Conditions for making competition work in the Central European electricity market
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Abstract
A major motivation for the currently ongoing restructuring of electricity markets is the assumption that liberalization, deregulation and privatization will lead straightforward to competition in electricity generation as well as electricity supply and to corresponding lower prices. In this paper we focus on the Central European electricity market. The core objective is to analyse which conditions are necessary to bring about competitive electricity prices and to avoid market power in this market in the long term.

The major conclusion of this investigation is that the following conditions are simultaneously necessary to meet the objective of a competitive electricity market in the long term: (i) a more rigorous financial separation of the grid from generation and supply especially in Germany and France to ensure non-discriminating grid access; (ii) sufficient transmission capacities for creating a larger market; (iii) a minimum of remaining excess capacities in generation; (iv) a sufficiently large number of remaining generators; (iv) a continuing equilibrium of short term spot markets and liquid and actively-traded long term financial instruments for managing price/cost risk; (v) a 100% liberalised market.

If only one of these conditions is missing, competition in Central Europe will remain an illusion and the final result will be a considerably distorted market again.

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1. Introduction
In Central Europe the introduction of a competitive electricity market has been started in 1999 and is currently still under construction. A major motivation for this is the assumption that liberalization, deregulation and privatization will lead straightforward to competition in electricity generation as well as electricity supply and to corresponding lower prices. With respect to the political expectations e.g. the European Commission (EC) states: “market forces produce a better allocation of resources and greater effectiveness in the supply of services”¹.

Yet, so far only few investigations have been conducted on the conditions necessary for long-term competition in electricity markets. The most important paper is the seminal paper of Newbery (2002) that focuses on the restructuring process in UK. Newbery concludes that regulation is important also in the segments of the electricity market that are opened to competition: “The dictum of confining regulation to the natural monopolies have often been

taken to literally, paying to little attention to the unnatural, or at least undesirable, monopolies in generation”. The authors of this paper have argued years ago that the expectation of lasting competition in a “free” market is based on very simplified assumptions on the strategic behaviour of electricity generators and network operators (Haas et al (1997) and Haas/Auer (2001)). Similar are the caveats described in Banks (1996) and Banks (2004) that are based on the experience in the UK and the Nordic market (Norway, Sweden…). He states that “the market is a wonderful thing and it should be exploited as far as possible but it also has its limits”.

In this paper we discuss the relevance of the following conditions to bring about real competition and to avoid market power in the Central European electricity market:

(i) a rigorous correct unbundling;
(ii) excess capacities in transmission (TM) and non-discriminating conditions for grid access;
(iii) excess capacities in generation;
(iv) the number of generators;
(v) an equilibrium between short-term spot markets and liquid and actively-traded long-term markets e.g. bilateral contracts (Over-the-counter), forwards, and financial instruments for managing price/cost risk;
(vi) full liberalisation;
(vii) privatisation.

Finally, it is discussed what will be the consequences for wholesale electricity prices.

2. The European electricity markets

The initial intention of the EC was to introduce a common European electricity market, see EC (1997). Currently, the experience is as follows: The current conditions are:

• Western Europe is far away from a joint electricity market. The Western European electricity market (15 EU member countries plus Norway and Switzerland) consists in 2004 in practice of (at least) five different sub-markets which are separated by insufficient transmission capacity and limited access to the grid (especially in France and Germany). see Fig. 1. These sub-markets are: 1) UK and Ireland, 2) The Nordic countries (Norway, Sweden, Finland, Denmark), 3) Spain and Portugal, 4) Italy, and 5) Central Europe (France, Germany, Austria, Switzerland …). A detailed analysis of the transmission restrictions between these markets is given by Glachant (2003).

• In Central Europe (mainly Germany and France) the major problems are: (i) a very small (and continuously decreasing) number of generators, and (ii) a lack of serious unbundling between generation and transmission; This leads to cross-subsidization of generation by the network operation and to a heavy discrimination of other and new generators;
3. **The relevance of correct unbundling and sufficient transmission capacities**

The first important issue is “correct unbundling”. It is based on the idea that competition in generation and supply of electricity requires the separation of the parts of the former vertically integrated electricity supply industry where competition is possible and parts where it is not, see Fig. 2. Currently, in generation and supply it is assumed widely that competition should be pursued while the transmission and distribution grids remain natural monopolies.

With respect to access to the transmission and distribution grid it is of high relevance that open and comparable access at reasonable non-pancaked rates is ensured.

A very important prerequisite regarding “unbundling” is that it refers to “financial” unbundling and not to technical unbundling. This financial unbundling – a separation of electricity generators and transmission grid operators - is important because of the following reasons:

- to ensure that potential new generators are not discriminated from access to the TM grid and
- to avoid cross-subsidization of generation by transmission.

That is to say, it is very important that financial unbundling is not accompanied by a technical unbundling. The retainment of communication between generators, grid operators and suppliers is an essential element of a functioning electricity market. Otherwise the likelihood of “blackouts” as recently experienced in various European countries increases.

Finally it is important to state that there is no reason for an unbundling of the areas generation and supply. In both areas competition is expected. As can be seen from the Californian desaster (financial) unbundling of generation and supply is even counterproductive. From a suppliers point of view owning generation capacities can simply be seen as a possibility of hedging against the risk of price increases because owning a power plant for a supplier is kind of a long-term contract and long term contracts are an important element of a functioning competitive market, see Section 8. For a generator the situation is vice versa. In England & Wales this unnecessary unbundling of generation and supply led to “contracts for differences” between generators and suppliers to provide an alternative.
The Western European experiences with respect to unbundling between generation and TM are ambiguous. In England & Wales as well as in the Nordic market and in Spain a by and large correct unbundling of generation and transmission was conducted, see Glachant and Finon (2003). Yet, in Central Europe especially in Germany, France and Switzerland unbundling was only done by means of weak internal management measures and not sufficient for avoiding discrimination. Currently due to this lack of rigorous unbundling market power of generators over the grid is a major obstacle for a real competitive electricity market. Especially in the core countries of the Western European transmission grid - Germany and France - incumbent generators retain market power over the transmission grid since the start of liberalisation, see Haas (2001) and Finon (2003). This led to cross-subsidization of generation by the network operation and to a heavy discrimination of other and new generators. In the first years after the start of liberalisation the large vertically integrated German utilities made high profits with the grid and no profits or even losses in generation (Source: Annual reports of the companies). The major problem in Germany is that due to private ownership of the large vertically (generation and transmission) integrated utilities it is very difficult to achieve a rigorous unbundling by legal measures or by ownership. Table 1 provides a survey on the type of Unbundling of the transmission system operator (TSO) and the type of access to the transmission grid in Western Europe (CEC (2005)).
Table 1. Type of unbundling and access to the grid in several EU-15 member countries incl. Norway in 2002 (rTPA...regulated third party access, nTPA...negotiated third party access, SB...Single Buyer model). Source: CEC 2004

<table>
<thead>
<tr>
<th>Country</th>
<th>Unbundling TSO (Transmission system operator) 2004</th>
<th>Access to the grid 2004</th>
</tr>
</thead>
<tbody>
<tr>
<td>Austria</td>
<td>Legal (AGP); Management (TIWAG, VKW)</td>
<td>rTPA</td>
</tr>
<tr>
<td>Belgium</td>
<td>Legal</td>
<td>rTPA</td>
</tr>
<tr>
<td>Denmark</td>
<td>Legal</td>
<td>rTPA</td>
</tr>
<tr>
<td>Finland</td>
<td>Ownership</td>
<td>rTPA</td>
</tr>
<tr>
<td>France</td>
<td>Management</td>
<td>rTPA</td>
</tr>
<tr>
<td>Germany</td>
<td>Management</td>
<td>nTPA</td>
</tr>
<tr>
<td>Greece</td>
<td>Legal/ Management</td>
<td>rTPA</td>
</tr>
<tr>
<td>Ireland</td>
<td>Legal/ Management</td>
<td>rTPA</td>
</tr>
<tr>
<td>Italy</td>
<td>Legal</td>
<td>rTPA ... eligible customers SB(rTPA)...captive customers</td>
</tr>
<tr>
<td>Luxembourg</td>
<td>Management</td>
<td>rTPA</td>
</tr>
<tr>
<td>Netherlands</td>
<td>Ownership</td>
<td>rTPA</td>
</tr>
<tr>
<td>Norway</td>
<td>Ownership</td>
<td>rTPA</td>
</tr>
<tr>
<td>Portugal</td>
<td>Ownership</td>
<td>rTPA ... eligible customers SB(rTPA)...captive customers</td>
</tr>
<tr>
<td>Spain</td>
<td>Ownership</td>
<td>rTPA</td>
</tr>
<tr>
<td>Sweden</td>
<td>Ownership</td>
<td>rTPA</td>
</tr>
<tr>
<td>UK</td>
<td>Ownership (E&amp;W); Management (Scotland, Northern Ireland)</td>
<td>rTPA</td>
</tr>
</tbody>
</table>

From this table it can be seen that a rigorous unbundling by ownership or legal measures took place only in the UK, Spain and the Nordic countries but not in Central Europe.

Another important prerequisite for a sufficiently large market is that there are sufficient transmission capacities to neighbour regions. This increases the number of competing generators in principle. This is due to the basic principle of electricity trade between two regions A and B: Trade from A to B only takes place if the sum of generation costs in A plus transmission costs from A to B is lower than generation costs in B. Hence, it is important for an intensified trade between countries that the transboundary TM grid fee is low and this can only be brought about by low congestion due to sufficient capacities in transmission.

Another important issue is correct transmission pricing. Yet, even currently in an environment with strong cooperation among the European regulators correct transmission pricing is not at all a hot issue. The intention current is rather to apply flat non-pancakes rates (e.g. 1€/MWh for every MWh traded via Cross-borders, see ETSO (2004).

But transmission constraints have a substantial impact on the separation of sub-markets in Western Europe.

Hence, the basic conditions to bring about a European-wide electricity market are an extention of the TM grid at the bottlenecks and a non-discriminating, open and comparable
access to the transmission grid at reasonable non-pancaked rates. Or as Newbery (2003) puts it “... to rapidly increase transmission capacity offered at efficient prices”.

4. Electricity demand and the role of excess capacities in generation in liberalised markets

Excess capacities in generation play a very crucial but also very ambiguous role in the restructuring process of an ESI:

If excess capacity in generation exist – and as has been mentioned before this depends most often on transmission capacity - and utilities compete at least to some extent the price they receive for electricity will be equal to the short term marginal costs. Under perfect competition without remarkable excess capacities the price will be equal to the long-run marginal costs (LRMC). But if there is no competition the price will be set strategically and might be substantially higher than under competition especially if demand is very inelastic.

This leads to a bivocational paradoxon regarding excess capacities:

• On the one hand it is obvious that excess capacities in generation are a basic condition for competition in generation. E.g. Woo et al (2001) states “if electricity market reform is not done in an environment of surplus capacity … it will not yield the desired outcome.”. Otherwise, every generator can exert market power and prices will rise substantial, at least temporarily. An important issue in this context is the fact that short-term electricity demand is usually very inelastic.

• On the other hand it is obvious that generators have to recover returns on and of investments. This is not possible in the constant presence of surplus capacity andprices reflecting short-term marginal costs. But if this is not possible, then generation investment diminishes, thus removing the surplus capacity, harming reliability and raising price. Hence, competition between electricity generators in a deregulated environment will in the long run almost surely fail since constant surplus capacity cannot be true in the real world because it is a contradiction to the objective of profit maximization.

This leads to the following pattern which can be observed in most countries where liberalisation takes place: First, prices decrease due to efficiency gains and a shut-down of currently uneconomic capacities. But after a short period of time wholesale prices start to increase considerably, mainly due to the exertion of market power and a lack of excess capacities.

Currently, this pattern can also be observed in Central European countries. On the one hand electricity demand increases considerably, see Fig. 3. On the other hand, total conventional generation capacity decreased continuously since 2000, see Fig. 4.
Figure 3. Development of demand in Central European countries

Another important issue regarding the availability of excess capacities is the volatility of hydro power. As Fig. 5 shows for the example of some Central European countries hydro power availability varies tremendously over time. With an average of 1 the maximum over a
year is about 1.20 while the minimum is 0.85. Hence, the minimum is only 3/4 of the maximum. Moreover, in different countries like Austria, Switzerland and France the variation is very similar. Furthermore, in winter months the minimum production in the long run is only half of the maximum. In countries with a high share of nuclear power there is a feedback of available hydropower on the availability of nuclear power plants due to cooling capacity. Hence, to some extent the reduction in electricity generation due to less hydro availability will be intensified by a decrease in nuclear generation.

![Annual variation of Hydro Power availability in Central European countries](image)

Figure 5: Annual variation of Hydro Power availability in Central European countries (Source: UCTE and own Investigations)

5. Mergers vs divestiture: The relevance of a sufficient number of generators

Yet, excess capacities are not enough for effective competition. It is also of high relevance how many companies own these excess capacities. This is easy to prove with the following example. Assume ten different companies each own one power station each (same type, same size). Then no company can afford not to operate its power station without the risk of considerable high losses. But if these ten power stations are owned by one company it is easy to imagine that one or two of them will stop operation and lead to higher market prices and hence to higher revenues from the operating plants.

Hence, for effective competition a large number of companies who do compete is requested. This is proven clearly by the example of England&Wales where the number of generators has been increased several times by the regulatory authority.

Yet, a large number of competing generators does not coincide with the objectives of (incumbent established) companies in a liberalised market. Their objectives are:

- Satisfy shareholders
- Prices and profits as high as possible
- Avoid competition and strive for mergers and, strategic prices.

Western Europe is a typical example. As can be seen from Fig. 9 from the 17 largest generators which existed in 1999 – the year liberalisation started - in Western Europe five years later only 11 remained. With respect to market shares in 1998 ten generators owned 60% of the generation capacities, in 2002 only six (see Codognet et
al (2003)). Thomas (2003) suspects that finally European-wide (similar to the seven sisters in the oil industry) only “seven brothers” will remain as large generators. Of particular concern with respect to competition is the situation in Central Europe (France, Germany, BeNeLux, Austria). The concentration process in the electricity generation market was especially fulminous in Germany. Mez (2003) provides an impressing and detailed description of this process. A quite different picture is described in Finon (2003). He portrays how a dominant player like EdF in France can benefit from liberalization by exerting severe market power in the home market while at the same time an aggressive acquisition policy is pursued abroad. (For a comprehensive analysis of the merger-mania in Western Europe after the implementation of the EU-Directive see also the analysis of ownership structures in Midtun (2001) and the comprehensive discussion on mergers in Western Europe in Codognet et al (2003)).

Now in Central Europe only five large blocks dominate the market: EdF/EnBW, RWE, E.ON/Sydkraft, HEW/Vattenfall/VEAG, and Electrabel.

Of course, it is hard to believe that this structure ensures effective competition even in the short-term. It is much more likely that the major objective of these utilities is to set strategic prices. And, indeed, as e.g. Muesgens (2004) shows from 2001 to 2003 in Germany the difference between wholesale electricity prices and marginal generation costs has increased continuously due to increasing market power, see also Fig. 9.

Summing up, the "merger-mania" in the years following the start of liberalisation in Western Europe in 1999 – see Fig. 6 – proves that the major strategy of investor-owned electricity generators is not to compete but rather to merge or to purchase shares. The mergers pursue two major objectives:

(i) An official one: to achieve a potential for savings due to synergies;
(ii) An unofficial one: to become able to set prices as high as possible. In practice minimal shares owned by otherwise competing utilities or joint-ventures can avoid competition and allow to set strategic prices;
6. Distortion of competition due to geographically and timely different market opening

Another major barrier for effective competition is the geographically and timely different opening of the market. It leads to customer discrimination and high transaction costs for transboundary electricity trade due to reciprocity.

Customer discrimination has initially been caused by the EU directive (CEC (1997)) which prefers liberalisation for large customers and discriminates households. Glachant (2003) provides a sound analysis of the sizes of eligible and non-eligible electricity markets in Western Europe.

This discrimination favours large electricity users like business firms who enjoy far lower energy prices than small users like households, see e.g. EC (2005).

Table 2 depicts the opening of the market in different EU member countries in 2003. Some countries like UK, Sweden, Germany, Finland, Norway and Austria have fully opened their market (=100 %). Others like France, Greece, Ireland have opened only the minimum.
Table 2: Electricity directive implementation (1 January 2004) in EU countries, Norway and Switzerland. Source: CEC 2004.

<table>
<thead>
<tr>
<th>Country</th>
<th>Eligible customers</th>
<th>Market opening</th>
</tr>
</thead>
<tbody>
<tr>
<td>Austria</td>
<td>All</td>
<td>100%</td>
</tr>
<tr>
<td>Belgium</td>
<td>&gt;10 GWh (*)</td>
<td>80%</td>
</tr>
<tr>
<td>Denmark</td>
<td>All</td>
<td>100%</td>
</tr>
<tr>
<td>Finland</td>
<td>All</td>
<td>100%</td>
</tr>
<tr>
<td>France</td>
<td>&gt;7 GWh</td>
<td>37%</td>
</tr>
<tr>
<td>Germany</td>
<td>All</td>
<td>100%</td>
</tr>
<tr>
<td>Greece</td>
<td>&gt;1 kV</td>
<td>34%</td>
</tr>
<tr>
<td>Ireland</td>
<td>&gt;0.1 GWh</td>
<td>56%</td>
</tr>
<tr>
<td>Italy</td>
<td>&gt;0.1 GWh</td>
<td>66%</td>
</tr>
<tr>
<td>Luxembourg</td>
<td>&gt;20 GWh</td>
<td>57%</td>
</tr>
<tr>
<td>Netherlands</td>
<td>3 X 80 A</td>
<td>63%</td>
</tr>
<tr>
<td>Norway</td>
<td>All</td>
<td>100%</td>
</tr>
<tr>
<td>Portugal</td>
<td>1 kV</td>
<td>45%</td>
</tr>
<tr>
<td>Spain</td>
<td>All</td>
<td>100%</td>
</tr>
<tr>
<td>Sweden</td>
<td>All</td>
<td>100%</td>
</tr>
<tr>
<td>Switzerland</td>
<td>No final customers</td>
<td>0%</td>
</tr>
<tr>
<td>UK</td>
<td>All</td>
<td>100%</td>
</tr>
</tbody>
</table>

*) Figures for Vallonia. Full market opening in Flanders region

Norway (not in the EU) has already fully opened its market whereas in Switzerland (not in the EU) the market opening is 0%.

Recently, the EC announced that it intends to fully open the electricity market in the year 2007. Yet, it is very likely that this point-of-time will be too late. It is likely that then the generators structure has been strongly settled and no significant number of Independent power producers (IPPs) will contest the market.

7. Impact of Eastern European countries

An important future impact on the Central European electricity market might come from Eastern European countries. Currently, the transmission lines are limited, especially between Germany and Poland and Austria and Slovakia/Hungary. Moreover, the situation with respect to competition in the Eastern border countries is not promising. While in Poland and Hungary there are about three large generators there is only one in the Czech Republic and Slovakia. Yet, it has to be considered that excess generation capacities exist in Poland, Czech Republic, Bulgaria, Romania and Ukraine, see Fig. 7. Hence, if the transmission system in and between the crucial countries along the former EU-15 countries Eastern border is extended there could be the chance for an extention of the current Central European market to the East.
8. **Consequences for electricity price development**

Finally, of interest is of course how electricity prices will develop. Figure 8 depicts the historical price development in Central Europe 1999-2004. Figure 9 compares the historical numbers with a marginal cost model. As can be seen since 2001 the gap between prices and marginal costs has widened continuously (see also Müsgens (2004)).

![Central Europe: spot market price EEX](image)

Figure 8. Historical development of electricity prices in Central Europe 1999-2004
As argued in Section 4 most important in this context is the development of generation capacities. Fig. 10 depicts the currently looming development of load and capacities.

Finally, Fig. 11 depicts the like development of electricity prices in Central Europe if a bottleneck situation as described in Fig. 10 emerges.
9. Conclusions

The major conclusions of this analysis is: all the following conditions are necessary to bring about real competition in Central Europe:

- a rigorous financial separation of the grid from generation and supply: otherwise it is very likely that generation of the incumbent utility is cross-subsidized via the grid fee and that the entrance of new IPPs is made impossible. This experience has been made in recent years in Western Europe especially in the French and German markets.

- sufficient transmission capacities for creating a larger market: The evidence from Western Europe is that, currently, there are (at least) five sub-markets separated by insufficient transmission capacities and partly non-transparent access to the grid. Hence, the basic condition to bring about a European-wide electricity market is a non-discriminating, open and comparable access to the transmission grid at reasonable non-pancaked rates. As Newbery (1992) puts it “The best short-run method of supporting electricity liberalisation is to rapidly increase transmission capacity (offered at efficient prices)”. This is also important for a continuing integration of Eastern European countries.

- the existence of sufficient excess capacities in generation: Competition can be sustained only if excess capacities are available. After the dust of merging, acquisitioning and share purchasing has settled without regulatory interferences in every liberalized electricity market capacities soon become scarce and the volatility as well as the absolute level of wholesale electricity prices rises substantially; This effect has so far occurred impressively in Central Europe. Hence, it is of tremendous importance that incentives for investments in sufficient excess capacities are provided by the regulatory authorities. Note, that adequate excess capacities can also be brought about by proper demand-side load management.

- regulatory measures also in the generation sector: Yet, adequate excess capacity is not enough. It is also important, who owns it. That is to say, it is important that excess capacity is shared between at least 5 to 7 generators as the English deregulation experiment proves. Moreover, the issuing of licences for generators could ensure a more transparent capacity availability and avoid sudden bottlenecks (Newbery (1998)).
a 100% liberalised market: the still fragmented different market opening in different Western European countries ranging (in 2004) from 0% to 100% (see Table 2) is – because of reciprocity rules – still a barrier for non-distorted transboundary electricity trade.

All these conditions must be fulfilled simultaneously to bring about a competitive electricity market. Yet, implementing these conditions demands severe regulatory interferences, especially in the competitive generation sector. But as Newbery (2002) argues, “the EU lacks the necessary legislative and regulatory power to mitigate generator market power.” If only one of these conditions is missing, competition will remain an illusion and the result will be a distorted market again. In the worst case an even a more distorted market structure will emerge than before the start of restructuring and costs for consumers (in total) might be substantially higher.

References


