Industrial Demand Response

Shifting loads &
Tilting demand curves

Michaël Van Bossuyt

The Role of DSM to Provide Flexibility in Electricity Systems (Brussels, 13/10/2016)
- Radically changing electricity supply / demand situation

- New unmet challenges in terms of security of supply and competitiveness / prices

- Storage and / or additional (reliable) generation may not be optimal

- Demand response can offer a cost efficient alternative!
Demand Side Flexibility (DSF) is the capacity to change electricity usage by end-use customers (including residential) from their normal or current consumption patterns in response to market signals, such as time-variable electricity prices or incentive payments, or in response to acceptance of the consumer's bid, alone or through aggregation, to sell demand reduction/increase at a price in organized electricity markets or for internal portfolio optimisation (CEER).

CEER: DSF has the potential to provide value throughout the energy system, both for markets and networks.

Demand Side Response (DSR) can be defined as the voluntary activation by a party of its Demand Side Flexibility.
Demand Side Response & Energy Efficiency: Tilting & Shifting!

Stylized German merit order curve

Source: Öko-Institut 2013
Basic principles DSR

- On a voluntary basis only
- Against a fair remuneration (by market or TSO)
- Not primarily for structural generation shortages
- Demand response can play a role in different timeframes and markets:
  - Forward Market
  - Day Ahead Market
  - Intraday Market
  - Strategic Reserve Market
  - Close-to-realtime / Balancing Market
Role of Demand Response in Electric System Planning and Operations (US DoE)
Demand Side Response vs. Energy Efficiency

• Demand Side Flexibility opportunities must be balanced with other company objectives:
  – Sustainability
  – Energy Efficiency
  – Emissions Efficiency

• Goal should be **System Efficiency**

First objective of industry is to produce!
DSR: How to make it happen?

- Give every consumer the right to valorize his flexibility
  - Solution for Transfer of Energy and Baselining

- Give visibility: first objective of industry is to produce!
  - DSR ≠ Negative consumption
  - Changing production planning requires anticipation and has a cost
  - DR potential can be increased via process adjustments requiring investment
  - Need for a stable framework with fair remuneration

- Enable cheapest solutions to emerge ➔ System Efficiency
  - Most critical issues are limited in duration
  - Products proposed should enable a whole range of responses via a proper segmentation of criteria

➔ One size does NOT fit all!
Lack of **consistency** between legislations/regulations and lack of **visibility/sustainability** of energy policies

Lack of **harmonization of (national) grid codes**

Lack of intraday and balancing markets coupling

- **Finalize Target Model!**

Lack of transparency

- Access to essential information (designed for generators, not for load)
- Aggregators operations
  - More transparency required (rules, market impact, …)
Barriers and solutions

- **Lack of incentives to consume more in moments of higher than expected intermittent power generation**
  - Manufacturing / products can be used as “storage”
  - Improve market access
  - Adapt grid tariffs to avoid additional costs / adapt remuneration

- **Commercial and contractual constraints - Who is the owner of load flexibility?**
  - All flexibility must be able to find its way to the market or to TSO products (balancing / strategic reserve)
  - Legal intervention needed?
  - Constraints can concern either sourcing (relation with supplier / BRP) or production (internal constraint) issues

- **Level-playing-field**
  - No discrimination between generation/demand response/storage in tendering procedures for flexibility products/markets
Overall (opportunity) costs of DR actions can be very high (generally a multiple of power price)

- Very process/sector specific: Diverging preference for variable / fixed remuneration
- Diverging fixed costs / variable costs
- Safety aspects (e.g. Seveso plants)

Grid tariffs & tariff structure: DSR should not lead to extra grid costs

- Deviating from nomination mostly comes with a penalty
- Catching up lost production later on is penalised
- No level playing field with generators as often they are not subject to grid tariffs and/or no penalties are applied to them

Introduce appropriate remuneration (fixed / variable)

- Market value (DA/ID)
- Tariff / remuneration
DSR can offer a wide range of services to the system:

- **Adequacy issues**: Energy efficiency investments can solve baseload issues, by structurally reducing demand.

- **Balancing issues**: Consumers can provide flexibility to solve the temporal (peak load) scarcity of the “top” of the (residual) load duration curve.

- **Congestion issues**: DSR can provide flexibility to solve congestion issues, as grids have been developed to fulfill electricity demand. Moreover, DSR can provide flexibility both upwards and downwards.
A New World!

Capacity Regulated System: Reserve Margin

Capacity Liberalized Market: Flexibility!

In 2015 in Belgium:
* Last 500 MW only 23h
* Last 1000 MW only 140h

Badly conceived capacity mechanisms are lethal for demand response (large reserve margin)
- On a voluntary basis only
- Against a fair remuneration (by market or TSO)
- Not primarily for structural generation shortages
- Could contribute to solve transmission and distribution network issues (adequacy, balancing, congestion, ...) and even contribute to a better integration of renewable energy in the market

Overall goal: Lower the overall cost of the system, to the advantage of all users of the system, by allowing the least-costly and most (system-) efficient solution to emerge
Questions?

mvanbossuyt@febeliec.be

Febeliec
Diamant Building
Bld A Reyers 80
1030 Bruxelles
+32 473 88 55 83