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

Price

Aggregated supply bids

Aggregated demand bids

MWh/h
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)