

TASK XIII: MARKETPLACE OVERVIEW

Background:

In October 2003, the Executive Committee of the International Energy Agency (IEA) Demand Side Management Program approved a new project, entitled Task XIII. Twelve countries agreed to participate in the project, with the United States (via the US Department of Energy) in a lead role.

The objective of the project is to deliver necessary methodology, business processes, infrastructure, tools and implementation plans that will facilitate robust demand side participation in participating country electricity markets. The project will produce a “State of the Practice” database, economic valuation tools, and methods to enable participating countries to implement demand response into their market structures.

The objectives of the IEA DRR project are to:

1. Identify and develop the country-specific information needed to establish the potential for demand response.
2. Perform the market and institutional assessments within participating/member countries needed to set realistic goals for the contribution of DRR to sector objectives.
3. Mobilize technical and analytic resources needed to support the implementation of DRR programs within participating/member countries and track their performance.

Marketplace Overview Form Objective:

The enclosed questionnaire will provide the Operating Agent with a brief overview of each participating county’s marketplace structure and demand response history. This will help the Operating Agent better understand the similarities and differences amongst the countries participating in Task XIII. This request is not intended to be an in depth research project. It is simply intended to be a brief overview to provide basic facts and understanding that can orient the project team and help share basic information across participants.

The Operating Agent will use the information develop thoughtful and thought provoking questions during the data gathering phase of the project.



Marketplace Overview Form Organization:

The following Marketplace Overview Form is organized utilizing a question and answer format. We have attempted to provide sample responses to each question so that you can see the type and depth of information desired.

There are three categories of questions:

1. **Electric Industry:** Basic overview of market structure and market actors.
2. **Demand Response:** Basic overview of demand response efforts.
3. **Market Transactions:** Basic overview of electricity market transactions.

We have provided a form with sample answers to guide you as complete the document.

Marketplace Overview Process:

Step 1: Please complete the enclosed form and email it to rmalme@retx.com by May 31, 2004. We realize that some questions may ask for data that are not readily available, and that some questions may not apply to certain countries. In this step 1, we are requesting that you fill out the "market overview" as best as you can, then in Step 2 we will contact you by phone to discuss any missing elements or questions that were difficult to interpret.

Step 2: We will schedule a brief telephone call with each country expert to review your response to ensure understanding. These calls will take place during the first two weeks in June.

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Section I: Electric Industry

1. Does your country operate as one national electricity marketplace or do you have multiple regional electricity marketplaces?

The Danish electricity trade takes place at one centralized marketplace, the Nordic Power Exchange, NordPool, which is located in Norway. Besides the elspot day-a-head trade, there also exist possibilities to trade bilaterally within the exchange system. Some of the electricity is also traded outside the elspot area as import or export via interconnectors to neighbouring countries such as Germany, Poland and Russia. Two independent TSO's operates and in Denmark, one in western Denmark and one in eastern Denmark. There are no direct connection (yet) between western Denmark and eastern Denmark, which means they are two separate price areas. The western TSO operates therefore in the UCTE area and the eastern TSO in the Nordel area.

To balance the market, there also exist a balancing power trade, which takes place after the electricity day-ahead bids are closed. This regulating power trade takes place in eastern Denmark, which is connected with Sweden. From august this year (2004), eastern Denmark will take part in the Elbas balancing power trade, the Nordel area balancing power trade. In Western Denmark, the TSO manages the balancing power.

2. If you have multiple regional marketplaces, how many exist in your country? Please explain.

There is one marketplace, the Nordic Power exchange, NordPool.

3. What market actors perform the following functions in your marketplace: (Please list and briefly describe)

Market actors that perform the following functions:

In general, after the deregulation of the electricity market, there are vertically integrated utilities, municipal utilities and cooperative utilities that operate on the Danish electricity market.

a. Generation:

There are two kinds of generation categories. One category operates in the competitive market. The other category delivers “feed-in production”, i.e. the production is used (and paid for by the electricity consumers) before the electricity sold on the competitive market is purchased. The first category operates the so-called “centralised power plants” (big CHP plants that operates on competitive market conditions), and the second category operates the “decentralised power plants” (smaller CHP, industrial CHP and wind turbines). One company may own both centralized and decentralalized power plants and generate both kind of production. Over time, more production is traded on the competitive market and the feed-in production is reduced.

b. Transmission:

There are two transmission companies that own and manage the 400 kV transmission network within the county and the interconnectors used for export and import of electricity from abroad. One transmission company operates the 400 kV network in western Denmark and one transmission company operates the 400 kV network in eastern Denmark. The western and eastern parts of Denmark are not (yet) connected with each other.

c. Distribution

Distribution companies are regional companies and own in general the 60 kV and 150 kV distribution networks. They are monopoly companies by its natural monopoly and are generally vertically integrated in a group of companies with other electricity related activities such as retail customer services.

d. Retail customer services:

The companies responsible for the retail customer services operates on the competitive part of the electricity market by buying electricity either bilaterally Danish producers or from foreign producers through the Nordic Power Exchange, NordPool.

e. Reliability management:

The two transmission companies have the overall responsibility for the reliability management by balancing the whole electricity system. The overall responsible transmission companies enter agreements with companies who want to become

balance administrators. Balance administrators balance the anticipated power sales and consumption in their region on hourly basis regulates financially the balance discrepancies with the overall responsible transmission companies. The balance administrators also have a responsibility to provide the retail customers with electricity if the customer chooses not to take active part on the electricity market.

4. What market actors' work directly with the retail consumers (e.g. distribution company, competitive suppliers, energy service companies, etc)? Please provide brief description of their roles.

Market actors that work directly with retail customers are distribution companies, competitive suppliers and energy services companies

- a) The distribution companies are responsible for providing the electricity. The customer pays a transmission fee to the company that owns the network. Due to the natural monopoly, the retail customer can't choose distribution company.
 - b) On the other hand, the retail customer can choose which supplier they want to buy the electricity from. The suppliers act on a competitive electricity sales market and the customers are free to choose the supplier who gives them the best conditions concerning price, service etc.
5. Please list key regulatory players and their roles.
- a) The Danish Energy Authority (DEA) – Energistyrelsen
The DEA is overall responsible to ensure energy supply and the function of the energy market by establishing framework and instruments. The Danish Energy Authority administrates the energy legislation.
 - b) Danish Energy Regulatory Authority (DERA) - Energitilsynet
The DERA is a supervisory authority for the monopoly companies in the Danish Energy Sector. In general, the DERA ensures reasonable and transparent prices for the electricity consumers.
6. Please list key industry stakeholder groups (e.g. large customer associations, reliability organizations, trade associations, etc.)

The following organizations are the main key industry stakeholders:

- a) Association of Danish Energy Companies
The Association of Danish Energy Companies is an industry organisation for associations and groups of associations of energy companies in Denmark. The organisations membership is predominantly made up of Danish energy companies and they are affiliated in four main groups and one group for associate members:
 1. The industry association for grid and supply (distribution) obligation companies - ELFOR
 2. Forum for the generating companies
 3. Forum for the transmission companies

4. Industry association for electricity trading companies – Dansk Elhandel
5. Associate members
 - b) Association of Danish CHP Producers (Foreningen Danske Kraftvarmeværker)
 - c) Association of Danish District Heating Producers (Danske Fjernvarmeværkers forening)
 - d) Danish Wind Turbine Owners Association
 - e) Danish Wind Industry Association
7. How many commercial, industrial and residential customers exist in your marketplace (add additional customer classes, e.g. agricultural, as needed)?

Customer Class	No. of Customers**			Winter Peak Demand *		Annual MWhs		
	Total	DK West	Dk East	DK West	Dk East	Total**	DK West	Dk East
Total	2 990 500	1 597 800	1 392 700	3600 MW	2600 MW	32 750 000	19 366 000	13 384 000
Residential	2 569 900	1 335 100	1 234 800			9 603 000	4 949 000	4 654 000
Industrial	30 200	20 300	9 900			9 569 000	6 737 000	2 832 000
Commercial (inkl agriculture)	374 600	232 500	142 100			12 752 000	7 378 000	5 374 000
Other	15 800	9 900	5 900			826 000	302 000	524 000

* Peak demand 2004 (Eltra and Elkraftsystem)

** Dansk Energi 2002

8. How many distribution companies operate in your marketplace? Please list the top five largest distribution companies.

Number of Distribution Companies: 125

Largest Distribution Companies	Number of Customers	Summer Peak Demand	Winter Peak Demand
NESA	533 900		
Københavns Energi	343 300		
SEAS	173 100		
Sydvest Energi	156 100		
NRGi	142 000		

The peak demand figures are not available.

9. If you have retail competition, how many competitive suppliers exist in your marketplace?

Number of competitive suppliers who are members of the Association of Danish Energy Companies is 17.

10. If you have retail competition, what percentage of the summer and winter peak demands do competitive suppliers supply?

Figures of competitive suppliers supply of peak demand are not available.

11. What is the forecasted peak demand growth rate in your marketplace?

Winter peak load in western Denmark was 3780 MWh/h in the winter 2003/2004 and in eastern Denmark 2665 MWh/h. Predicted winter peak load in winter 2007/2008 in western Denmark is 4019 MWh/h and 2993 MWh/h in eastern Denmark. This makes a growth rate in western Denmark of 1.5 per cent pr. year and in eastern Denmark of 2.5 per cent (Nordel).

12. What is the projected supply (capacity) growth rate in your marketplace?

Installed capacity on the 31st of December 2003 in western Denmark was 7.432 MW and in eastern Denmark it was 5.398 MW (12.830 MW in total). Expected growth in eastern Denmark until 2013 is 200 MW on-shore wind power and 600 MW off-shore wind power. In western Denmark, the prognosis for 2014 is 400 MW off-shore wind power. This makes a growth of 10.5 per cent and 7.5 per cent respectively in a ten-year period.

Section II: Demand Response

13. Has demand response been attempted in your market? If so, please provide brief description of relevant successes and challenges.

Answer: *The Danish TSO has several experiments going on to get both businesses and householders with electric heating to make their electricity consumption flexible by using more electricity when the price on the market is low and reducing their electricity consumption when the price is high. The TSO is looking into the possibility of promoting demand response within all customer categories. The experiments with flexible electricity consumption are one of several research and development activities that the TSO supports that are paid by all electricity consumers in Denmark help via their electricity bills.*

A barrier for demand response investments is that there is no model for pooling of the demand response benefits for different market actors. Another barrier is very different spot prices from year to year depending very much on the amount of stored water (dry or wet year) for the water power plant production. The compensation for participation is thus variable making it difficult to develop long-term business cases.

14. Which market actors might be most supportive of demand response in your marketplace? Please explain why.

Answer: *Utilities and competitive suppliers might be supportive because they have direct relationship with consumers. In the future, grid utilities might use demand response for things like grid congestion and substation cost management. Competitive suppliers might use demand response strategies to help mitigate supply portfolio risk.*

A few large consumers e.g. iron foundry industry (one has actually a demand response agreement with the TSO) are in favor of demand response because they see it as a way to manage their total energy expenditures.

The TSO has signed agreements including around 30 MW with customers who have offered demand response. This includes e.g. a skating ice hall used for demand response in both day-to-day planning and as operating reserve (onsite/back-up generation).

15. Which market actors would be the most likely to offer demand response services to the consumer? Please explain why.

Answer: *Competitive suppliers might use demand response strategies to help mitigate supply portfolio risk. Grid utilities might use demand response for things like grid congestion and substation cost management. In the future, we might see demand aggregators who aggregate up demand response resources as a way of creating “virtual*

power plants” managing their resources portfolio in a similar way that an Independent Power Producer.

16. Can demand response resources participate in electric market transactions today? If so, how?

Answer: *In the Nordic market place Nord Pool, a market participant can sell demand response into the electric market by giving a price-dependent offer of buying if the price is below a given level. The Nord Pool market rules establish the requirements for selling into the capacity, operating reserve and energy transactions. The market rules describe response requirements, usage data submissions, and settlement processes. The market rules can be located at www.nordpool.com*

17. What are the most important objectives for demand response? Please explain.

Answer: *The Nordic power system is gradually turning tighter. The Danish objectives for demand response are to secure supply and demand meets in the liberalized market and to increase competition.*

18. Do energy consumers see different electricity prices at different times of the day? (Please explain in terms of how many and by class or size)

Answer: *All customers with consumption above 200.000 kWh/year (100.000 kWh/year from 1/1 2005) have meter storing the hourly consumption. These customers can choose to have a spot price related tariff. For more than 12 year a time of use tariff with three level (peak, shoulder and valley) have been in use for customers with yearly consumption above 100.000 kWh/year and even lower for some utilities. The use of the time of use tariff is limited today.*

19. Have any energy efficiency and/or a demand response market potential studies been completed in your marketplace in the last ten years? YES / NO

If yes, please provide a reference location or attach the report.

Answer: *Load management studies where performed by DEFU in the period 1983-1993 while energy efficiency studies where performed hereafter by DEFU and ELFOR. Based on these resources, the EFFLOCOM project (phase 1 report from 2004) summarizes the demand response potential for Denmark.*

Section III: Market Transactions

20. What type of electricity products traded in your marketplace (e.g. 5-minute spinning reserve, 30-minute non-spin, day ahead, capacity, hourly energy/spot, etc.)?

In the NordPool area, the electricity is traded physically day-ahead and market prices are set hourly. In addition, financial contracts such as forward contracts and futures are also traded. In addition, eastern Denmark will take part in Elbas system for trading balancing power from August this year (2004).

21. Do you have a central trading exchange in your marketplace?

Yes, the Nordic Power Exchange, NordPool.

22. How are reserve margin targets established in your marketplace? Please explain.

The TSOs Eltra and Elkraft determine country specific reserve margins. Broader guidelines are established by the two TSO international network organisations into which the Danish system is synchronised, Nordel for the eastern part of Denmark and UCTE for the western part.

23. What is the current reserve margin target in your marketplace?

In Denmark (both eastern and western) there is excess capacity. In the Nordel area, Nordel has recommended common fast disturbance reserves of 5500 MW (3700 MW in production capacity and 1850 MW in dispatchable load). The recommended reserves have been subtracted from available production capacity (Nordel).

24. Does your market currently exceed or fall short of the current reserve margin target? Please explain.

In the Nordel area, the market falls short on the reserve margin target. On the 3rd of January in the very cold winter 2002/2003, the generation was 61831 MWh/h and the peak demand was 65009 MWh/h. This meant an imbalance of -3.178 MWh/h. The power balance prognosis for the NordPool area in 2007/2008 shows a shortage of 2 465 MWh/h, where predicted available production capacity is 72.280 MWh/h and predicted peak demand is 74.745 MWh/h.

In Denmark during the specific period there was excess capacity. The specific figures for Denmark West was in MWh/h:

Generation: 3921

Peak demand: 3304

Exceeding capacity: 617

The prognosis for western Denmark in 2007/2008 is (in MWh/h):



Predicted Available Capacity: 4.510
Peak Demand: 4.200
Exceeding capacity: 310

The specific figures for Denmark East was in MWh/h
Generation: 2837
Peak demand: 2524
Exceeding capacity: 313

The prognosis for eastern Denmark in 2007/2008 is (in MWh/h):
Predicted Available Capacity: 3.240
Peak Demand: 3.010
Exceeding capacity: 230