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## **Bottleneck management in the transmission network in southern Sweden**

In March 2006, Statens Energimyndighet (the Swedish Energy Agency/STEM) published a report on the Nordic electricity market entitled "*Prisbildning och konkurrans på elmarknad* (in English "Price development and competition on the electricity market"). One of the purposes of the report is to assess how dividing Sweden in several price areas would affect competition on the electricity market in the Nordic countries and Sweden.

In the report, STEM discusses dividing the Swedish wholesale electricity market in two separate price areas either at 'snit 2' or 'snit 4' at times where transmission capacity cannot match demand. The main conclusion is that dividing Sweden in price areas (market splitting) at 'snit 4' is unacceptable because competition south of 'snit 4' will be inadequate:<sup>1</sup>

*"The market concentration in this constellation is unacceptable. It is therefore out of question to implement market splitting at 'snit 4'"*

In addition, the report concludes that counter trade at 'snit 4' is not a relevant alternative because it suppresses price signals in the market and lowers market efficiency<sup>2</sup>:

*"Introducing counter trade in the planning phase does not further a well functioning market due to the fact that it gives a decreased efficiency in the price development (page 131)"*

### **Market concentration**

STEM primarily bases its conclusion on evaluations of the expected market concentration as calculated by the so-called Herfindahl-Hirschman Index (HHI). HHI is a measure of the average market structure in a market and STEM argues that HHI is a relevant measure of the degree of market power, in general positively correlated with the market concentration<sup>3</sup>. STEM concludes that south of 'snit 4', the HHI is so high (3,886) that a division into separate price areas at 'snit 4' will imply unacceptable competition problems.

It is probably right that HHI is statistically correlated to the degree of market power, but STEM commits the classic mistake of using a statistical relationship to infer from the level of HHI to the level of market power in a single particular case. This is, in particular, problematic in the wholesale electricity market where an HHI generally is a poor measure of the degree of market power. The flaws of an HHI have, for example, been stressed in a report prepared by the European Electricity Transmission System Operators, ETSO<sup>4</sup>:

*"The traditional approach to measuring the potential for market power is to use concentration indices, the most important being market share and the Herfindahl-Hirschman index (HHI). There is some theoretical justification for*

<sup>1</sup> Statens Energimyndighet, *Prisbildning och konkurrans på elmarknaden*, Stockholm, March 2006, p. 127.

<sup>2</sup> Statens Energimyndighet, *Prisbildning och konkurrans på elmarknaden*, Stockholm, March 2006, p. 131.

<sup>3</sup> Statens Energimyndighet, *Prisbildning och konkurrans på elmarknaden*, Stockholm, March 2006, p. 120.

<sup>4</sup> "A Review of the Monitoring of Market Power", Report prepared at the request of European Electricity Transmission System Operators (ETSO), 2004.

*using these measures as an indicator of potential market power but they ignore many factors that contribute to the potential exercise of market power. In particular, demand conditions, strategic incentives (such as from forward contracting) and market contestability are ignored. The static nature of these measures may also not be appropriate for dynamic markets such as electricity where demand and supply conditions can change rapidly.”*

In the wholesale electricity market, the market price is determined by the marginal plant and it is the flexibility of the marginal plant, i.e. its possibilities to change production level, which determines the degree of market power. Furthermore, the degree of market power is influenced by the ability of the consumers to adjust their demand, and the ability of the competitors to adjust their supply to price changes.

Moreover, STEM has not corrected the calculated HHI neither for transmission capacity in the transmission lines between different price areas, nor for cross-ownership. *Firstly*, cross-border trade is probably the strongest driver of competition within the Internal Market of the EU and the import capacity into a price area is highly relevant for a correct assessment of competition<sup>5</sup>. *Secondly*, in a report from 2003, the Nordic competition authorities point out that cross-ownership should also be included in the calculation of an HHI<sup>6</sup>.

### **Price signals and market efficiency**

STEM correctly concludes that counter trade is not an efficient method to handle internal bottlenecks within a transmissions system<sup>7</sup>. Counter trade implies that price signals get suppressed so that the market price does not reveal that there is over-supply on one side of the bottleneck and under-supply at the other side. As a result, market efficiency is reduced.

Given this correct observation, it is rather surprising that STEM recommends an overall solution to the bottleneck problems which most prevalent feature is that it does not send any price signals at all. STEM's recommendation implies that bottleneck problems in 'snit 2' are solved by market splitting while bottleneck problems at 'snit 4' are primarily solved by reducing the export capacity on the Øresund connection. The first part of the solution does not significantly improve the degree of market efficiency as market splitting is done at places where bottleneck problems are limited. The second part of the solution implies less market efficiency because it creates a single price in Sweden in a situation where bottlenecks at 'snit 4' would require price differences and because it distorts price signals between Sweden and Denmark.

### **Competition assessment with a EU perspective**

However, the main problem with the conclusions drawn by STEM is not the applied method, but the limited scope of the assessment. The objective is to assess the potential for competition in the Nordic area and in Sweden in isolation. Sweden, Finland and Denmark are, however, members of the EU. Thus, any competition assessment should not ignore the Community dimension.

Therefore, let us for now assume that the European Commission was to carry out a competition assessment of bottleneck management in the transmission network in the Nordic area. Such a situation could realistically appear if a company in one EU member state claimed that it is being discriminated by the actions of a transmission system operator (TSO) in another EU member state and filed a complaint to the European Commission. We ask the following

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<sup>5</sup> See for example, Models for the Identification of Market Power in Wholesale Electricity Markets”, Philippe VASSILOPOULOS, University Paris IX – Dauphine U.F.R Sciences of Organizations, September 2003.

<sup>6</sup> “A Powerful Competition Policy”, report from the Nordic Competition Authorities, 2003.

<sup>7</sup> See for example, Copenhagen Economics, Counter trade and market power, May 2003.

question: How would the Commission argue and which conclusion would the Commission draw?

The European Commission would have to answer a number of questions.

Firstly, the European Commission would ask whether the actions of the system operator are covered by EU competition rules. The EU competition rules are part of the EU Treaty; Articles 81 and 82. According to Article 82, companies are prohibited from entering agreements limiting competition, while according to Article 82 prohibits companies from abuse of dominant position<sup>8</sup>.

First of all, there is no doubt that EU competition rules apply to the energy sector:

*“The European Court of Justice has ruled that the energy sector is within the scope of the competition rules”<sup>9</sup>.*

In addition, there is no doubt that EU competition rules carry more weight than the sector specific regulation of the energy sector, e.g. Directive 2003/54/EC163 (“Second Electricity Directive”) and Regulation (EC) No 1228/2003 (“Cross Border Electricity Trading Regulation”).

Both Article 81 and 82 specify that there are two pivotal conditions when assessing whether an action is covered by the EU competition rules. Firstly, the system operator has to be an *undertaking* in the sense of the Treaty, and secondly the actions by the system operator must affect trade between EU member states. This is stated in the wording of Article 82:

*“Any abuse by one or more **undertakings** of a dominant position within the common market or in a substantial part of it shall be prohibited as incompatible with the common market insofar as it may **affect trade** between Member States.”*

It is the Nordic transmission system operators who handle the bottleneck problems in their own transmission network. The transmission system operators may be state enterprises, but they are still considered undertakings in the context of EU competition rules. The EU Treaty does not contain a precise definition of the concept, but legal practice has shown that the concept is broadly defined, and that it has no significance whether the undertaking is privately or publicly owned<sup>10</sup>:

*“..the concept of an undertaking encompasses every entity engaged in an economic activity regardless of the legal status of the entity and the way in which it is financed...”*

Neither is it significant if a system operator is not allowed to accumulate profit. Any company is covered by EU competition rules as long as they carry out commercial or economic activities<sup>11</sup>:

*The fact that an organisation lacks a profit-motive or does not have an economic purpose does not disqualify it as an undertaking, provided always that it is carrying on some commercial or economic activity.”*

The handling of internal bottlenecks in the transmission system does not necessarily affect trade between EU member states, but it has the potential to do so. Several of the Nordic countries are directly connected with both the other Nordic countries and other EU countries,

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<sup>8</sup> Article 82 in the EC Treaty, EU-Commission

<sup>9</sup> “The EC Law of Competition”, Faull and Nikpay, Oxford University Press, 1999, p. 689.

<sup>10</sup> Competition Law, Richard Whish, LexisNexis, UK, 2003, p. 81.

<sup>11</sup> Competition Law, Richard Whish, LexisNexis, UK, 2003, p. 81.

and thereby indirectly connected to the European electricity market. In previous cases, the European Commission has determined that the impact of trade does not need to be very large to establish an effect on trade between the EU member states<sup>12</sup>:

*"Intra-community trade is confined to that between the UK and France via the interconnector....equivalent to 4% of the electricity output of England and Wales...the reorganisation of electricity generation in Scotland and the prospect of a medium term increase in the transmission capacity of the interconnector....the agreement is therefore likely to affect trade between member states."*

Secondly, the European Commission would ask whether Article 81 or Article 82 is relevant. The European Commission would probably argue that both Articles are relevant. The reason is that part of the actions of the system operators is unilateral, e.g. handling of internal bottlenecks, while another part of the actions is decided according to agreements between system operators, e.g. market splitting between two Nordic countries.

Adjustment of the transmission capacity of cross-border connections is likely to fall under Article 81 because cross-border connections are usually administered in co-operation between two transmission system operators. However, the rules concerning the handling of capacity of cross-border connections include the possibility for one of the transmission system operators to decide the actual adjustment of the capacity: *"the underlying principle is that the lowest valuation of the trade capacity made available by some of the system operators will set the dimensions for the transfer capacity in the hour in question"*. In cases where one of the transmission system operators is able to adjust the capacity independently of another transmission system operator, it can be expected that the European Commission will also apply Article 82.

Thirdly, the European Commission would assess whether capacity adjustments are in conflict with Article 82 and constitute abuse of dominant position. Here the EU competition authority will have to carry out three assessments. The Commission must define the relevant market; assess whether the company is dominant at the relevant market, and finally decide whether the action is an abuse of dominance.

As the first thing, the European Commission will define the relevant market which consists of a relevant product market and a relevant geographical market<sup>13</sup>. Transmission System Operators supply transmission of electricity. Purchase of transmission capacity makes it possible to transfer electricity from the production place to the buyer at the wholesale market.

In the Sydkraft/Gräninge<sup>14</sup> merger case, the European Commission has previously concluded that these types of services constitute a separate product market and that the relevant geographical market is the network which the system operator is responsible for. The European Commission would thereby conclude that the relevant market for a system operator is the market for transmission of electricity in the relevant area or country.

Next, the European Commission must determine whether the company is dominant on the relevant market. Often, this can be a difficult question to answer and may require a large scale analysis of market shares, but in the case in question, it is straight forward to determine that any Nordic system operator is dominant on the market for transmission of electricity in the

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<sup>12</sup> "The EC Law of Competition", Faull & Nikpay, Oxford University Press, 1999, page 699.

<sup>13</sup> Commission notice on the definition of the relevant market for the purposes of Community competition law, EU-Kommissionen, 1997.

<sup>14</sup> Case No COMP/M.3268.

relevant area or country. Due to the fact that the market for transmission of electricity is one of the remaining monopoly areas on the electricity market, the Nordic transmission system operators have a monopoly on this market in the relevant area or country. Per definition, monopolies are dominant companies.

Finally, the European Commission must assess whether the relevant action, capacity adjustment, constitutes abuse of dominant position. There is no exhaustive list of what types of behaviour constitute abuse of dominant position according to Article 82, but the article contains a list of actions which always constitute abuse of dominant position<sup>15</sup>:

*(a) directly or indirectly imposing unfair purchase or selling prices or other unfair trading conditions;*

*(b) limiting production, markets or technical development to the prejudice of consumers;*

*(c) applying dissimilar conditions to equivalent transactions with other trading parties, thereby placing them at a competitive disadvantage;*

*(d) making the conclusion of contracts subject to acceptance by the other parties of supplementary obligations which, by their nature or according to commercial usage, have no connection with the subject of such contracts."*

It is determined according to each individual case whether a given action constitutes abuse of dominant position. However, as the EU competition rules are one of the means to implement the EU internal market, legal practice has shown that actions limiting trade between EU member states and lead to a nationalised market almost always fall under the prohibition of abuse of dominant position according to Article 82<sup>16</sup>:

*"...the Commission will condemn abusive practices that are harmful to the single market"*

The same applies to actions leading to discrimination between national electricity consumers and electricity consumers in other EU countries<sup>17</sup>:

*"Discrimination by a dominant firm between nationals and residents of different Member States is contrary to Article 12, which is a cornerstone of the creation of the single European Market, and has been held to be abusive from the outset".*

Subsequently, the European Commission will look at the different methods applied by a system operator for management of bottlenecks and assess whether these different methods would constitute abuse of dominant position.

Basically, there are four different methods that a system operator can apply for managing bottlenecks. These are:

- Capacity expansion
- Market splitting
- Counter trade
- Capacity adjustments

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<sup>15</sup> Article 82 in the EC Treaty, EU-Commission

<sup>16</sup> "Competition Law", Richard Whish, LexisNixis, 2003, side 679.

<sup>17</sup> "Competition Law of the European Community, Van Bael & Bellies, Kluwer Law International, Netherlands, 2005.

The European Commission would not see any problems in the system operator expanding network capacity. Lack of capacity is the cause of the bottleneck problems, and expanding the capacity is thereby the direct solution.

Neither would the European Commission have any concerns about market splitting. If the system operator handles internal bottleneck problems with market splitting, prices are determined by demand and supply conditions. As a result, the market players receive a clear and market-based signal to adapt their capacity to these market conditions. Prices in the individual price areas will depend on the physical conditions on each side of the bottleneck. Prices will be low in areas with over-supply and high in areas with under-supply. The price difference will provide incentives to expand (reduce) capacity in areas with high (low) electricity prices. In the long run, this will solve the structural problems which create the bottleneck.

The European Commission will regard counter trade as an inferior solution compared to market splitting, but counter trade is unlikely to be regarded as abuse of dominance. By counter trade, the system operator intervenes on both sides of the bottleneck. If there is over-supply on the one side of a bottleneck and under-supply on the other side, the system operator pays producers for producing less power in the area with over-supply while producers in the area with under-supply will be paid for increasing production. The main problem is that the price becomes equal on both sides of the bottleneck. As a result, the market is not provided with visible incentives to solve the structural problems which create the bottleneck.

In contrast, the European Commission would find it very problematic if a system operator handles internal bottleneck problems by reducing the capacity of the cross-border connections unless it is necessary for security of supply or safety *and* there is no other more efficient way of solving the problem. Reduced capacity on the cross-border connections often implies that demand is reduced in the system operator's own price area and that supply is reduced in the price areas at the other end of the cross-border connections.

This would be in conflict with EU competition rules, especially Article 82. *Firstly*, it limits trade between EU member states and is thereby in conflict with one of the fundamentals of the internal market. *Secondly*, it discriminates between national electricity consumers and electricity consumers in other EU countries. Both are actions that the European Commission considers abuse of dominant position; cf. Article 82 (a). *Thirdly*, it limits supply in another EU country which is one of the actions specifically mentioned; cf. Article 82 (b).

All in all, the above considerations imply that the European Commission, if the case was filed, clearly would assess that it is an abuse of dominance if a system operator, in order to handle internal bottleneck problems, systematically reduces the capacity on cross-border connections.

### **Handling internal bottleneck problems in Sweden**

If we assume that a consumer, e.g. in Denmark, files a complaint to the European Commission against Svenska Kraftnät, we can use the above considerations to reconstruct the expected arguments and conclusions of the European Commission. The European Commission can be expected to conclude:

- EU competition rules are a relevant framework because the energy sector is covered by the competition rules, and because the Electricity Directive and other sector regulation cannot disregard the rules of the EC Treaty.
- From a competition point of view, Svenska Kraftnät is an undertaking.
- The actions of Svenska Kraftnät have an effect on trade between EU member states. This implies that the actions of Svenska Kraftnät are not exempted from the

EU competition rules. The total export of electricity from Sweden is about 10 percent of the total electricity production in Sweden. A reduction of the capacity on the Øresund connection has been used to handle internal bottleneck problems in Sweden for more than 10 percent of all the hours of the years 2000-2005. In 2005, a reduction has been used for about 40 percent of all hours.

- The relevant market is the market for transmission and distribution in Sweden
- Svenska Kraftnät has a monopoly on and is thereby also dominating on the relevant market.
- Svenska Kraftnät handles internal Swedish bottleneck problems by reducing the capacity of the Øresund connection. Thereby Svenska Kraftnät is limiting the production to the benefit of Swedish consumers, but at a cost to Danish consumers. The capacity reduction and the indirect price discrimination are both in conflict with Article 82 and thus constitute an abuse of dominance. In addition, Svenska Kraftnät is limiting market integration between Sweden and Denmark.
- Market splitting with two separate price areas in Sweden will not change the conclusion of the European Commission unless Svenska Kraftnät avoids using capacity adjustments on the Øresund connection.
- Market splitting with three separate price areas in Sweden would be a better solution to the internal bottleneck problems in 'snit 4' as this would create the price signals which in the end are needed to create an effective market.
- Moreover, the European Commission would assess that a solution with market splitting at 'snit 2' and continued capacity adjustments at the Øresund connection implies a low degree of market efficiency. This solution will suppress the price signal which is required to create an effective market, partly by creating distorted price signals between Sweden and East Denmark, partly by not creating price differences within Sweden in the limited number of hours when bottleneck problems occur at 'snit 2'.