A brief report on the EU Internal Electricity Market

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In order to successfully stabilize supplies & prices, these fluctuating over-capacities have either to be shifted to neighboring networks or stored locally. However, the increasing interest in international electricity trade within the EU has turned cross-border transmission capacities into a bottleneck. (Gebhardt, Hoeffler 2013) Even though the rising share of renewable energies seems to be slowed down in the mean time, the problem is not solved yet. Therefore, the extension of national storage capacities seems to be indispensable in the short-term.

The EU Internal Electricity Market (IEM) has to overcome continuous challenges and may never be called well-functioning. For instance, if solely national capacity markets will be improved in the future and cross-border trades neglected, the energy sectors would be effectively shut off from each other, and negate all the plodding work of building cross-border interconnectors, agreeing pan-European network codes schemes and coupling power markets. (Buchan, 2012)

This report briefly introduces the problematic of establishing the EU Internal Electricity Market (IEM) and tries to give fundamentals insights in today’s cross-border trade of electricity.
• Wholesale baseload electricity price in the EU

The costs and benefits of cross-border electricity trade within the EU are broadly similar to those of international trade in general. Theoretically the result should be an overall gain to welfare. Yet, wholesale prices for electricity still differ significantly\(^1\). The price components usually include capital costs for power plants, fuel costs, operation and maintenance costs; not mentioning additional costs for carbon certificates, network costs, taxes, fees, surcharges and so forth\(^2\). Besides external effects, the high difference of electricity price within the EU mainly depends on the:


The influence of the IEM can already been observed in several countries. Although total price benefits are not clear yet, competition between member states is increasing noticeable:

"In consequence of having the highest average wholesale electricity price in the EU, the UK tends to be a net importer of electricity as competitive imports from France and Netherlands are available."\(^3\).


The liberalization of national electricity markets was aiming at restructuring the monopoly (resp. oligopoly) market structures within the EU in order to increase competition and decrease dependency. However, the so-called unbundling process is still in progress. Because member states are currently in different developing stages, fair competition for cross-border trade is not guaranteed.


Additional problems for the pricing of electricity occur as the generation can be highly volatile; mainly depending on the mix of connected power plants. For instance, if national markets are facing unexpected electricity surplus generation, exporting electricity for negative prices could be even more feasible than shutting down the power plant and re-starting it. To prevent such situations, supply & price stability is usually ensured with the help of balancing power and comprehensive trading strategies. (Ocker, Ehrhart 2015)

\(^1\) Figure 1 Comparison of average wholesale baseload electricity prices
\(^2\) http://www.isi.fraunhofer.de/isi-wAssets/docs/x/de/projekte/Comparison_industrial_electricity_prices_final.pdf
\(^3\) Figure 2 Net import & export flows in the pan-EU region
4 Price mechanism.

Because of intense political interests in electricity pricing, the complexity of harmonizing wholesale electricity prices in the EU is even higher. Regulations and incentives for prioritizing certain technologies like feed-in-tariffs, quota systems or other privileges were developed and implemented separately around the EU. Thus, similar technologies can provide electricity to differentiated prices.

- **Barriers for a well-functioning EU Internal Electricity Market**

The EU ambition to establish a well-functioning IEM already started in the early 1990s. Certainly, efforts need to be continued if the potential of strengthened cross-border relations should be exploited. The challenge for a well-functioning IEM therein lies in solving close related & complex issues of political, economic and technical nature, constantly. Some aspects are introduced in the following:

[1] The conflict of interests between individual member states and the EU as a whole.

As electricity is one of the most valued good in our economy, various individual agreements have been reached over the past decades in order to guarantee stability. Therefore, the idea of creating an IEM with a common approach is not a simple task.

Besides 28 member states of EU, the member states of the European Free Trade Association (EFTA) as well as several neighbouring countries are in- & directly participating in the IEM⁴. A good example to illustrate the complexity of electricity trade agreements and the importance of trade within the pan-EU region is Switzerland. The country is neither an EU nor EEA member, but still one of the major participant in Europe's most intense electricity trading region⁵; even though an EU-Swiss electricity agreement is non-existent. The establishment of the IEM seems to need even more incentives:

"The ensuing incoherence of internal market rules creates discrimination issues for investors, businesses and citizens, a structural challenge that the EU seeks to remedy." ⁶


Due to higher volatile electricity in-feed, trade participators have to react faster and more accurate in order to ensure supply security and low electricity prices. Although day-ahead trading schemes were only established recently between most of the EU

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⁴ E.g. Bosnia Herzegovina, Montenegro, Macedonia, Serbia, Albania, Belarus, Morocco, Russia, Turkey, Ukraine, Andorra.

⁵ Figure 5 EU cross-border monthly physical flows by region

member states\(^7\), in some regions intra-day trading schemes already allow cross-border trade within only 15-45 minutes ahead of delivery\(^8\). The creation of such fast interacting trading regions is basically initiated by coupling national markets. The so-called “Multi-Regional Coupling (MRC)” already covers 19 countries, representing around 85% of the European power consumption.

Still, trading schemes remain inhomogeneous and require a well thought and fast changing approach. The main markets (products) for doing so are:

- Spot market (Day-ahead /Intraday)
- Derivatives Market (Futures / Options)

The major platform for these trades within central Europe is the European Energy Exchange AG (EEX), based in Leipzig.

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Electricity itself is seen as a very high quality and homogenous good which cannot, as it today, be stored without significant loses. In order to guarantee supply security and competitive prices, relevant power transmission data therefore need to be communicated bidirectional and with a high level of transparency. An improvement in communication between trading regions would prevent over-capacities from damaging electrical networks as counter measures could be taking immediately. These problems are partly triggered by the change from a centralized to a more decentralized structure, where consumers are most likely to be producers at the same time, and the fact that these networks were not constructed for doing so. Thus the increase of remote control abilities is seen as crucial.

Currently, so called Project of Common Interest’s (PCI’s) are negotiated, in order to achieve the target of 10% electricity interconnection until 2020.\(^9\) The coordination of these sophisticated technical issues can only succeed with intense negotiations and standardization. Two of the key players in this concern are the European Network of Transmission System Operators for Electricity (ENTSO-E) and the Agency for the Cooperation of Energy Regulators (ACER).

\(^7\) Figure 3 Progress in the coupling of markets in 2014 and 2015 (Source: Eurolectric)
\(^8\) France, Germany, Austria and Switzerland (Source:EPEX SPOT)

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\(^9\) Figure 4 Interconnection levels at the end of 2014 and main areas where the interconnectivity is expected to be improved due to the PCIs (Source: Eurolectric)
Outlook

The tremendous importance for electricity supply security & competitive electricity prices is forcing member states to expand their capacities; either through cross-border trade or national storage.

For an effective reduction of the average energy wholesale baseload electricity price in the EU, member states need to focus on their comparative advantage and increase transmission capacities.

Cross-border interconnections are particular useful when two countries have diverging characteristics, and this will be increasingly the case as the massive planned expansion in renewable sources takes place across Europe. A higher level of interconnectivity would enable member states to bypass transmission bottlenecks in, thus alleviating domestic congestion.

One significant new development being encouraged by the European Commission (EC), is the so-called “market coupling” which has started to take place on some parts of Europe. Market coupling involves two or more countries coordinating their power exchanges, in such a way as to remove the need for explicit auctions for cross-border capacity. Instead, the integrated power exchanges make cross-border capacity implicitly available, up to the maximum physical limit, in a process known as implicit auctioning. If sufficient physical capacity is available, prices are equalized where import demand meets export supply at equilibrium and there are no longer any price differences between the countries involved.

As globalization is moving forward in tremendous pace, lower electricity costs are getting even more substantial. In comparison to other international energy markets, the development of the average wholesale baseload electricity price in the pan-EU area is still lagging behind.\textsuperscript{10}

Nevertheless, an EU Internal Electricity Market has never been so close within reach, than it is today. By now, 36 countries have already emerged their national trading markets in only seven regions\textsuperscript{11}. If this development will continue, the IEM won't remain a mere idea and in fact be able to proof its contribution to welfare within the pan-EU area.
Figures

Figure 1 Comparison of average wholesale baseload electricity prices, 3rd quarter of 2015
(Source: Pattts, European power exchanges)
Figure 2 Net import & export flows in the pan-EU region, 2014. (Source: ENTSO-E)
Figure 3 Progress in the coupling of markets in 2014 and 2015 (Source: Eurolectric)
Figure 4 Interconnection levels at the end of 2014 and main areas where the interconnectivity is expected to be improved due to the PCIs (Source: Eurolectric)
Figure 5 EU cross-border monthly physical flows by region

Source: ENTSO-E
European countries are grouped in the following regions:
- Central Western Europe: DE, NL, FR, LU, BE, AT, CH
- Central Eastern Europe: PL, CZ, HU, SK, HR, SI
- Iberian Peninsula: ES, PT
- South Eastern Europe: RO, BG, GR, RS, BA, ME, FYROM, AL

CWE: DE, NL, FR, LU, BE, AT, CH
CEE: PL, CZ, HU, SK, HR, SI
Nordic: SE, FI, DK, NO
British Isles: UK, IE
Apenins Peninsula: IT
Baltic: EE, LT, LV
Figure 6 Comparison of the average US, Japanese, Australian and European wholesale electricity prices
References


