Swedish Interconnector case / Improving electricity cross-border trade
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Introduction
The size of the transmission network is a key determinant of competition in wholesale electricity markets. The larger this network, the more suppliers inject their electricity and hence compete for consumers. However, the Energy Sector Inquiry carried out by the European Commission (2) has shown that markets in Europe are mainly national in scope because there are few cross-border links — or ‘interconnectors’ — between them, and those which exist have limited capacity. As a result, competition between suppliers of electricity across borders is restricted. Given the network constraints, in order to fully benefit from competition it is crucial that available scarce interconnector capacity is fully utilised.

On 14 April 2010, the Commission adopted a commitment decision which addressed the concern that Svenska Kraftnät (‘SvK’), the sole operator of the electricity transmission network in Sweden, may have abused its dominant market position according to Article 102 TFEU. SvK may have done so by limiting export capacity on the interconnectors between Sweden and neighbouring EU and EEA Member States when SvK faced congestion problems inside its network. This behaviour distorted wholesale electricity prices in Sweden and in neighbouring countries, and segmented the EU internal market.

The commitment decision in this case makes it binding for SvK to maximise utilisation of the cross-border links between Sweden and its neighbouring countries. This will boost trade and strengthen competition between suppliers on both sides of the borders. Moreover, this case is of systemic value as it sends a signal to all network operators in the EU to respect the European common market when they solve their internal network problems.

The electrical system in Sweden
The starting point of this case is the electrical transmission system in Sweden, which is integrated into the ‘Nordic Market’. This includes Denmark, Finland and Norway. The network in Sweden is heavily interconnected with its neighbouring countries (figure 1): Denmark, Germany, Finland, Poland and Sweden. SvK is the monopoly supplier of transmission services in Sweden.

Figure 1. Schematic overview of the Nordic bidding zones and interconnectors on 17 November 2008

Note: The solid lines in the figure indicate interconnectors. The bidding zones were, as of 17 November 2008, North Norway (NO2), South Norway (NO1), Denmark West (DK1), Denmark East (DK2), Sweden (SE) and Finland (FI).

Electricity in the Nordic Market is traded through various trading forums (such as ‘over-the-counter’ trading and power exchange) and using different products (such as supply contracts for ‘day-ahead’ and ‘year-ahead’). The most important forum for physical trading is the Nord Pool day-ahead market, where approximately 70% of the total electricity consumption in the Nordic region is traded (3).

The Nord Pool day-ahead price is determined by a matching process of hourly (4) supply and demand offers (5) from market players. Those offers are made by players in predefined bidding zones according to where their production or consumption physically takes place. Those bidding/geographical zones, and the electricity links (‘interconnectors’) between these zones, are depicted in Figure 1.

(1) The content of this article does not necessarily reflect the official position of the European Commission. Responsibility for the information and views expressed lies entirely with the authors.
(3) See: http://www.nordpoolspot.com/about/.
(4) Electricity markets are organised on an hourly basis because electricity cannot be stored and demand is continuous and fluctuates significantly from hour to hour.
(5) There are three types of bids available on the ‘Elspot’ exchange: Hourly Bid, Block Bid and Flexible Hourly Bid.
The demand in Sweden is mainly located in the south (79% of total) where the major cities are situated, while relatively cheap hydro electricity generation is located in the north of Sweden. In addition to the domestic demand for electricity in south Sweden, there is often demand from South Norway, Denmark, Germany and Poland.

The topology and capacity of the network are such that electricity flows from northern to southern Sweden. However, at times of day when demand is high, the transmission capacity may be insufficient to satisfy all demand in the south of Sweden. This is due, in particular, to the bottlenecks in the Swedish network which are schematically indicated in figure 2: B1, B2, B4 and the ‘West Coast Corridor’ (\(^ {(*)} \)).

**Figure 2. The Swedish network with four network bottlenecks**

![Image of the Swedish network with four network bottlenecks](image)

Source: SvK (2009).

**Curtailments**

The Commission’s assessment revealed that, between January 2002 and April 2008, SvK — the Swedish transmission system operator — substantially and systematically limited interconnector capacity on the southern borders to neighbouring countries, for many hours, in order to relieve the internal congestion.

For instance, the assessment showed that, from 2005 to 2008, due to internal bottlenecks, SvK restricted export capacity for 26% to 34% of all hours on the interconnectors to Eastern Denmark, Poland, Germany and Norway. On the interconnector to Finland, SvK curtailed capacity less often but still 6% of all hours, whereas on the interconnectors to central and northern Norway, SvK almost never curtailed export capacity.

The most acute problems of congestion and export capacity limitation were found on the interconnector to Eastern Denmark and to Germany (the ‘Baltic Cable’), especially in 2005 and 2007. On the interconnector to southern Norway, frequent congestion and export capacity restrictions occurred in 2003, 2004, 2006 and 2007 and on the SwePol cable (between Sweden and Poland) in 2005, 2006, 2007 and 2008.

On average, SvK curtailed more than half the total capacity of the southern interconnectors between 2005 and 2008, in order to cope with internal congestion.

**Legal analysis and theory of harm**

SvK has a dominant position within the meaning of Article 102 TFEU on the Swedish electricity transmission market, as Swedish legislation gives it the exclusive right to operate the Swedish electricity transmission network. As a monopolist on this market it has the ability to reduce and thereby control the available export capacity to neighbouring countries.

The Commission had concerns that SvK may have abused its dominant position on the Swedish electricity transmission market according to Article 102 TFEU by curtailing capacity on the Swedish interconnectors when it anticipated internal congestion within the Swedish transmission system (\(^ {(*)} \)), thereby discriminating between different network users. By treating requests for transmission for the purpose of consumption within Sweden differently from requests for transmission for the purpose of export, SvK may have artificially segmented the EU (and EEA) internal market and prevented industrial and other users located outside Sweden from reaping the benefits of the internal market.

This behaviour led to several effects that are harmful to competition and, in the end, to consumers. First, there was an immediate price effect. SvK’s behaviour meant that consumers abroad were deprived of lower energy prices, as more expensive resources

\(^ {(*)} \) the West Coast Corridor presents a special case of congestion, which can occur during certain low-load periods when the flow in the Transmission System is reversed (south to north) compared to the prevailing flow (north to south).

\(^ {(*)} \) There can be legitimate reasons for curtailing capacity on an interconnector, such as a technical failure which reduces the capacity of that interconnector. The Commission is concerned only about curtailment due to internal congestion.
had to be used in place of the energy not delivered from northern Sweden. Moreover, consumers in Sweden were effectively shielded from higher electricity prices, since curtailments kept more of the relatively cheap electricity from the north inside the country. Hence, SvK’s behaviour prevented a free trade scenario in which electricity supply would have flowed to higher-price neighbouring areas, thus lowering prices abroad. Secondly, the curtailments distorted the long-term efficiency of the market by changing the incentives for all market players. For instance, incentives to build new transmission lines in order to eliminate bottlenecks were reduced since congestion problems became less visible. Electricity producers’ incentives to locate plants in high-demand areas were also reduced because prices in those areas were lower than they would have been without curtailments. Finally, the incentives to avoid consuming electricity in certain areas or at certain times of day were affected, because consumers did not pay market prices. As the result, distorted market signals led to inefficient long-term market outcomes.

**Commitments offered**

In response to the concerns raised by the Commission, SvK voluntarily offered a set of commitments that would remedy these concerns. Market players were consulted, and in the light of comments from several stakeholders, SvK amended the offered commitments. They include the following.

First, SvK will subdivide the Swedish electricity market into several bidding zones, bordered by congestion points within the Swedish electricity system, and will operate it on this basis by 1 November 2011. This means that the transmission capacity actually available will be reflected in market prices rather than leading to arbitrary curtailment measures at the borders. The configuration of the zones will be flexible: it will be rapidly adaptable to changes in future electricity flow patterns in the Swedish transmission system. Once the zones are in operation, SvK will manage congestion in the Swedish transmission system without limiting trading capacity on interconnectors. There will be one exception to this new system, i.e. congestion in the West Coast Corridor, where there are specific technical constraints. SvK will alleviate congestion in this area by building and operating a new 400 kV transmission line between Stenkullen and Strömma-Lindome, by 30 November 2011.

Before the new market zones come into operation, SvK has undertaken to reduce congestion-related curtailments as much as possible by using an interim measure called ‘counter trade’. Counter trade involves paying generators/consumers to adjust their production/consumption schedules, thereby adjusting transmission flows to the capacity actually available. By using counter trade, SvK will as far as possible limit the curtailment of capacity on the interconnectors on its borders. During this intermediate period, which will last 18 months, SvK and market stakeholders will have sufficient time to adapt their operations to the new market design.

**Conclusion**

The Commitments offered by SvK remove the Commission’s concerns. SvK will no longer limit cross-border transmission capacity when faced with internal congestion. This will increase utilisation of the interconnectors south of Sweden, which will improve cross-border trade, provide greater investment incentives and enhance competition between suppliers. This example should also encourage all operators of electricity networks to take a European view that goes beyond purely national boundaries when trying to address network congestion problems.