

Introduction to Demand Response

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Demand Response (DR)

What is it?

DR is a **voluntary** change of demand. The change can be

- a reduction of demand when the electricity price exceeds the consumer benefit from using electricity
- a moving of demand to period of lower electricity prices
- an increase of demand when the consumer benefit from using electricity clearly exceeds the price (this can be relevant e.g. in a system with substantial share of wind power)



How can DR be performed



- by end-user
 - by bidding in the market places
 - by performing demand reduction as agreed in a supply contract
- by market participant
 - by utilising remote control for reducing load as agreed in a supply contract

Why is DR important for the Nordic market



□ Balance between supply and demand is tightening and risk for market non-clearing is increasing

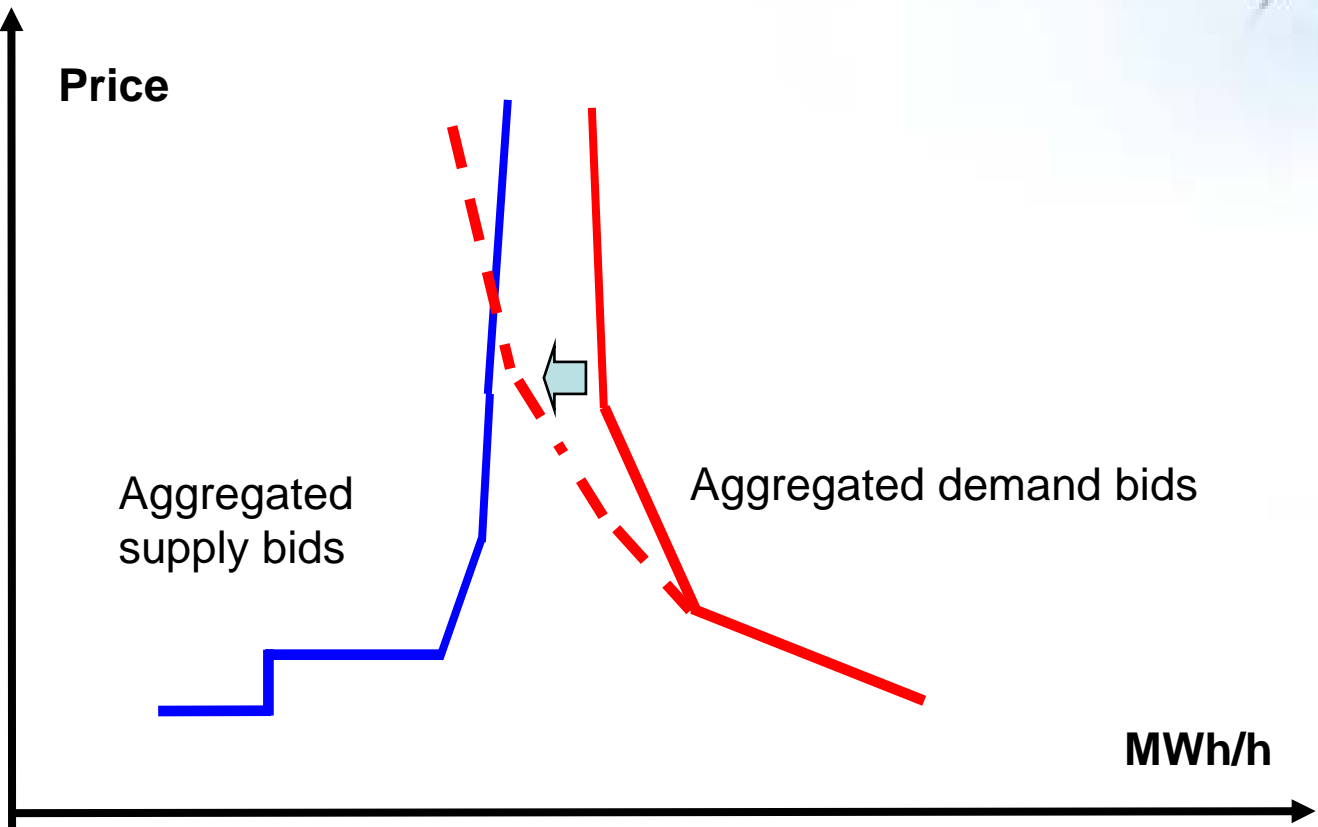
- DR is an already existing physical resource for maintaining the balance without any major investments
- There is a substantial technical potential for DR

□ Price spikes are a risk for market participants and undermine general thrust to the market

- Consumers' risk aversion contributes to DR which contributes to more stable market prices

=> DR is a pre-requisite for an efficient Nordic market

DR and market clearing



Market places for DR

- **There is a real-time market price for electricity**
 - Elspot day-ahead, minimum bid 0,1 MW
 - Elbas intra-day, min bid 0,1 MW
 - Regulating Power Market within the operating hour, min bid 10-25 MW (depending on the country)
- **Financial market creates a link to DR**
- **Bilateral contracts may include incentives for DR**



Realised DR in the Nordic market

- **No systematic monitoring of realised DR in place, only snapshot estimates available**
- **5 February 2001** (price higher than 100 €/MWh in 8 hours):
 - Sweden: Demand reduction 700 MW (partly due to information on a tight power balance)
 - Norway: Demand reduction 500 MW
- **Winter 2002-2003:**
 - Norway: demand reduced by 2,9 TWh (corresponding 1300 MW)
 - Finland: demand reduction 200-300 MW
 - Nordel's statistical analysis: Norway - 4,9 %, Sweden - 1,0 %



Challenges for expanding DR to smaller end-users



- **Get the economic incentive through the whole market chain to end-users**
- **Create new business and organisational models for DR**
- **Develop attractive terms and products for the DR market**
- **Improve technical infrastructure**
 - metering, 2-way communication, etc.
- **Establish supportive regulatory framework**

Further enhancement of DR

- DR has a significant potential and value
- But DR is a complex issue
- The main challenge is to translate the benefits into practice
- Contribution by all parties is needed
 - authorities
 - market participants
 - TSOs/DSOs
 - equipment/service providers



Role of TSOs

- **As a catalyst**
 - Initiate and co-finance studies and R&D projects, which are of common interest
 - Communication and information measures to encourage different stake-holders for action
 - Improve analysis and communication of future power balances to increase awareness of potential risks
- **User of demand resources as operational reserves**
- **Systematic monitoring of DR (Nordel to start a mechanism)**

