



DEMAND SIDE RESPONSE

Sources of Value and Potential Business Strategies

Demand Side Response ('DSR') will be a major feature of tomorrow's electricity markets and could represent a €50 billion/year market by 2030 across the EU. Whilst attracting significant interest from existing players and new entrants, no business model has yet to emerge as a key winner.

In this article, FTI-CL Energy experts explore the key sources of value for DSR in current electricity markets and potential strategies for capturing this value.

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Motivation

The utility industry is at a critical juncture, as traditional business models are challenged through an ever increasing focus on customer engagement and the need to reduce demand. DSR is one key dimension of active consumer response in electricity markets, and raises technological, regulatory and strategic issues.

Various analyses demonstrate a significant potential for DSR in European power markets – in the most mature DSR markets, such as PJM in the Eastern US, DSR represents up to 10% of capacity. But the development of this technical potential hinges on the development of a supportive regulatory framework and successful business models.

In this article, we aim to answer the following questions: “What business models currently exist?”; “How do they make money?”; and ultimately, “Who is best positioned to capture the benefits from the growing DSR market?”

What is Demand Side Response?

Demand Side Response ('DSR') is the action to change electricity usage in response to incentives that reflect the real-time needs of the electricity system. DSR is a subset of Demand Side Management ('DSM'), which includes all measures to alter normal usage, including permanent changes through energy efficiency measures. DSR is currently split into categories:

- 1) **Demand actions.** This is considered 'true DSR' where a consumer a) adjusts usage by temporarily suppressing demand; and b) 'load shifting' whereby demand is transferred to a different time period when prices are lower.
- 2) **Embedded generation.** Small on-site generators that are owned and operated by consumers to either a) reduce energy imports by meeting a customer's demand using their own generator; or b) export power to the distribution network to create additional income.

Who currently provides DSR services?

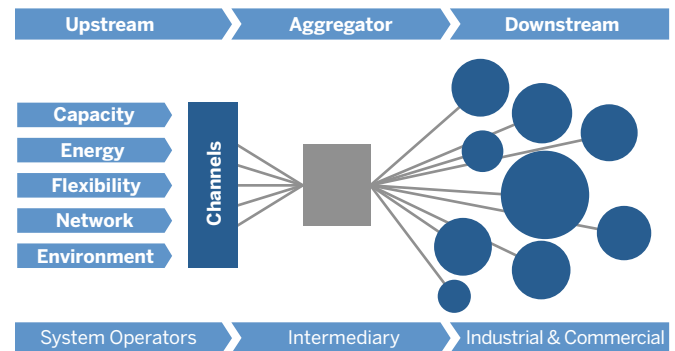
A number of businesses already provide DSR services globally and within the EU energy market. These DSR services use an 'Aggregator' business model (Figure 1). The business negotiates agreements with multiple end-users of energy that are willing to alter their demand profile. An Aggregator combines these responses into larger portfolios, forming the downstream portion of their business. The upstream portion consists of deriving revenue from selling its DSR portfolio into the market through a number of value mechanisms. The mechanisms and associated value will vary depending upon the market structure that the Aggregator operates within. We detail upstream and downstream sections in turn below.

Upstream

DSR value can be categorised into five channels: capacity, energy, flexibility, network and environmental. Figure 2 outlines each of these.

For most markets, the key sources of value will come through the capacity, energy and flexibility channels. We do not expect network value to be a scalable business proposition in the medium term because of the uncertain nature of the opportunities which are bespoke in terms of location, size and duration. When assessing DSR value, Aggregators 'de-rate' nameplate portfolio capacity based upon factors such as eligibility, availability, and duration of response. These factors can significantly reduce the 'committed capacity' i.e. the capacity that is contracted into the wholesale market.

Figure 1: Interaction of the Aggregator with the upstream value channels and the downstream customer.



Source: FTI-CL Energy, April 2015

Downstream

Aggregators typically interact with end customers from the Industrial and Commercial ('I&C') segment. I&C customers consume far more energy than a typical domestic customer, making the upfront cost of equipment installation (like half-hourly meters) and ongoing costs of customer management, financially viable on a per customer basis. Many I&C customers also own embedded generation units. These are a core element of what is currently considered to be DSR capacity (see: 'What is Demand Side Response?' above).

Commercial structures between the Aggregator and the end customer define a number of core items: capacity, revenue share, payments structure, availability (speed and duration of response) and penalties. The typical revenue share between Aggregators and the end customer is based on a 50-50 split of upstream revenues. The end customers own the flexibility, with many contracts limiting the guaranteed obligations in place for response capacity and duration.

Challenges

The biggest risks with the Aggregator model occur in the contractual arrangements with upstream and downstream:

- **Maturity matching.** To mitigate earnings risk, an Aggregator wants to secure long term contracts with an equal tenure both upstream and downstream. Market rules are the restricting factor upstream, which in turn limit the duration of offers made downstream. This consequently matches with shorter downstream contracts and raises the churn risk. A recent example of this occurred in the GB Capacity Mechanism rules where DSR providers were not permitted to bid for 15 year upstream contracts; and
- **50-50 split of revenue.** We consider that the current split of downstream revenues favours the end customer. The current split by revenue, and not by profit, means that all costs are borne by the Aggregator's share and not the customer's. Early movers may have set an early precedent that provides less favourable commercials for ongoing investment recovery and ongoing margin potential.

Figure 2: Upstream sources of value.

| Value source | Description | Availability within GB market | Estimated size £/kw/pa | Contract stability |
|----------------------------|---|---|---------------------------------|-----------------------------------|
| Capacity value | Guaranteed load shedding within the capacity market | Eligible to bid for 1 year contracts in main auction additional "Transitional Arrangements" 2015-2017 | £15-35 | Medium to long term stable income |
| Energy value | Bidding DSR into the wholesale energy market for the prevailing price | Currently ineligible Work underway in cash out reforms for inclusion | Uncertain | Short term uncertain income |
| Flexibility value | Provide balancing services for the system operators | Eligible for many of the reserve markets specific demand side balancing reserve (DSBR) | £40-55 | Short to medium term |
| Network value | Removing local distribution network constraints in the short and longer run | Limited current schemes Some pilot projects (e.g. Low Carbon Network Fund) | Bespoke per network requirement | Infrequent long term |
| Environmental value | Reducing the supply of CO ² emitting generation | No current value mechanisms | Not available | Not available |

Source: FTI-CL Energy, April 2015

How should DSR providers position for growth?

Aggregators have developed recently in a number of European power markets as niche players. They target specific customer segments (large I&C customers), and specific upstream market channels that provide the greatest value. As Aggregators mature and grow, they face a number of strategic choices – principally how to diversify their sources of revenue. A niche business is highly exposed to changes in market regulation and threats from competitors.

When an Aggregator diversifies it must carefully consider what its 'value-add' is relative to its competitors. We see two distinct routes to diversification:

1) Across business models. Requires a change in business model to encompass additional areas of the value chain, as identified in Figure 3.

2) Across geographical markets. Applies the existing business model and any competitive advantage to other markets. The difficulty here is finding a similar market structure and value channels.

A small number of more mature Aggregators have started this diversification journey. Enernoc, for instance, has deployed both approaches. Their business model has extended beyond pure aggregation, to providing energy management services and a DSR software product on a stand-alone basis. This business model is now being used across a number of power markets in the US, Australia, the UK and other countries in Europe. The recent proposed regulatory change to the PJM capacity market, which threatens Enernoc's core market, indicates how important such diversification is for a long-term business model.

Figure 3: Assessment of aggregator business models in the current value chain.

| <div> <div>Low</div> <div>← Difficulty →</div> <div>High</div> </div> | | | | | | |
|---|--|---|---|--|--|--|
| Business models | Description | Contractual arrangements | Operational arrangements | Technology | Scalability | Competition |
| True DSR – I&C segment | Portfolio of a few large DSR participants (>100kW) | 1-5 year downstream and 1 year upstream | Small number of customers | Standard software to aggregate and communicate | I&C participation is still low relative to segment demand | Replicate model quickly but I&Cs can be tied in |
| True DSR – Domestic segment | Portfolio of many small participants | Consumer protection limits stability | Very large number of customers | Large scale technology roll out (e.g. smart meter) | Technically feasible but not currently economically viable | Limited current offerings but high churn in end state |
| Embedded generation – I&C segment | Portfolio of small customer owned generation assets | 1-5 year downstream and 1 year upstream | Small number of customers | Standard software to aggregate and communicate | Large embedded generation capacity available for DSR | Risk of increasing environmental restrictions |
| Virtual Power Plant | Small decentralised assets (e.g. storage, renewables, peakers) | 1 year to lifetime with generation assets | Multiple small assets of various technologies | Software to communicate and optimise upstream | Limited number of PPA contracts available | Multiple PPA buyers, including energy suppliers |
| Generator – Buy Operate Own | Small to medium scale flexible generation assets | Longer contracts with more secure revenue streams | Small number of customers | Software to communicate and optimise upstream | Asset intensive requires significant capital | Risk of technology obsolesce (e.g. efficiency/enviro.) |
| Ancillary Optimiser | Specialist third party trading function that optimises flexibility | Uncertainty until dispatch | Multiple upstream and downstream contact points | Leading offering required to differentiate | Optimisation for monetisation of all flexibility | In house – existing competency for existing operators |

Source: FTI-CL Energy, April 2015

Future scenarios: which role for utilities?

DSR services offer a large potential for growth to existing electricity market players and new entrants. For instance, DSR comprises less than 1% of total capacity today in GB, whilst the market is estimated at £2.3 billion by 2030. A number of significant hurdles remain:

- how to engage all customers to actively participate, including in the retail segment;
- how to develop a 'response trigger', the mechanism that initiates a reduction in demand, that is automatic and not manual;
- whether smart meters meet expectations and fully remove the barrier of high initial capital costs for DSR technology in homes;
- how will environmental regulations develop for behind-the-meter generators and their participation as DSR units?; and
- who will be able to adapt fastest, at low cost, and with the correct offering to provide DSR profitably?

Clearly a number of scenarios are feasible, depending on whether existing market players position themselves fast enough, or whether they will leave new entrants to capture most of the DSR market. We outline the two paths that we consider most likely: "aggressive utilities" and "aggressive Aggregators".

1) Aggressive utilities. Large energy suppliers have competitive advantages. They own relationships with millions of customers, which provide a channel for mass engagement, and they also benefit from scale. Their operational structures are well placed to respond to the large volumes of communications and billing required. Clearly a bundled offering of energy supply and DSR is the most efficient business model to serve the domestic segment. The challenge for this scenario is the ability for a large business to transform and adapt to a more complex business model with a very high volume of consumer interactions.

The Aggregator can remain viable in this future scenario as the DSR provider for I&C clients. In this more competitive environment, the Aggregator must demonstrate added value and build a strong reputation for serving I&Cs using deep DSR market insight and providing resulting savings. Additional opportunities exist to provide niche offerings through the development of proprietary hardware and software that serve customer's DSR needs better than competitor's technology offerings, as well as diversified energy services.

2) Aggressive Aggregators. In this scenario, Aggregators expand aggressively in the DSR market and are the disruptors in the retail market, offering DSR and energy supply as a bundle.

The range of facilities which need to be developed for the DSR revolution is substantial. These include: hardware for automatic response, software for optimisation, software for communication, software for measurement, and meter provision, repair and services. Smaller companies are able to use a more agile and innovative approach to develop market service offerings that adapt to meet customers' needs and are able to extract more value from DSR.

The experience in the US reveals that the incumbent utility companies struggled to adapt to DSR and Aggregators grew rapidly instead. The utilities are now playing catch-up.

The wheels are in motion towards the new world of DSR. While we do not yet know which service and business models will succeed, we know the potential is considerable and represents significant opportunities for businesses that are bold, innovative and prepared.

FTI-CL Energy experts have recently conducted a number of DSR related projects for our clients to segment the market, assess different business models, track regulatory developments and develop effective commercial strategies.

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About FTI-CL Energy

The FTI-CL Energy team is a collaboration between experts from Compass Lexecon and FTI, in the fields of natural gas, electric power, renewables and other forms of energy, bringing together market leading industry expertise and economic excellence

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