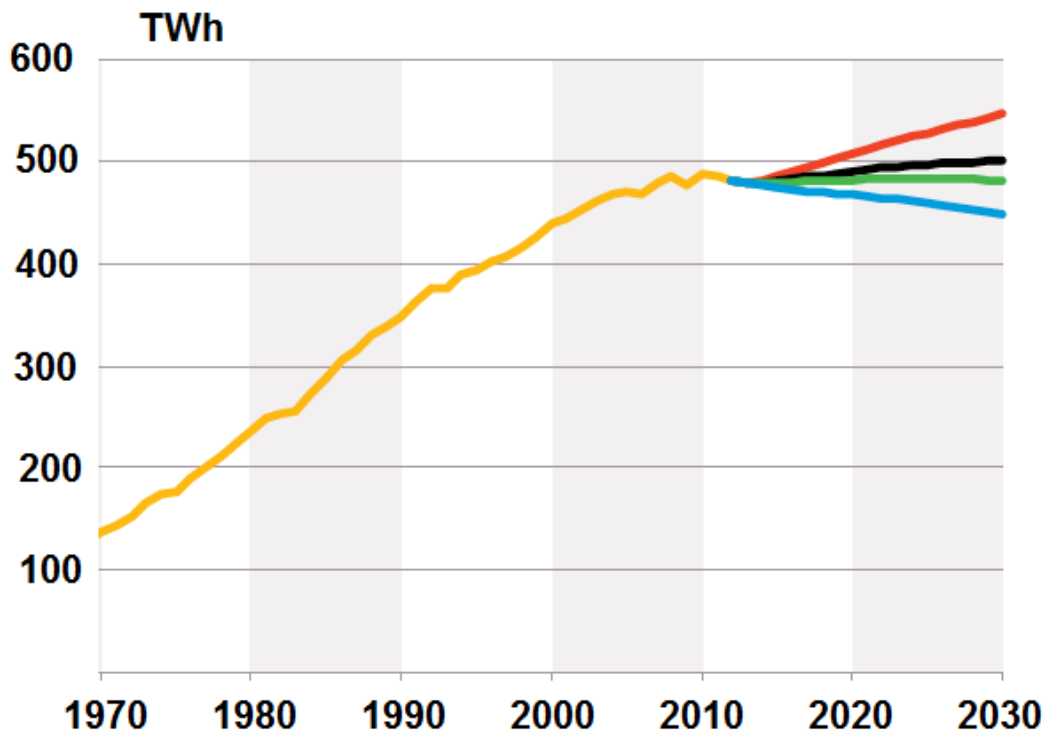
Moreover, the final cost to the consumer depends on other key factors, such as taxes & levies or transmission & distribution costs. These costs could increase if part of the networks have to be laid underground in order to overcome the opposition against the building of new high voltage overhead lines. The maintenance of smart equipment may also prove more expensive than expected.

**** Social benefit = gross welfare benefit, social economic welfare, social welfare…***

Impact of energy efficiency

Consumption forecast remains highly uncertain throughout Europe.

Evolution of electricity consumption in France:



The EU Council agreed on an indicative target at the EU level of at least 27 % for improving energy efficiency in 2030 (maybe 30 %).

Electricity will replace other energy sources in some sectors (e.g. transport), but energy efficiency measures may offset this new consumption.

Source: RTE

A risk of overcapacity

A decoupling of network capacity and transmitted energy already appears.

Evolution of the length of overhead high voltage lines in Europe:

	Consump. TWh	Growth	Installed Capacity GW	Growth	E-RES Installed Capacity GW	Growth	HV Lines x 1000 km	Growth
2009	3 231	2.4 %	881	14.1%	101	107.8%	270	12.1%
2013	3 308		1 005		210		302	

Network capacity is proportional to the installed power capacity. Nowadays, operators' income is proportional to the energy which is shipped. As the latter may stagnate, an increase in tariffs appears unavoidable. If the tariffs are to reflect the costs, an increase of the fixed component looks like the best option.

Source : ENTSO-E

Transmission tariffs & Competition

TSO tariff rates are quite different from one country to another. As a result, there is no equality in transmission costs for importation and exportation.

Examples of TSO tariffs:

	Sharing of charges		Time	Cost of	Tariff
	Generation	Load	Signal	Losses	€/MWh
Germany	0	100 %	No	Yes	9.93
Spain	10 %	90 %	Yes	No	12.02
France	2 %	98 %	Yes	Yes	5.56
Great Britain	27 %	73 %	Yes	No	10.25
Italy	0	100 %	No	No	10.64

Time signal may depend on the season & the hour (peak/mid-peak/off peak).

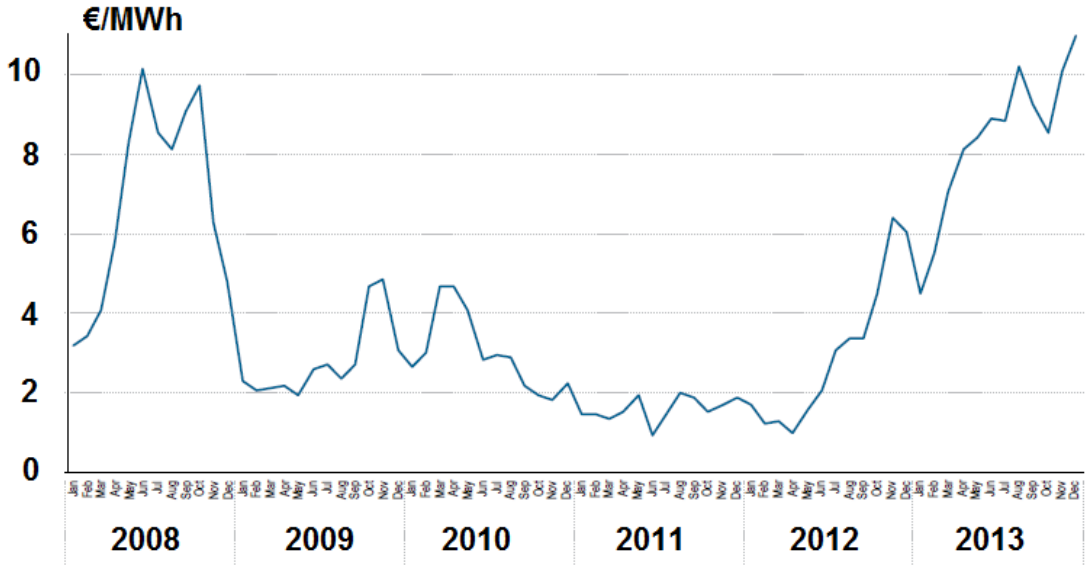
Tariff case: Power from 10 to 40 MW, 5 000 hours per year, 150 to 220 kV.

Source : ENTSO-E

Price convergence

Recent analysis shows that the benefit of market coupling on price convergence may be offset by national policies.

***Price differentials of baseload year-ahead products in the CWE region*:**



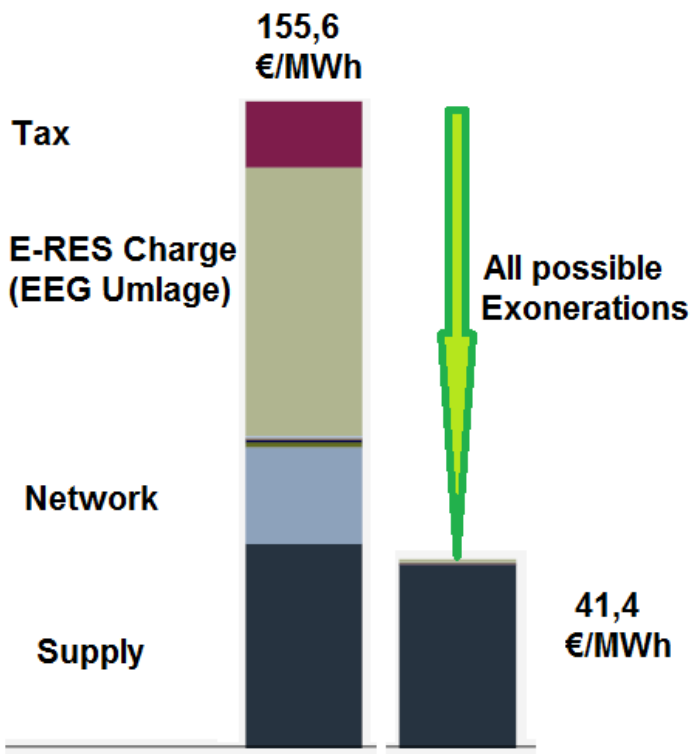
Therefore a doubt remains of the benefit of interconnections.

Source : ACER

Sources of disparity

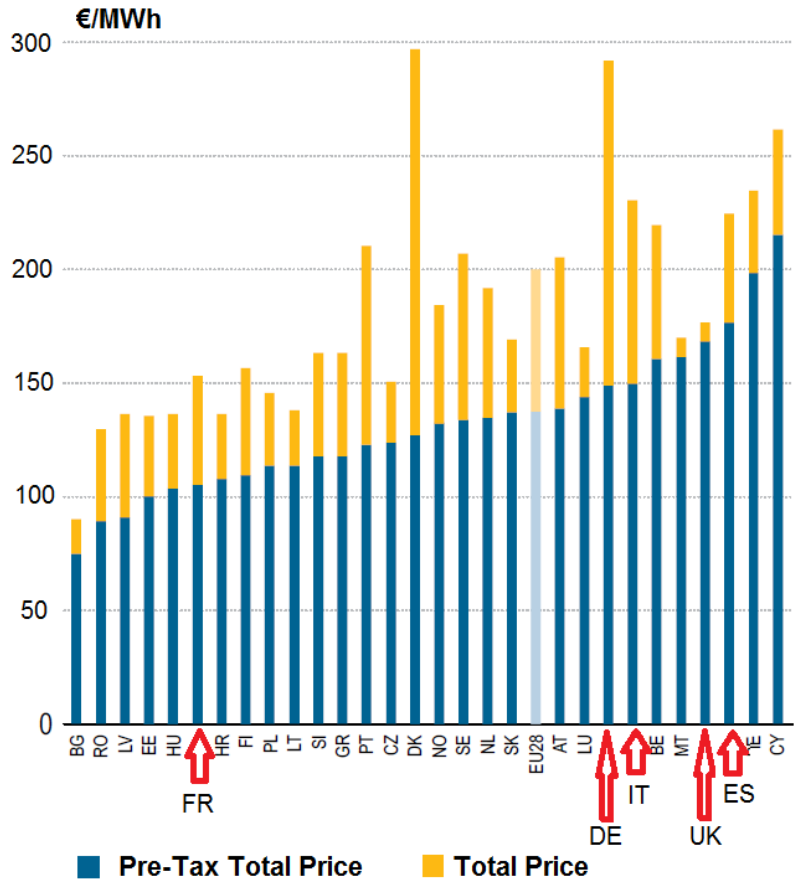
Convergence of prices on wholesale markets cannot compensate for the impact of present national policies.

Final price for industry – Impact of exonerations in Germany:



Source: BDEW

Final price for households:



Source: ACER

Interconnections & Security of supply

The target regarding interconnections is based on the installed capacity. As renewable sources have a rather low load factor, a target of 45 % E-RES means a rapid growth of installed capacity, at a pace much higher than the growth of consumption (if any).

Example of Spain:

	Annual Consumption TWh	Peak Power Demand GW	Installed Capacity GW	Wind & Solar Capacity GW
2004	235	37.7	67.9	7.8
2014	243	38.7	102.3	29.5

Within 10 years, growth of consumption was 3.4 %, growth of peak demand 2.7 %, growth of installed capacity 51 %.

Source: Red Electrica de Espana.

Security of supply

According to directive 2005/89, Member States are responsible for the security of supply in electricity. Hence, nowadays solutions diverge, from “Grid Reserves" to “Capacity Remuneration Mechanisms". The European Commission believes that with a proper interconnection capacity, a regional approach will become possible, relying on trading mechanisms and spot markets.

The pooling of backup resources across countries requires political agreement setting the rules by which these resources will be distributed in the event that they could not meet the entire demand.

On the long run, increased market integration is likely to have considerable implications for some Member States. There will be winners and losers; in some cases generation capacity may migrate beyond national borders.

For some Member States, more interconnection capacity may imply an increased dependency on neighbouring countries.

Main recommendations

Networks perform a crucial function in the energy transition. Concerns expressed herein cannot be an excuse for inaction. But they invite to act carefully so that investments do not penalize economic growth. As regards interconnections, clear agreements and regulations are necessary to avoid mistrust among member states. Hence:

1. **Keep expenditures under control through regular review of cost / benefit analyses based on the latest technical and social developments.**
2. **Adopt an industrial policy encompassing R&D (especially on HV-DC equipment and on the processing of data from smart grids) and support, through tendering procedures, to the most innovative European enterprises.**
3. **Promote cooperation through the sharing of experience gained.**
4. **Develop a "reliable and transparent governance system with the necessary flexibility for Member States and fully respecting their freedom to determine their energy mix, in order to facilitate coordination of national energy policies and foster regional cooperation".**

IFRI Energy Breakfast Roundtable

Brussels, June 30, 2015

Comments & Questions are welcome

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Afterword

By the end of the 19th century, France engaged into a huge programme of rail connections.

Due to economic downturn and technology evolution, most of these railroads became unprofitable.

It is thought that by diverting investments from the industry, this contributed to hamper France's economy in the early 20th century.

Sources (1/2)

Slide 2:
- ENTSO-E, *Ten Year Network Development Plan (TYNDP),* 2014, page 12.
- Eurelectric, *Power Distribution in Europe – Facts and figures*, 2013, page 6
- European Council 23 and 24 October 2014, Conclusions, page 6.

Slide 3:
COM (2014) 015, January 22, 2014, page 7.

Slide 5:
RTE, *Bilan prévisionnel de l'équilibre offre-demande d'électricité en France - Synthèse,* 2014, page 9.

Slide 6:
ENTSO-E, *Statistical factsheet,* 2009 & 2013.

Slide 7:
ENTSO-E, *Overview of transmission tariffs in Europe: Synthesis 2014*, page 6 and page 10.

Slide 8:
ACER, *Annual Report on the Results of Monitoring the Internal Electricity and Natural Gas Markets in 2013,* October 2014, page 113.

Slide 9:
- BDEW, *Strompreisanalyse Juni 2014*, June 20, 2014, slide 20.
- ACER, *Annual Report on the Results of Monitoring the Internal Electricity and Natural Gas Markets in 2013,* October 2014, page 27. Price for a consumption between 2,5 and 5 MWh per annum.

Sources (2/2)

Slide 10:
Red Electrica de Espana, (peninsula)
Annual consumption:
• 2004: El sistema electrico espanol 2004, page 21
• 2014: The Spanish electricity system 2014, preliminary report, page 7
Installed Capacity & Wind and Solar Capacity:
• Table Potencia instalada – Marzo 2015, page 3
Peak Power Demand:
• Table Maximo de potencia demanda horaria, page 3, Demanda maxima horaria peninsula

Slide 11:
- Directive 2005/89 EC, January 18, 2006
- Mines Paris-Tech, EU Energy Policy Blog - Daniel Scholten, Thomas Sattich and Inga Margrete Ydersbond, *Power Struggles: The Intra-Community Implications of EU Energy Policy*, 30 November 2014

http://www.energypolicyblog.com/2014/11/30/power-struggles-the-intra-community-implications-of-eu-energy-policy/

Slide 13:
Annuaire CHAIX, 1921.