Market design for Demand Response: the French experience

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1

SETTING THE STAGE
Back in 2010: concerns about DR penetration

France was initially a country with large DR participation... but since market opening, a gradual decrease in DR capacities whereas peak load has become more and more important.

WG convened in 2010 → conclusion that some regulatory and technical obstacles were preventing the development of DR in France.
Back in 2010: concerns about DR penetration

Traditional obstacles to DSM development are now well identified

**Regulatory / market design**
- Institutional framework: DSM pure players want to access the market and compete with suppliers to value flexibility in markets whereas traditional regulation is supplier-focused → competition can be hampered
- Public policy: **positive externalities** associated to load control (security of supply, decrease in GES emissions, etc.) are not properly integrated into markets → lack of incentive to develop DR

**Technical**
- **Barriers to aggregation** of capacities (individual control on each of them whereas it is the pooling effect that brings value)
- **Barriers to participation of small capacities** connected to distribution grids (e.g. no smart meters, lack of confidence towards data used by DSM operators)

Addressing them requires strong political commitment and technical involvement

**Regulatory / market design**
- **A level playing field** should be implemented between suppliers and independent DSM operators → aggregators should be able to participate to all markets as a resource (supply side) - later confirmed by Competition Authority rulings
- **Public policies** can recognize positive effects through (i) market redesign (e.g. capacity markets) and (ii) dedicated public policies to value externalities

**Technical**
- Aggregation should be encouraged through **adapted control methods** (e.g. no restriction to aggregation as regards the size, location or connecting grid of capacities)
- Data collected by DSM operators can be used **under a regulated regime** (e.g. certification) in the absence of smart meter
Different stages in market design

Full participation of demand-side is needed to reflect all the components of its value (EC, 2013)

How does it translate in the French market design?
Different stages in market design

**Stage 1:** regulatory regime before 2010

- Predefined tariffs (even when dynamic)
- Specific products providing little flexibility (D-1 signals, no RT action)

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<thead>
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</tr>
</thead>
<tbody>
<tr>
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<td></td>
</tr>
<tr>
<td>Markets</td>
<td></td>
</tr>
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<td></td>
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**Stage 2:** DSM-compatible market design
- DSM participation authorized in markets

**Stage 3:** DSM-friendly market design
- Adapted governance framework to enable the participation of independent DSM Operator
- Specific products tailored to enable DSM participation in all markets (but with equal conditions to other products)

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**Stage 4:** Public support for DSM in market design
- Support schemes

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*Full participation of demand-side is needed to reflect all the components of its value (EC, 2013)*
Stage 1 arrangements have proved efficient before market opening (6 GW in year 2000), but the potential then dropped to 2 GW.

In France, a program was launched in 2010 to open all markets to explicit DR participation (stage 3).

Recent law provides for possibilities to reach stage 4 (support must be based on proven externalities – debate over regime based on the “net benefit” analysis decided by FERC in the USA).

**DSM has already become a new market per se**, where independent new entrants compete with incumbent suppliers.
A ‘3 YEARS’ TARGET: REMOVE REGULATORY CONSTRAINTS & OPEN ALL THE MARKETS TO DR IN FRANCE
DSM integration in all the markets in France
Balancing / ancillary services

Balancing Mechanism
Industrial consumers fully integrated since 2003
Aggregated load Balancing experiment since 2007

Ancillary services
Bilateral market for primary & secondary frequency reserves open to DSM (certificated consumption sites, industrial & aggregated load) in July 2014

DSM for Balancing (MWh)

0 5000 10000 15000 20000 25000

- Industrial consumers
- Aggregated households
In Europe, France is the only country to allow DSM operators to participate directly to D-1 markets as a resource (direct participation)

Same kind of discussion than the one in the US (should DSM be paid market price? With what impact on suppliers? Based on a net benefit criterium?)
DSM integration in all the markets in France
Capacity markets

French capacity market

DR contributes to SoS: 2 possibilities to participate to the French capacity market (chosen by DR owner)

- Explicitly through certification (asa resource)
  - Similar to generation
  - Requires correction of load
  - Well adapted to "easily certified" DR

- Implicitly through obligation reduction
  - No certification
  - No load correction
  - Well adapted for difficult to assess DR

DR is expected to be price-setter in the French CRM (possibility to get certificates closer to real time, short peaking periods making DR operators particularly suitable to compete, etc.)
3 KEY REMAINING QUESTIONS ABOUT MARKET DESIGN
How the public policy debate did structure in France

1st debate: should DSM operators:

- be restricted to propose load management services to suppliers (« implicit valuation »)
- or authorized to directly value load reduction in energy/capacity markets? (« explicit valuation » - participating as a resource)

Direct participation to the French Balancing Mechanism opened for DSM operators since 2003... but questioned for energy and capacity

Other options (specific market for DR, « implicit only » system to reduce transaction costs) have been contemplated but not pursued

A new role in the institutional organization of the power industry to shape: that of the independent DSM operators

2nd debate: how to regulate the interface between independent DSM operators and suppliers?

Historically, the interface has been organized on negotiated bases, but various reasons (inc. competition concerns) have questioned this model as from 2007
First debate – the DSM Operator

Who should be in charge of DSM?

**Suppliers in charge of DSM?**
- DR for portfolio optimization exists and can further develop with adequate tariffs
- Suppliers’ core business is to sell energy
  → Mixed incentives to develop DSM beyond portfolio optimisation?

**Consumers in charge of DSM?**
- High transaction costs & complexity, especially for small consumers (residential load)
  → Consumers are generally not willing to do it themselves (except for extreme prices)

**There is room for a new type of market party, the Independent DSM Operator**

Requirements

- Open access to demand side potential
- Open (explicit) access to markets
Second debate – the regulatory framework

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<th>Trust in the product</th>
<th>Technical issues</th>
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<td>Pre-qualification &amp; quality controls</td>
<td>Step by step improvements</td>
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Two rulings from Competition authority (2012 and 2013) with important consequences:

- Suppliers and independent DSM operators are competitors (i) for contracting with consumers and (ii) for selling energy/capacity (two-sided market)
- Any DSM operator shall have the right to implement load reduction to sell the corresponding energy **without agreement from the supplier** → requires a regulated interface rather than a contractual one between the two → **this is a form of unbundling**
- control and monitoring tasks should be performed by the TSO
Regulating the interface between suppliers and independent DSM operators requires to address the question of energy

- Financial transfers between DSM operators and suppliers must be settled in order to maintain markets rationale (participants are paid for what they deliver - the “just compensation”) and maximize social welfare
- **But no more:** reverse payments should not be aimed at compensating suppliers for the loss of any commercial opportunities due to DR
- In decentralized markets such as European energy ones (no central dispatch), solution implemented in the US cannot be simply transferred: BSP perimeters must be corrected and according financial settlements made
- Data transfers should be carefully regulated, making them anonymous if necessary: suppliers will not be told the identity of DSM operators that intervene
- the TSO thus intervenes as an interface between parties to enable financial settlements and data transfer between competitors

→ **Brottes Law (2013) creates a regulated and non-discriminatory access for DSM operators to consumers** – this form of unbundling requires a new set of technical rules that takes time to draft
FROM TECHNICAL PARITY TO EXPLICIT SUPPORT ?
Public support for DSM – Content of a premium

DR is supposed to provide some benefits to the collectivity.

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<th>In the electric sector</th>
<th>Out of the electric sector</th>
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<td>• Production savings due to consumption decrease</td>
<td>• Jobs creation</td>
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<td>• Contribution to the security of supply</td>
<td>• Innovation</td>
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<td>• Network savings (losses, avoided infrastructure reinforcements)</td>
<td>• Competitiveness</td>
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<td>• …</td>
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<td>• Reduction of GHG emissions</td>
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<td>• Reduction of the potential market power of actors on wholesale market</td>
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Pricing these externalities allows DSM actors to be incentivized vis-à-vis the improvement in social welfare they make possible

BUT Difficulty to assess the level of the externality & to fine-tune the corresponding level of public support
Premium has to be designed carefully
Taking delayed consumption into account

DSM energy is supposed to replace generation for marginal technology
→ Avoids corresponding CO₂ emission

For CO₂ value = 30€/tCO₂, DSM externality =
→ 30€/MWh of DSM without delayed consumption
→ 18€/MWh of DSM with delayed consumption
Premium has to be designed carefully

The effect of bad technological choices

1. Necessary subsidies
   - Required Market design
     « compatible DR »

2. ... to the detriment of DR
   (whose abatement cost has increased)

PV is given high subsidies...

... and lowers market price...

Finally, the very high abatement cost of PV is paid two times because this option makes DR more expensive collectively.

Theoretical cost
- Practical cost
  (not counted the too expensive support to PV)
Impact of DSM on spot prices and stakeholders

What is the impact of DSM on prices and stakeholders?

Introducing DSM creates distribution effects on the whole value chain in addition to social welfare gains. RTE has performed economic studies showing that price variations induced by DSM lead to distributional effects (in favour of consumers) that are bigger than social welfare gains (6 times higher in our case).
CONCLUSION
• Demand Side Management is central in the energy policy in France, with **strong political support** (« Brottes law »).

• The **potential for Demand Response is high**: Stakeholders evaluate the potential capacity to several GW (aggregated & industrial).

• Demand Response development requires **full participation** to all aspects of the market design: **achieved in France in 2014**

• **Social welfare gains are expected from** Integration in energy markets (peak-shaving)

• **Challenges**:
  - Assessment, certification, performance monitoring
  - Data management: commercial confidentiality & privacy protection
  - Dealing with load shifting (operational & market design considerations)
  - Regulatory framework: Economic parameters determination

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