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A preliminary assessment of the market coupling arrangement on the Kontek cable

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Abstract

This paper presents a preliminary assessment of the market coupling arrangement on the Kontek (KT) cable between East Denmark and Germany and an assessment of the original auction mechanism. KT, the new spot price area, was introduced in Germany on October 5, 2005 to facilitate a market coupling arrangement on the KT cable between East Denmark and Germany. We would expect the KT price to correlate more with the European Energy Exchange (EEX) price because arbitrage normally levelizes the price. However, spot prices in late 2005 were both high and volatile because congestion management practices in Sweden transferred internal bottlenecks to the cable between Sweden and East Denmark. Since spot prices were equal in East Denmark and the KT area for a substantial time, it implies that some hours had no congestion on the KT cable. Market players valued the previous monthly auctions for transmission capacity more than the daily auctions. Compared to the daily auctions, market players received smaller payoffs on average for the market coupling arrangement, and the smallest payoffs for the monthly auctions.
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Keywords: Power system economics; Market coupling; Spot price assessment

1. Introduction

This paper presents a preliminary assessment of the new market coupling arrangement on the Kontek (KT) cable, including an assessment of the original explicit auction mechanism. To our knowledge, it is the first paper to present an assessment of the new arrangement. Although the data period is limited, we believe that this paper provides useful insights about the problems of both auction mechanisms.

On October 5, 2005, Nord Pool Spot opened a price quotation area in Germany. The new bidding area named KT (Nord Pool, 2005b) offers geographic access to the Vattenfall Europe Transmission control area from East Denmark (DK2) and allows Nord Pool to compete directly with European Energy Exchange (EEX).[1] Nord Pool intends to use KT to persuade Germany's power-intensive companies to become customers on the spot market; however, many existing obstacles still prevent the large industrials from changing their current methods of securing electricity deliveries.

Nord Pool manages the capacity of the KT cable that Elkraft System (now ENERGINET.DK) and Vattenfall AB have at their disposal. This capacity corresponds to 550 MW in the northbound direction (KT–DK2) and 550 MW (200 MW till January 5, 2006) in the southbound direction (DK2–KT). The new auction that replaces Elkraft System's monthly and daily cross-border auctions links Germany and East Denmark for the first time through the implicit mechanism used in the Nordic market. The voluntary cross-border market coupling aligns with the EU's strategic plans for the future development of Europe's energy market and with the Nordic Mini-Forum's recommendations on congestion management.

Like all Nord Pool Spot bidding areas, KT is open for trade Monday through Sunday, and its rules for bidding

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[1]Nord Pool owns 17.39% of the shares of EEX and proposed a common market with EEX but EEX said no. However Nord Pool still holds the door open for cooperation.

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and price calculation are similar to the other areas.[2] The price difference between DK2 and KT determines the flow direction. The flow must go from the low price area to the high price area to avoid the problems of flows in the opposite direction observed in the cross-border auctions. Within days of its inception, the voluntary market coupling proved its worth when cross-border trade equaled the trade via the KT cable.

Explicit transmission capacity auctions continue between Jutland and Germany because there has been no agreement on market coupling with E.ON Netz (the German transmission system operator). For the same reason, Nord Pool Spot has only a portion of the cross-border capacity at its disposal that it can make available voluntarily to the winners of the auction. However, market players can use the recently established cross-border optimization procedure to trade transmission capacity to the KT spot area.

The structure of this paper is as follows: Section 2 briefly describes the problems associated with the previous explicit cross-border auction on the KT cable; Section 3 outlines the principles of the market coupling arrangement; Section 4 assesses the new market coupling arrangement in terms of pricing and exchange; Section 5 makes the same assessment of the previous explicit auction on the KT cable; Section 6 reviews the conclusions from the Danish transmission system operator's (TSO's) market reports associated with the market coupling arrangement; and Section 7 discusses policy issues related to the congestion management procedures. Section 8 provides concluding remarks.

2. Problems associated with explicit cross-border auctions on the KT cable

Daily and monthly cross-border auctions began on January 1, 2002. Although they brought significant improvements compared to the previous capacity reservation system, more integration of the German and Nordic markets was still possible through market coupling. Prior to the market coupling arrangement, flows occasionally went from high price areas to low price areas. Table 1 shows the amount of time the DK2 price was higher than the EEX price and vice versa, and the corresponding energy flows on the KT cable in 2003 and 2004 (Elkraft System, 2005). It is worth noting that for 8% of the time DK2−EEX flow (DK2−EEX>0) has moved from the high energy price area (DK2) to the low energy price area (EEX), and that for 6% of the time the EEX−DK2 flow (EEX−DK2>0) has moved from the high energy price area (EEX) to the low energy price area (DK2). In total 14% of the time the flow went from a high price area to a low price area. This is a general problem with explicit cross-border auctions because there is no market coupling arrangement that ensures that flows always go from low energy price areas to high energy price areas. In total 23% of the time there was no flow on the cable due to maintenance on the interconnector or in neighboring networks. Capacity reductions are announced well ahead (e.g. for the monthly auction at least 3 weeks in advance).

The earlier time schedule was problematic because the deadline for bidding in the daily auction was 11.00 and 12.00 in EEX and Nord Pool. If the expectations at 11.00 were incorrect, KT became non-optimal, and power could flow from the high price area to the low price area. Mondays were especially difficult because the German market is cleared on Friday, while both the Nordic market and the KT auction are cleared on Sunday.

3. The market coupling concept

In general, Vattenfall Europe Transmission (2005) believes that the new arrangement (market coupling) will allow an optimal (complete, always correct direction) utilization of the available transmission capacity by means of a "common" auction (second iteration after two separate auctions in the first step) of the power exchanges of the two separate markets. Bidders from the inexpensive market who find additional demand in the more expensive market will influence prices, which in turn will affect the behavior of generators and consumers in both markets. However, the KT DC cable cannot influence the AC-network and thus becomes a merchant link. Since there are no externalities for the grid users as a whole, it will be possible to compare economic benefits and operational costs.

On October 5, 2005, Nord Pool (2005a) Spot introduced a market coupling approximation known as cross-border optimization (CBO) to improve cross-border efficiency between Jutland (West Denmark, DK1) and Germany. The objective is to ensure that power flows always go from the low price area to the high price area. Traders can hand over the administration of the capacities bought at the daily auctions at the border to Nord Pool Spot. The working principles of the CBO concept are (Nord Pool, 2005a):

1. At the daily auction, a market player purchases capacity at the border Jutland–Germany for selected hours of the next day.
2. Nord Pool Spot manages the capacity on behalf of the market player, including it in the price calculations of the Nordic and German markets.
3. Nord Pool Spot calculates the day-ahead power prices.
4. If there is a price difference between Nord Pool Spot's bidding area DK1 and Nord Pool Spot's German bidding area KT, Nord Pool Spot will use the transferred capacity to create a power flow from the low price area to the high price area.
5. The market players are obliged to include their volumes in their schedules to the three TSOs (ENERGINET.DK, E.ON Netz and Vattenfall Europe Transmission).

[2]On January 1, 2006, the two Danish bidding areas were fully integrated in the System Price. However, no plans exist for the full integration of Kontek, since the System Price is a Nordic price reference.

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