

The value of Demand Response in the Nordic Market

A Transmission System Operator's (TSO) perspective

Demand Response and Forecasting

EU EFFLOCOM Work Shop

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A TSO perspective

Outline

- **Investments in production capacity**
- **Why worry?**
- **A private good and security of supply**
- **The missing link**
- **Other values in demand response**

Investment in production capacity

Intuition/assumption on consumers and price elasticity

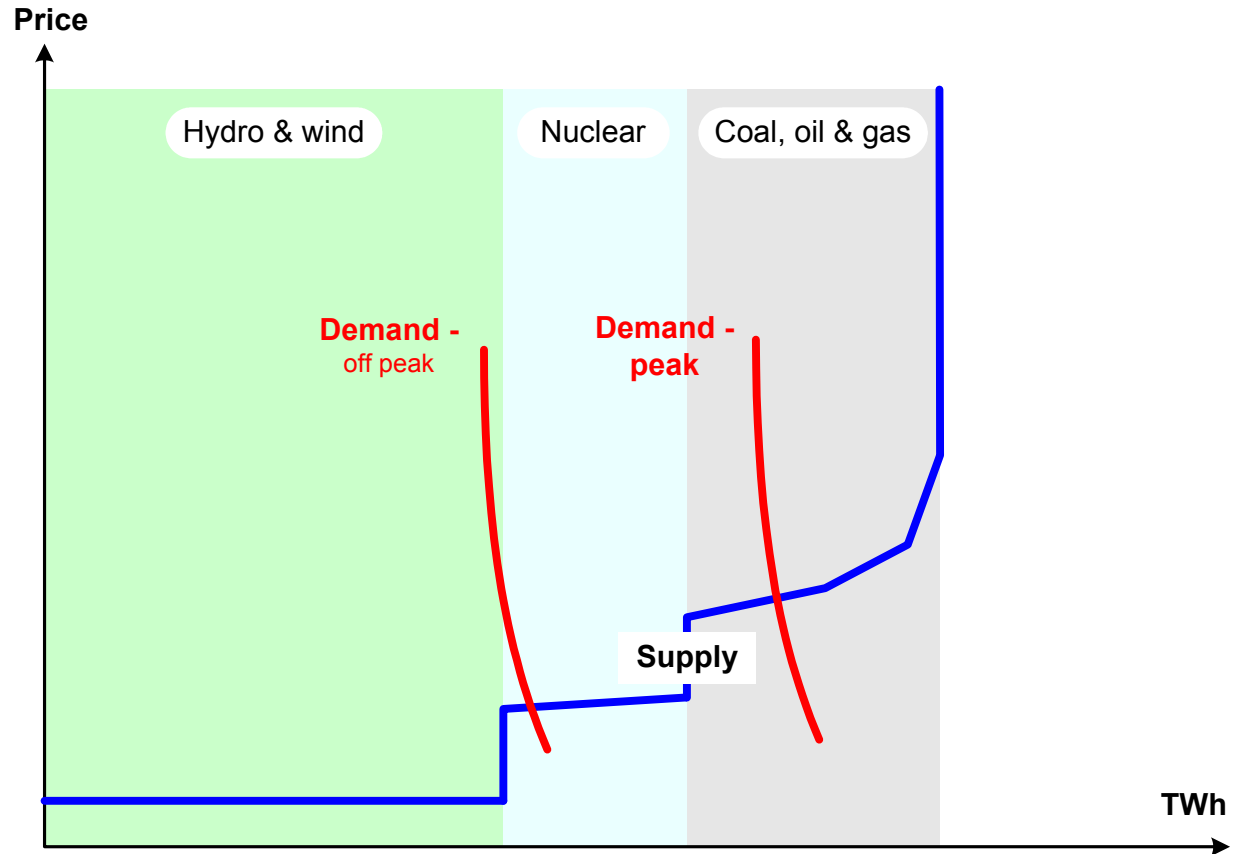
- **Electricity *has* different values to its users.**
 - The value depends on time, location, purpose...
- **Electricity consumption IS price elastic**
- **Transaction cost are the barrier to making price elasticity visible in the electricity system**

Liberalised markets versus central planning

- **The shift from central planning to open markets has shifted the focus from supply to demand.**
 - In central planning flexible demand is an instrument for the system
 - In an open market price elastic demand is the consumers' reaction in order to maximise own utility

Investment in production capacity

Setting the price:



Investments in production capacity

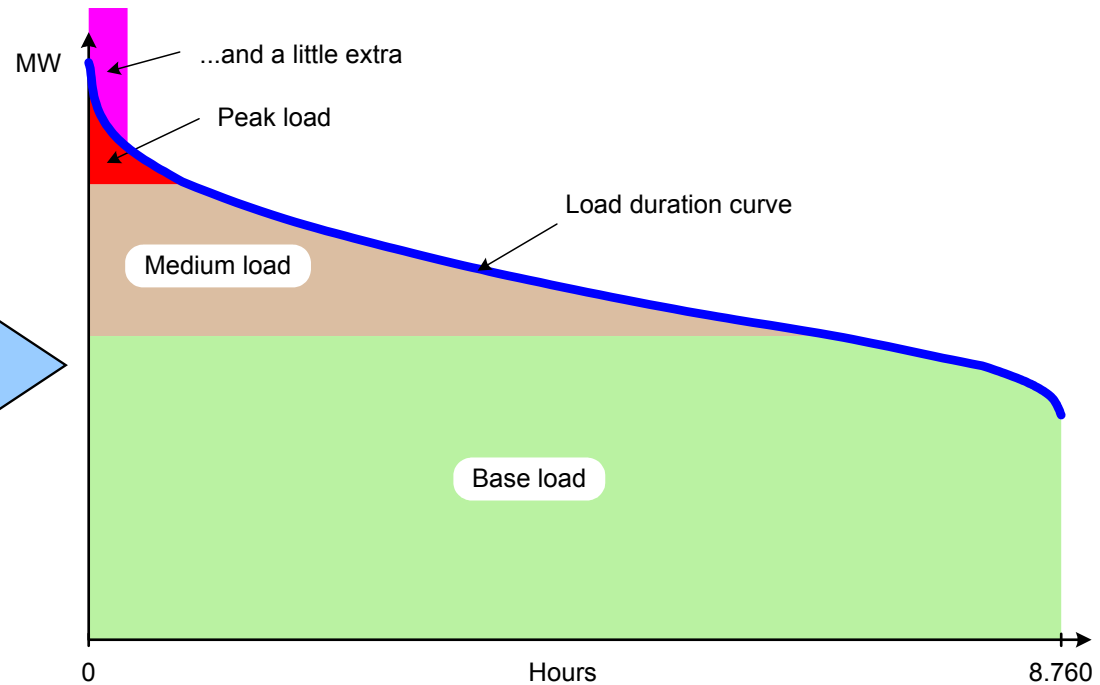
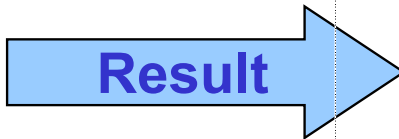
	Investment costs	Operational costs
Base load	High	Low
Medium load	Medium	Medium
Peak load	Low	High

⇒ Many hours operation

⇒ Few hours operation

⇒ Very few hours operation

**Financing in centrally
planned system:
Cost recovery from
consumers**

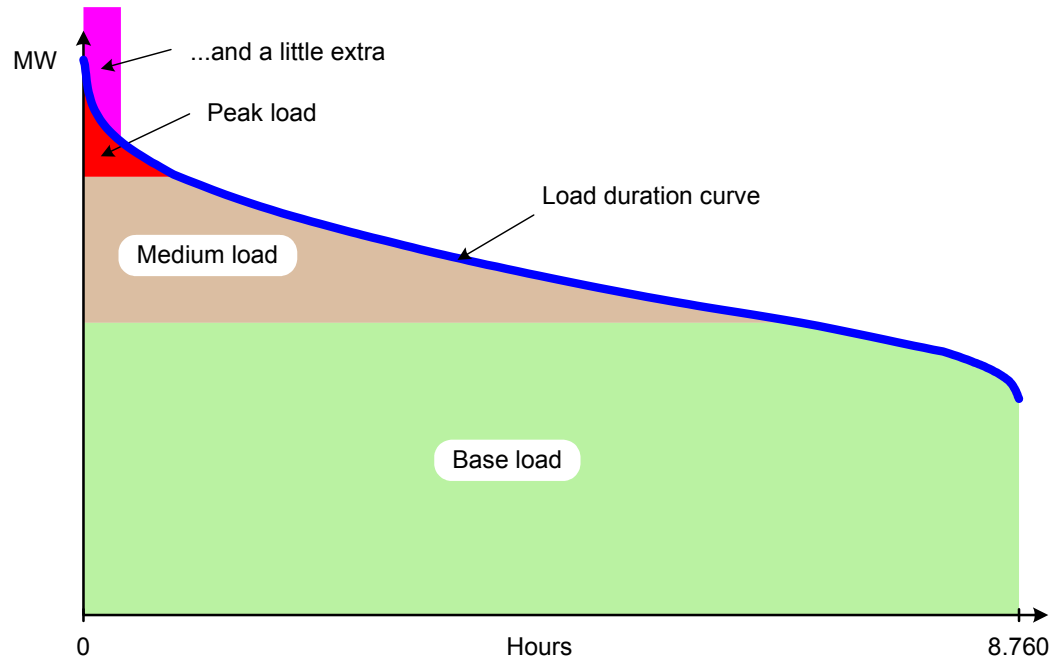
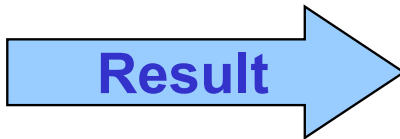


Investment in an open electricity market

Financing in the market:

- By prices set in the (spot) market

⇒ **Marginal costs**



Recovery of investment costs in a market:

- Base load ⇒ during medium and peak load hours
- Medium load ⇒ during peak load hours
- Peak load ⇒ during hours when prices are set by consumers

Why worry?

Yes, it works...

- No examples of market failure in the Nordic market.
- There has been very few examples of tight situations. Evidence indicate increased consumer response in these situations.

...but...

- What if consumers will only respond after a few incidents of rationing?
- Rolling black outs are *not* a market solutions and are *not socially acceptable*.
- ⇒ We must take initiatives to make sure that the consumers are ready to respond already in first incidents.
- ⇒ There is a value in the readiness ⇒ an **OPTION value**

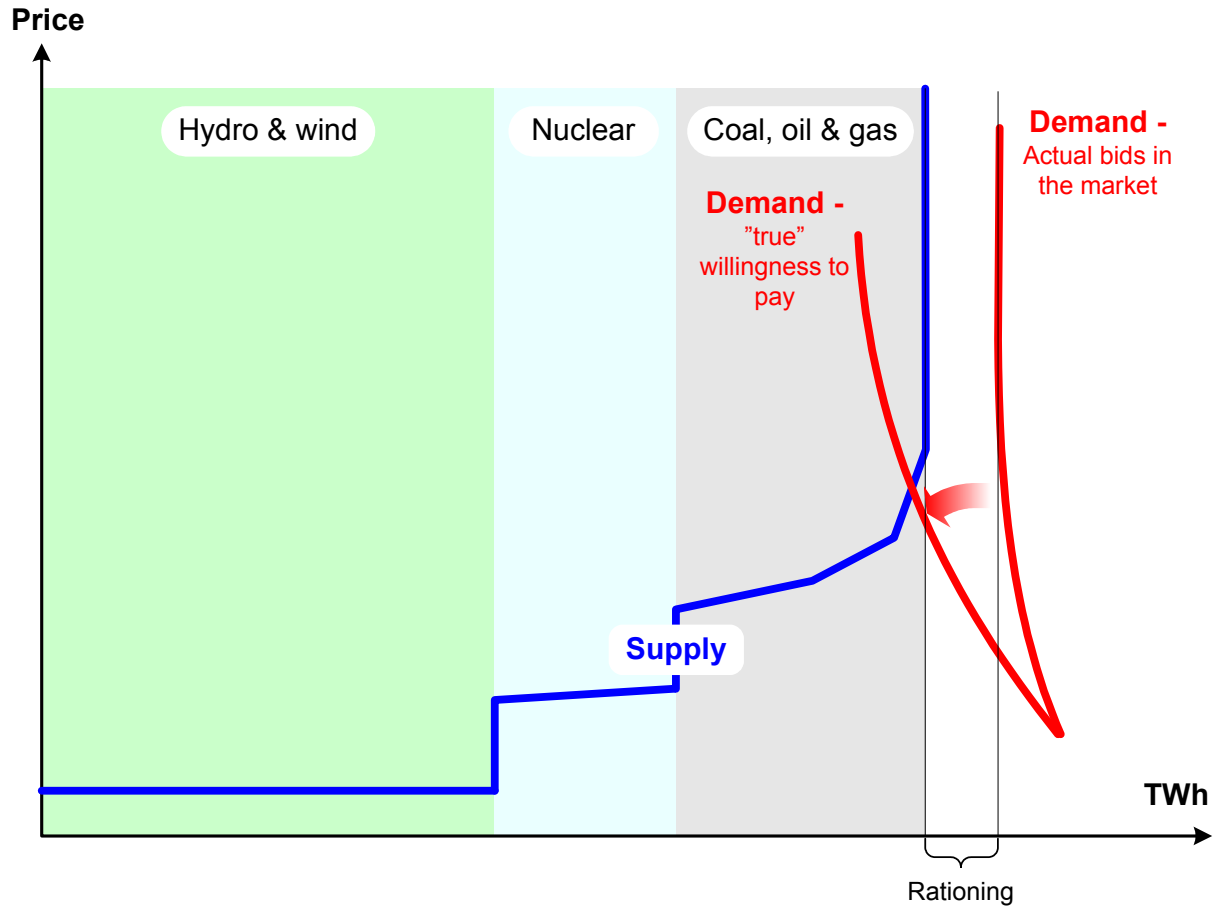
Why worry?

Setting the price
in situations with
extreme load:

Risk of market
breakdown in
the specific hour



Rationing/forced
outage



Why worry?

Values of demand response in the market:

- **Main value from the freedom of choice.**
 - Values given by the value of electricity in the market through trade with electricity as a normal **private good**.
 - The possible choice of *not* consuming when the price is high.
- **Security of Supply?**
 - TSO should *not* balance the *trade* with electricity so that supply and demand always meet ⇒ the market
 - TSO balance the system physically in real-time
 - TSO does not have the technology to control exactly who will suffer from a disturbance
 - Security of supply is a **public good**

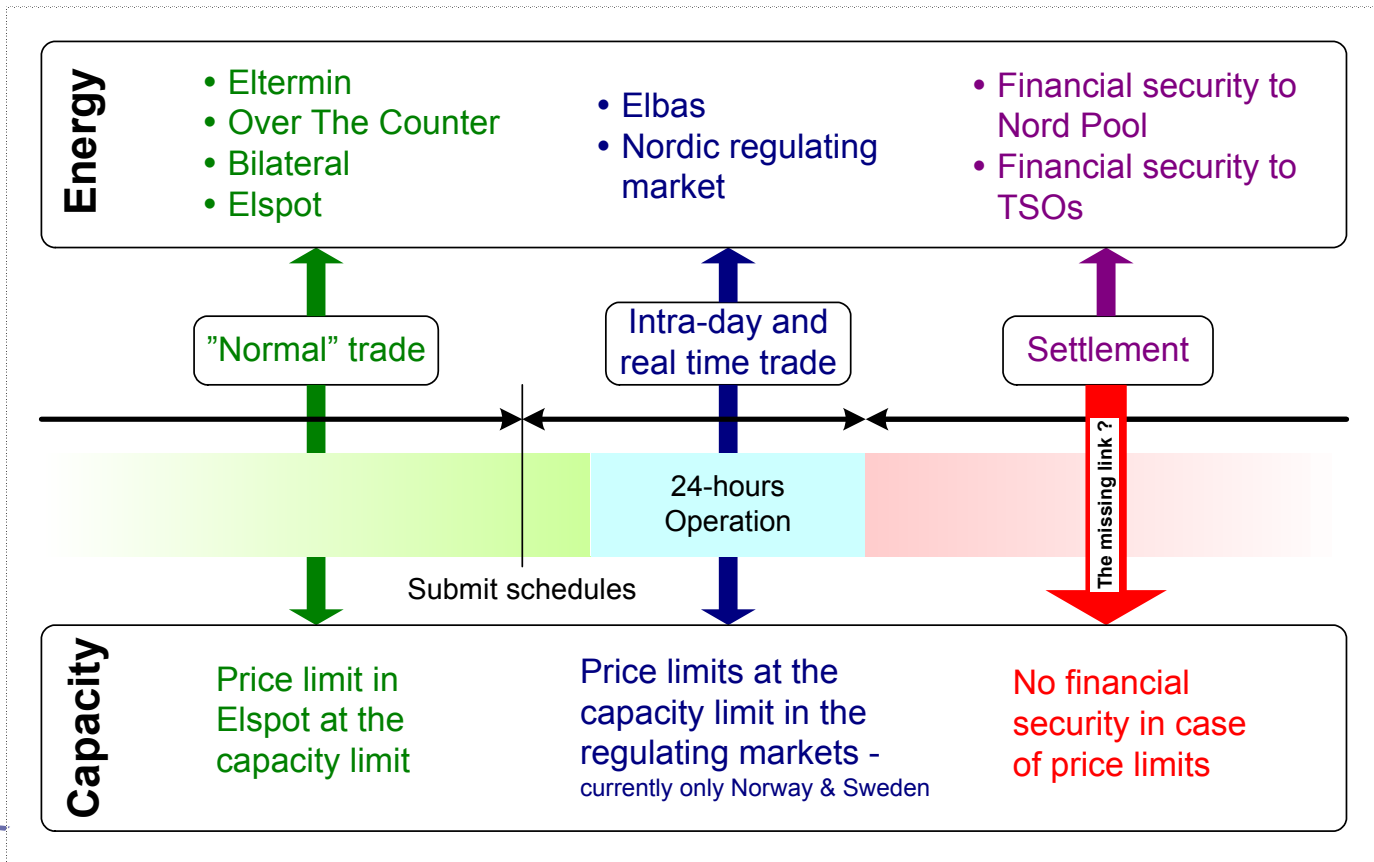
Why worry?

Dilemma

- **What if the disturbance originate from the inability of the market to balance the trade in a specific hour?**
 - ⇒ **What should have been traded as a private good is handled by the TSO as a public good.**
 - ⇒ **The road to re-regulation?**
- **Where does this shift from a private to a public good take place?**
 - ⇒ **The risks are not distributed correctly in the current market**

The Missing Link

Financial instruments and measures in the Nordic market:



The missing link

Capitalising Risk of Market Breakdown

- **Today the consequences of capacity shortage are unclear**
 - market breakdown ⇒ shortage/forced outage ⇒ large financial consequences for market players ⇒ bankruptcy ? ⇒ unpaid bills to TSOs? ⇒ TSOs bankrupt? ⇒ political interference?
 - **In a market system risks should be “capitalised” and distributed to the risk “source”**
 - TSOs run the risk of suffering severe consequences in case of shortage.
 - To the TSO the “source” is the balance responsible market players.
 - To the balance responsible market players the source is (the electricity supply company or) the electricity consumer
- ⇒ **A documented access to flexible consumers may be the “insurance” from the market players towards the TSO. This may be the way to set a price and a value on the *readiness to respond.***

Other values of demand response

- **The market settle the value of electricity in each specific hour and in each market area. This should also send a clear locational signal reflecting bottlenecks in the grid.**
- **The electricity system may not be divided into relevant areas that reflect all bottlenecks. Then there may be additional values to demand response in specific areas of the grid, which are not reflected in the pricing of electricity.**
- **It is up to each grid owner to asses this value – it is difficult.**

