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# Evaluation of Economic Merger Control Techniques Applied to the European Electricity Sector

*With European electricity markets not yet functioning on a competitive basis and consolidation increasing, the European Commission has said it intends to more intensively apply competition law in the electricity sector. Yet economic techniques and theories used in EC merger control fail to take sufficiently into account some specific features of electricity markets. The authors offer suggestions to enhance their reliability and applicability in the electricity sector.*

*Leen Vandezande, Leonardo Meeus, Bram Delvaux, Geert Van Calster and Ronnie Belmans*

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## I. Introduction

Before the start of the European liberalization process, electricity generation in many Member States was characterized by a monopolistic or at least oligopolistic market structure, often state-owned. Sector-specific regulation – consisting of the first Electricity Directive 96/92/EC, the second Electricity Directive 2003/54/EC and Regulation 1228/2003,

respectively – intended to put an end to this situation by exposing electricity markets to EU-wide competition. According to the Commission's report on progress in creating the internal gas and electricity market<sup>1</sup> and the preliminary report of the sector inquiry<sup>2</sup> this objective has not been achieved yet.

Firstly, concentration in national markets remains high: the concentration ratio

C3 – being the combined market share of the three largest generators – exceeds 65 percent in the majority of EU countries. The strong position of incumbent generators has not yet been significantly eroded by investments in generation by new entrants. Secondly, a growing consolidation at European level can be observed. National incumbent generators are increasingly entering other Member States through large acquisitions, raising as such the need for well-developed cross-border competition. Within this ongoing wave of mergers, several Member States are nevertheless still putting national interests first. The reactions of the French and Spanish government to the recently announced takeover bids of E.ON on Endesa and Enel on Suez, respectively, point to a rising tide of protectionism running counter to the idea of European market integration.

Given this persistent concentration, the Commission promised to more rigorously apply competition law in the electricity sector. On the one hand, it will meticulously scrutinize merger proposals under the EC Merger Regulation (hereafter ECMR). On the other hand, antitrust enforcement will be intensified: valuable precedents – tackling violations of Articles 81 and 82 of the EC Treaty – might soon be set. Furthermore, a review of both ECMR and Article 82 has been planned.

According to Barquin, Bergman, Crampes, Glachant, Green, Von Hirschhausen, Lévè-

que and Stoff<sup>3</sup> the Commission's rigid intervention in electricity markets is justified. Assuming that the costs resulting from the imposition of overly stringent pro-competitive remedies are significantly smaller than the costs arising from the prescription of ineffective remedies, they recommend merger control in electricity markets to be more cautious and stringent than in other sectors.

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However, being stringent does not imply that decisions should not be founded on sound economic analysis. Although EU competition law is increasingly based on market-centered economic considerations, this article will show that, due to its general nature, it fails to take into account sufficiently some specific features of electricity markets. This article aims to assess the economic techniques and theories used in merger control and to make suggestions of ways to enhance their reliability and applicability in the electricity sector. Section II analyzes the Commission's approach to market definition in

the electricity sector. Section III discusses the competitive assessment tools applied in merger control.

## II. Definition of the Relevant Market

Being a precondition for the economic assessment of any concentration, the identification of the relevant market is a key factor in every merger case. Moreover, it crucially affects the final outcome of such an investigation. Within competition policy, markets are usually delineated in terms of product range and geographical extent. The discussion below focuses on geographical market definition and restricts itself to the product market of generation and wholesale.

Under the Commission Notice on the definition of the relevant market for the purposes of Community competition law<sup>4</sup> (hereafter "Commission Notice") the relevant geographic market "[...] comprises the area in which the undertakings concerned are involved in the supply and demand of products or services, in which the conditions of competition are sufficiently homogeneous and which can be distinguished from neighboring areas because the conditions of competition are appreciably different in those areas." The identification of the relevant geographic market is usually based on available empirical information, which may differ from case to case. The

Commission Notice states within this context that “the Commission does not follow a rigid hierarchy of different sources of information or types of evidence.” Traditionally, demand and supply substitutability are assessed. Other relevant criteria – specific to electricity wholesale markets – include system design, interconnection capacity, the occurrence of grid congestion, the existence of price correlations and differentials and the differing nature of supply and demand on both sides of congested points.<sup>5</sup>

However, it is nowhere to be found which exact trigger levels should be passed on each of these factors, before the Commission declares a market wider than national. Only an examination of previous cases – as has been done in Cabau<sup>6</sup> – may give an idea of the Commission’s decision process. In Table 1 an attempt is made to derive the

threshold of some quantifiable decision criteria on the basis of recent case law.

Based on Table 1 it can be concluded that

- An interconnection capacity of 10 percent of national consumption on average is considered as being insufficient to allow substantial imports, while a capacity of 25 percent of national consumption is enough to declare a market wider than national.
- A 25 percent level of congestion is interpreted as being too high to point to a wider-than-national market, while a congestion level of 5 percent is acceptable.
- Contrary to prices differing around 50 percent of the time, price differences occurring roughly 10 percent of the time are admissible within a wider-than-national market.

This exercise makes clear that case analysis merely provides a vague insight into the Commission’s decision practices.

The Commission’s way of measuring and interpreting criteria lacks transparency as well. With regard to the level of interconnection capacity, no uniform calculation seems to be agreed on. While in one case the interconnection capacity is estimated as a percentage of average national consumption (e.g., M.2947 Sydkraft/ Graninge), other cases mention the capacity level as a percentage of average national peak consumption (e.g., M.3440 ENI/EDP/GDP) or as a percentage of national generation capacity (e.g., M.1853 EDF/ EnBW). Recently (case M.2947 Verbund/EnergieAllianz), the Commission indicated the net transfer capacity (NTC) – published by ETSO – as the correct estimate for interconnection capacity. It is nevertheless generally acknowledged<sup>7</sup> that the use of NTC values as an indicator for available interconnection capacity is arbitrary and systematically results in an underestimation.

The method used to measure the level of congestion is often vague as well. In the case M.2947 Verbund/EnergieAllianz the Commission concluded that no significant congestion had been observed on the interconnector between Austria and Germany. Because of the absence of a capacity auction – and consequently of a price – on that border, one may wonder how this has objectively been calculated. Moreover, according to Ehrenmann and Smeers,<sup>8</sup> not only the level of congestion should be taken into account, but

**Table 1:** Quantification of Relevant Market Criteria on the Basis of Case-Law

	Interconnection Capacity	Congestion	Price Differentials	Relevant market
	% of national consumption	% of hours a year	% of hours a year	
M.2947 Verbund/Energie Allianz June 2003	25%	no bottlenecks		beyond Austria (a)
M.3268 Sydkraft/Graninge October 2003		5.5% (2000) 0.0% (2001) 0.1% (2002) 0.0% (2003)	Finland 15.8% (2000) 0.9% (2001) 5.0% (2002) 29.8% (2003) East DK 7.2% (2000) 5.4% (2001) 9.3% (2002) 6.4% (2003)	Sweden, Finland and East DK (a)
M.3440 ENI/EDP/GDP December 2004	7-13% during peak demand	25.0% (Jan - June 2004)	50.0-60.0% size Δ: 20%-30%	national: Spain ↔ Portugal

<sup>a</sup>So far, the Commission accepted the existence of a few wider than national markets but it always left open the precise market definition. In other words, the Commission has not yet undertaken any competitive assessment on the basis of a wider than national relevant market.

the method of congestion management as well. Finally, congestion – like several other decision criteria – is a far from constant factor. Although the Commission states, for instance, in the case Verbund/EnergieAllianz that no bottleneck occurred on the Austrian-Swiss border in 2003, daily auction results of 2006 point so far to a significant level of congestion.<sup>9</sup> The Commission's practice of referring to relevant market definitions as identified in previous cases might consequently lead to the wrong conclusions. Criteria should instead be measured using a dynamic approach.

Furthermore, it is unclear how the Commission takes into account the ongoing process of market integration when delineating the relevant market. The Commission Notice states within this context that "a process of market integration that would, in the short term, lead to wider geographic markets may be taken into consideration when defining the geographic market." It is however nowhere to be found how "short term" should be exactly interpreted. Is it the time to build a line, a plant, time to entry ...? The Commission so far nearly always defined relevant electricity markets as being national in scope, arguing that the developments, leading to wider-than-national electricity markets, are uncertain and not fulfilled in the short term. The Commission's strict approach might be partially a matter of practicality: taking relevant market borders equal to

country borders is easier than, for example, bringing together parts of different countries – although they might constitute a more homogeneous entity.

Given the above limitations, defining the relevant geographic market should cautiously be dealt with. Therefore, the authors propose to introduce a "scaling system" in cases where it is not completely clear which market definition should be assumed.

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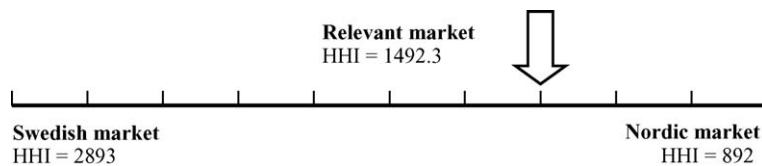
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The scaling system comprises the following steps:

1. Determine the conceivable relevant market definitions and pick out the extremes.
2. Carry out a competitive assessment for both extremes.
3. Measure predefined criteria and attribute a score to each, according to fixed thresholds.
4. Aggregate the scores and indicate the aggregated value on a scale.
5. Interpolate the outcomes of the competitive assessment on the basis of the scale.

In order to conceptually clarify the scaling approach, take as an example case M.2947 Syd-

raft/Graninge (June 2003). In this case the Commission doubted whether the relevant geographic market was limited to Sweden or encompassed Finland and eastern Denmark as well. A few months later the Commission recognized the Nordic market – comprising Sweden, Finland, Denmark, and Norway – as one regional market.<sup>10</sup> Given these considerations, the Commission could opt for a scaling approach – departing from a national Swedish market on the one hand and a regional Nordic market on the other hand – in its future decisions. Such an analysis starts with a competitive assessment of both markets, by means of the economic tools discussed in the next section. To keep the explanation convenient, we simply rely on the Herfindahl–Hirschman Indices (HHI) calculations of the Nordic Competition Authorities.<sup>11</sup> These come to 2,893 and 892 for the Swedish and Nordic markets, respectively. According to the Commission Guidelines on the assessment of horizontal mergers,<sup>12</sup> these outcomes indicate that, unlike the Nordic market (HHI < 1,000), the Swedish market is highly concentrated (HHI > 2,000), hereby inducing significant competition concern. Consequently, defining one of these markets as the relevant market would significantly impact the final decision. Therefore, relevant criteria – such as the level of congestion and the frequency and magnitude of price differentials – should be analyzed and a performance score should be attributed to each of them. Aggregating these



**Figure 1:** The Scaling System

scores subsequently results in a value between 0 and 1, positioning as such the relevant market between both earlier identified markets. (A detailed development of this score calculation is beyond the scope of this article.) Interpolating the HHIs on the basis of the aggregated value, finally gives insight in the competitive situation of the relevant market. An interpolation of HHIs, departing from an aggregated score of 0.7, is illustrated in **Figure 1**. The resulting HHI, equaling 2,893 – (2,893 – 892)0.7 or 1492.3, points to a moderately concentrated relevant market ( $1,000 < \text{HHI} < 2,000$ ).

Note, for instance, that The Brattle Group<sup>13</sup> made an attempt to incorporate relevant market criteria in its competitive assessment as well. It calculated the HHI of the Belgian electricity market by taking into account not only market shares but also interconnection capacities. Although more complicated, the scaling system nevertheless provides a more balanced view since it manages to take into account several relevant criteria.

### III. Competitive Assessment of a Merger

After the relevant market is identified, the potential

competitive effects of every proposed merger with Community dimension are assessed under the EC Merger Regulation. Before the 2004 reform, the ECMR<sup>14</sup> used to put all mergers to “the dominance test.” From the viewpoint that a dominant position would *a priori* exclude any possibility of sound market functioning, all mergers creating or strengthening dominance were forbidden. This misinterpretation of market power<sup>15</sup> as being the equivalent of market dominance has been adjusted under the new ECMR.<sup>16</sup> From May 2004 on, merging parties are subject to the “SIEC test.” Under this examination all mergers leading to “a significant impediment to effective competition” – even if they do not create or reinforce a dominant position – are rejected. It is uncertain, however, whether the Commission’s decision practice is effectively going to change. Instead of radically reshaping Article 2 of the ECMR, the Council put in a great effort to preserve the words of the old test and just reordered them to create its SIEC test. This elegant exercise in semantics permits the Commission – although not establishing the dominance test anymore – to refer to the old ECMR case law, based on dominance, in its future decisions. Therefore, it is likely that the notion of dominance will

continue to play a central role in EC merger analysis for some time to come.

A glance at the Commission’s economic assessment tools provides a clear indication of the importance of dominance within the ECMR as well. The Commission Guidelines on the assessment of horizontal mergers<sup>17</sup> recommend using concentration indices as a first indicator of market power. Both market shares and the Herfindahl–Hirschman Indices – being the sum of the squared market shares – should therefore be calculated. It is however generally acknowledged<sup>18</sup> that these concentration indices are ill-suited to be applied in the electricity sector since they do not incorporate demand-side conditions. Electricity markets are characterized by an inelastic supply and demand so that, during periods of high demand, a supplier can become pivotal, i.e., needed to fulfill demand – and exercise market power, even with a relatively low market share or HHI. One could circumvent this weakness by calculating a dynamic HHI, being the mean of hourly HHIs based on a generator’s sales. Several national competition authorities have already applied this adapted measurement tool.

Indices better suited to deal with this temporary market power phenomenon are the Residual Supplier Index (RSI) and the Pivotal Supplier Index (PSI). Both indices address the extent to which a generator’s capacity is necessary to supply the market

and can be applied on an hour-by-hour basis, thus providing a dynamic image of market power. Although these measures perform much better than the above-described concentration indices, they still have some shortcomings. First of all, they ignore the fact that utilities may have the potential to strategically interact with each other. Secondly, demand elasticities are not taken into account.

These weaknesses could be avoided using oligopoly simulation models for measuring market power. In these models, assumptions are made concerning the strategic behavior of agents. The modeling results are subsequently compared to the current market behavior. A first type is the Cournot model, applied in the electricity market by analysts like Borenstein *et al.*<sup>19</sup> and Willems<sup>20</sup> in which it is assumed that market players only compete on quantity. The realism of this model is however limited: while in reality companies compete on quantity as well as on price, product differentiation, etc., Cournot simplifies strategic interactions as being one-dimensional. A second type, the Supply Function Equilibrium Model (SFE), developed by Klemperer and Meyer,<sup>21</sup> deals with this shortcoming. The SFE model takes into account both relevant dimensions of strategic behavior by assuming that market players define a supply function (i.e., price–quantity combinations).<sup>22</sup>

Nevertheless, all the indices and models discussed

remain sensitive to difficulties related to the determination of the relevant market. To cope with this final problem, Cournot and SFE models have been extended with network constraints.<sup>23</sup> This adaptation makes an explicit market definition redundant, since interconnection capacities are implicitly taken into account. As a result, the interaction



between the exercise of market power on the one hand and the occurrence and severity of congestion on the other hand can be modeled. However, SFE models in combination with network constraints are computationally intractable. Regarding Cournot, no network-constrained model – covering the entire EU – has been developed so far. Existing models only take into account parts of Europe, e.g., ECN's COMPETES model is limited to a simplified representation of the Northwestern European market (Belgium, the Netherlands, and small parts of France and Germany). Furthermore, it is illustrated in Stoff<sup>24</sup> and Cunningham<sup>25</sup> that these models do not necessarily

yield an equilibrium and may also result in a multi-equilibrium outcome. And finally, as discussed in Hobbs and Helman,<sup>26</sup> Cournot models that take into account market players' capability to anticipate the behavior of the network operator are computationally intractable.

Furthermore, experts in this kind of complex modeling claim that the results of the models strongly depend on assumptions that are difficult if not impossible to verify.<sup>27</sup> Since these assumptions can be widely and equally chosen, the models become highly unreliable for taking important regulatory decisions. Moreover, certain variables are hardly quantifiable, e.g., the threat of regulatory intervention or the impact of the political environment on the behavior of market players.<sup>28</sup>

In conclusion, one could say that each index as well as each model has its strengths and weaknesses. Checking whether the outcomes of different indices and/or models confirm each other consequently provides more legal certainty than merely relying on one index or model.

## IV. Conclusions

The Commission's economic tools and theories, currently applied to electricity merger control, fail to take into account sufficiently some specific features of electricity markets. Two major shortcomings have been highlighted.

First of all, the identification process of the relevant market is found to be a black box. The lack of incontestable thresholds and a clear analytical framework indeed give the impression of some arbitrariness in the Commission's decisions, although the Commission pursues a similar case-specific approach in other sectors, too. More transparency and the use of quantifiable criteria could certainly improve confidence in the market definition process. Furthermore, the Commission should preserve itself from a black-and-white approach. The authors introduced a scaling concept to get a more balanced

approach for delineating relevant markets.

Secondly, competitive assessments in the electricity market cannot reliably be done on the basis of only one economic tool. Neither the simplest concentration index nor the most complex oligopoly simulation model is without shortcomings. Checking whether the outcomes of different indices and/or models confirm each other could consequently provide more legal certainty than merely relying on one index or model. ■

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