



SEDC
Smart Energy Demand Coalition

Enabling independent aggregation in the European electricity markets

Roles and Responsibilities: Keeping the BRP whole after a demand response event

Position Paper

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Roles & Responsibilities: Keeping the BRP whole after a Demand Response event

Demand Response (DR) has gained widespread policy support in Europe as is reflected in recent robust regulatory initiatives, including the Third Energy Package, the Network Codes and the Energy Efficiency Directive (EED). Within this larger framework, the EED calls for the development of demand response. Its article 15.8 requires, “Member States shall ensure that national energy regulatory authorities encourage **demand side resources**, such as demand response, to **participate alongside supply in wholesale and retail markets.**” Furthermore “Member States shall promote access to and participation of Demand Response in **balancing, reserves and other system services markets (...)** Such specifications shall include the **participation of aggregators**”. The Directive therefore stipulates that demand response (operated by consumers and aggregators) should participate alongside generation within the full range of organized electricity markets.

In Europe, the vast majority of consumers do not have access to any demand response service offerings within **any** market, to say nothing of the full range of balancing, reserves and wholesale markets. Demand Response programs provide consumers (residential, commercial¹ or industrial) with control signals and/or financial incentives to lower or adjust their consumption at strategic times. In market such as the USA, consumers currently earn over 2.2 billion Euros annually from these programs², and save more than 5 times this amount for all consumers by avoiding expensive generation capacities and therefore reducing costs for all.

Why aggregation matters

European and international experience over the past decade demonstrates that **competition** around consumer centred **aggregation services is the key** enabler of investment and growth in demand response. These services can be provided either by an independent aggregator or a retailer, but it is important that these services can focus on the consumer’s willingness and ability to sell the value of his flexibility and can be **unbundled** from the sale of electricity. For example, in the largest DR market in the world, the PJM capacity market in the USA, 77% of all Demand Response MW³ was provided through dedicated aggregation service providers in 2013, and thus not attached to the sale of electricity. Similar numbers also occur in unbundled competitive markets, such as those in the UK, Victoria Australia and New York.

¹ By the term “Commercial” is meant all buildings and businesses which are not directly industrial or residential; in other words, municipal buildings, SMEs, businesses such as hotels, office spaces, etc.

² Joule Assets Inc. ERA Fund Report. 2013

³ 2013 PJM Market Activity Report

Aggregation service providers are specialised in providing these consumer-centric demand response services. Competition between the retailer and the aggregator allows for the growth of a robust, competitive, demand response service industry and is a key component of a consumer centric electricity market (see Annex B for a description of aggregation services).

It is therefore critical that market regulations create clear roles and responsibilities between players, allowing consumers' free choice over their demand response service provider, including the possibility to sell their flexibility through independent aggregators and retailers, offering **dedicated demand response services**. Without this, market competition does not grow and few services are developed.

Challenge for Europe

Without fair and equal competition between providers, services will not be fully developed⁴. Demand Response and aggregation service providers, must therefore be integrated with the processes, roles and responsibilities of the electricity market, and the interactions with other electricity market participants. In particular, the roles and responsibilities of the customer's independent DR service provider, retailer and Balance Responsible Party (BRP⁵), need to be clearly defined and where possible standardised.

This paper discusses the two most critical interactions: 1) the need to avoid imbalance penalties for the BRP of the Retailer of participating consumers during a DR event triggered by an independent aggregator and 2) the open energy position of the BRP/Retailer due to a DR activation in an energy market. It is important to note that in an energy market that has enabled DR, the energy position of a BRP in the market can be either generation or DR and this is fully transparent, i.e. 1 MWh of generation is equal to 1 MWh of demand reduction. In many European Member States, the current market model does not allow DR-aggregators to compete effectively, as the interactions described above require a minimum bilateral agreements between independent aggregators and BRP/retailers, effectively allowing BRP/retailers to block market entry for aggregators.

The SEDC considers a standardized solution which allows free access to the market for all types of DR providers as critical for the viable development of Demand Response throughout European Member States. Solutions should therefore be holistic and developed by the Commission and NRAs in close cooperation with stakeholders, including aggregators, BRP/Retailers and consumers. Without a resolution of these two issues, competing interests will prevent a wide spread penetration of Demand Response and consumers will continue to be barred from the markets.

⁴ As an example: some commercial customers have had the required metering technology installed for the last decade, yet such metered customers rarely participate in demand response – there has been no competition between aggregation service providers to offer them services.

⁵ The Balance Responsible Party is the role in the entity taking financial responsibility (towards the TSO) for possible imbalances in its contractual portfolio or "perimeter", i.e. between on the one side, all consumers and sales, and on the other side, all generation and purchases contractually included in its perimeter. The BRP and the Retailer (who sells the energy to end-consumers) are generally part of the same organization or, in any case, linked by a commercial agreement.

Benefits of Demand Response

There is general agreement concerning equal treatment of demand-side and supply-side resources in a given market. A basic principle of equal market access and equal treatment is equal payment to providers (in this case generators and DR operators, i.e. consumers or aggregators offering DR in the wholesale market). In other words “blocks of DR” should be sold exactly as “energy blocks” in a market. Substitution of DR for generation can be possible due to the fact that both DR and generation create the same overall effect for the electric system – they balance electricity supply and demand in real time. DR substitution is beneficial to the power system in many ways such as: the cost-efficient integration of renewable energy sources; reduced investment needed for reinforcement of transmission and distribution grids, enhanced competition in the markets leading to lower prices, reduced CO₂ emissions, and importantly, an alternative value stream to local industry, schools, hotels... and households created by their participation in Demand Response programs. Therefore DR can benefit the environment, lower electricity costs and provide revenue to local communities at the same time

Situation description: Demand Response activation

An independent aggregator has closed a DR contract with a consumer, providing that consumer’s flexibility **access** to wholesale electricity markets. That consumer is therefore **offering** the value of their consumption flexibility directly in the market or, in most cases, to the aggregator, who then bids it into a wholesale electricity market. Within the market the shifted or curtailed consumption in MWh is treated the same as a MWh of electricity produced and sold by a generator⁶.

Meanwhile, the consumer is also served by his Retailer who is responsible to supply electricity to the consumer. As required, the Retailer has sourced an amount of energy -for example, in the day ahead market- that is equal to **its forecast of demand**. Therefore, its BRP’s perimeter is **balanced upfront**. Somewhere between years ahead and real-time, the independent aggregator has offered the consumer’s flexibility into a market (e.g. day ahead, intra-day, balancing, capacity, etc.).

Issue: According to the position it has taken on energy markets, the independent aggregator activates a DR dispatch in real-time. This event is not initiated by the Retailer itself, but it changes the actual consumption of the Retailer’s customer base. This renders the BRP’s forecast incorrect and results in an imbalance between the volumes purchased by the Retailer on the wholesale markets, and the electricity consumed by its consumers. Depending on the rules adopted, especially BRP rules regarding the assessment and compensation of imbalances, this situation creates the 2 issues mentioned above, i.e. an imbalance position for the BRP as well as an open energy position.

One possible solution is to apply no correction, in this case the imbalance of the BRP caused by the DR event will be settled as part of the total imbalance of the BRP at the imbalance price of the respective Member State, which depending on the situation and local rules can be an interesting remuneration or not. Although currently used in several member states, this simple solution does not offer a satisfactory result for all cases. It should therefore be a **starting principle** that any viable regulatory model for the issues above, allows for viable DR participation in the markets and at the

⁶ Demand can be either curtailed or increased. For simplicity sake we only look at curtailment in this example.

same time protects the Retailers and BRPs from unfair costs incurred through the fulfillment of their balancing requirements.

To summarize the two issues

1) Imbalance Position: The DR dispatch brings the BRP into imbalance. Assuming the BRP's position would have been balanced but for the DR event (demand is curtailed), its position is a long position - the BRP/Retailer scheduled more energy than its clients consumed. The imbalance settlement of long positions varies between Member States and depends on the situation of the total control area. Seen that the trigger for the imbalance in the case of a DR event is external and not under the control of the BRP, the BRP should not be penalized for it, nor should he be overly compensated.

2) Open Position for Retailer/BRP's sourced energy: The Retailer/BRP also has a **changed energy position**: the Retailer/BRP may have sourced 100 MWh for a specific quarter hour, but only sold 80MWh to the consumer via its Retailer in that quarter hour (DR curtailment, i.e. regulation up)⁷. **This means** that the Retailer/BRP has sourced energy, be it electricity generated or DR volumes, in the fulfillment of its regulated duties, which it now cannot sell.

Models for adjustment of the open position: Different mechanisms to address the above situation have been trialed in a few EU member states and implemented in international markets. A successful solution is **the** critical component of a successful DR market. A coherent adjustment mechanism is therefore required, addressing both the imbalance position and the open energy position faced by the Retailer/BRP.

Below the SEDC has outlined its preferred solution applicable for this critical issue on wholesale energy markets⁸, though different solutions might be envisioned depending on regional context.

Solution: Transfer of energy between the Retailer/BRP and the independent aggregator

This solution looks to address the BRPs open position directly, without attempting to take into account surrounding market benefits enabled by demand side participation in the markets. It is therefore relatively 'simple' to implement. That said, the mechanism would allow DR to be implemented quickly in the Member States for medium and large consumers, generating new revenue streams for European business and creating a positive cycle of investment in the industry, provided this mechanism is set up for a relative long duration (investment can only rely on regulatory stability and visibility). It is important to understand that this issue does not apply to markets that do not remunerate energy, such as the capacity market, frequency reserve markets, and some further reserves markets. This solution only applies when DR earns an energy fee, i.e. in day-ahead and intraday energy markets and for balancing products with energy payments.

⁷ Conversely it may have sourced for 100MWh and sold 120MWh if the DR event increased total consumption during this quarter hour (DR enhancement, i.e. regulation down).

⁸ When an independent aggregator provides a capacity or balancing resource, without an energy component, payments for the BRP sourcing of balancing resources is not required.

Principles:

- The open energy position is settled between the independent aggregator and the BRP, i.e. the aggregator will **buy** the sourced but not consumed energy from the BRP/Retailer in case of demand curtailment, or will **sell** the consumed but not sourced energy in case of demand enhancement to the BRP.
- This will:
 - Correct the balance position of the BRP avoiding any imbalance penalties due to the DR event independently of the imbalance settlement rules in place, solving issue 1
 - Provide fair payment to the BRP for the open energy position, solving issue 2.
- The adjustment mechanism should be applicable and symmetric for both regulation-up (demand curtailment) and regulation-down (demand enhancement).
- The adjustment mechanism must be **centrally facilitated** and **not** require the independent aggregator to contract directly with the BRP, which creates a clear conflict of interest between parties. Without a central facilitation, dedicated aggregation services are not possible, because if the Retailer/BRP does not agree to the fair terms of the contract no services can be provided.
- Any communication of information between the BRP and independent aggregator should be centralized in order to avoid confidentiality and competition issues.

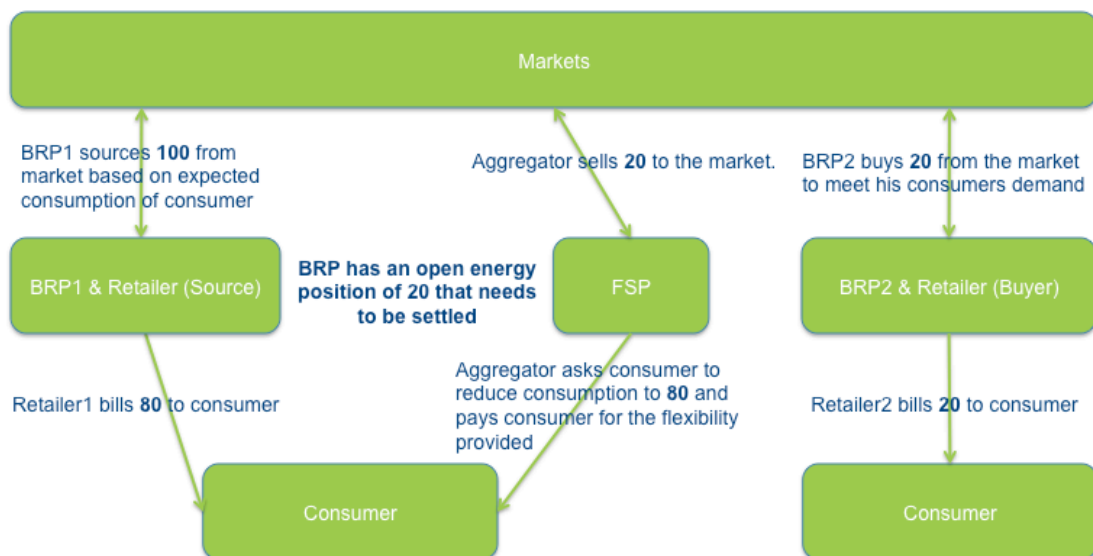


Figure 1: Open energy position

With regards to the open energy position, the details of the adjustment mechanism, including the price should be aggregated information only, as the data is commercially sensitive. The frequency should be left to the discretion of the appropriate European and/or national authorities.

- Payment should cover the **average⁹ sourcing** costs of the open position, but not include the profit margin of the Retailer during up or down regulation, so as to provide neither loss nor benefit to the BRP. Again the methodology for calculating this payment must be set by the

⁹ i.e. a representative mix of forward and day-ahead price indexes

national NRA, according to European common principles. Without a central facilitation, dedicated aggregation services are not possible as already mentioned above.

Key Characteristics:

- This solution (which is implementable outside the market) allows DR aggregators to participate in all energy markets **using the market's current rules**, allowing for an immediate implementation.
- It allows for DR to regulate both up and down, i.e. reduce demand when there is not sufficient cost effective generation available **and** increase demand when there is over-abundance of low cost renewable generation.
- It provides a level playing field where all forms of flexible capacity can successfully compete to provide the most cost effective solution to the systems flexibility needs.
- It provides a fair remuneration for the BRP impacted by the DR event.

Conclusion and Recommendations

As of today, the majority of consumers have no realistic means of accessing the wholesale, retail, balancing, reserves and other system services markets, as few Demand Response service providers exist in Europe. Only the very largest industrial consumers, with their own bi-lateral power purchasing agreements can participate and only on a limited level. Aggregation service providers ensure healthy competition in the markets between innovative players, all working to involve consumers in a range of Demand Response programs.

However, today, the market roles and responsibilities are unclear, and do not allow for direct access of consumers to service providers - therefore they do not offer them a clear path to market. The more in-depth the analysis, the more this issue is understood as a critical barrier throughout Europe to the development of consumer oriented services and demand response¹⁰. Member States in the process of overcoming this barrier are Switzerland, France, Belgium and Austria. However, the lack of appropriate definition in most Member States increases risk for all parties and enables abuse. When roles and responsibilities fail to enable the clear and direct access of consumers to aggregation service providers, free market competition around Demand Response services is impossible.

Solutions addressing the two issues described above are critical for enabling the full and positive contribution of DR in wholesale energy markets. This must therefore be a priority of any Member State looking to fulfill the requirements of the Energy Efficiency Directive and enable DR.

Protecting the BRP imbalance from an imbalance penalty due to DR has proven relatively simple to ensure for DR participation in balancing reserves (but not for wholesale markets) and successful models can be found in Belgium, Finland, France, Switzerland and elsewhere.

The open position for the BRP and the independent aggregator, and appropriate payment methodologies, are more difficult to address. We have outlined one possible solution. Different

¹⁰ SEDC-Mapping_DR_In_Europe-2014 0411

mechanisms have been trialed in a few EU Member States and implemented in international markets. In all cases the final model was chosen and accepted by the market parties as an acceptable compromise to allow quick implementation, though it contains strengths and weaknesses.

The Annex A of this paper describes a solution implemented in the USA for example, but which was not seen a practical or legitimate for Europe by the majority of SEDC Members.

There is a unique opportunity now to create an EU wide **target model** based on the principles stated above, that will facilitate the further integration of the different EU energy markets and allow Demand Response to participate on a level playing field and provide the market efficiency gains expected. Solutions should be holistic and developed by the Commission and NRAs in close cooperation with stakeholders, including aggregators, BRPs, consumers and retailers. Without a resolution of the two issues, competing interests will continue to prevent a wide spread penetration of Demand Response and consumers and aggregators will continue to be barred from the markets.

Annex A

Dissenting Opinion: Spreading the net benefits brought by DR between retailers and thus to customers

This appendix presents a dissenting opinion, promoting a model that has been implemented in the USA, but which was not seen as legitimate or practical for Europe, by the majority of SEDC Members. This solution takes a wider view of the system benefits, and specifically the benefits for Retailers themselves, as enabled by DR participation in the **wholesale electricity markets**.

Principle: The participation of DR in the wholesale market will make demand elastic at wholesale level, and, by lowering the point at which the supply and demand curves meet, lead to a reduction of wholesale prices. Thus, while demand reduction will reduce Retailers' revenues, in the view of this opinion, Retailers will simultaneously benefit from DR participation via a reduction of their supply costs.

Assuming this benefit is greater overall than their foregone revenues, Retailers themselves will derive an overall net benefit from the participation of DR in the wholesale markets, and in turn, ultimately, their clients will capture all or part of this net benefit – i.e. all consumers will benefit from DR (indirectly), not only those participating to DR and benefitting from it directly.

Thus, in this opinion, the participation of DR to wholesale energy markets will ultimately benefit Retailers (without any need for any specific payment to Retailers). Allowing such a participation of DR on an equal footing with generation is thus justified as a way to improve energy efficiency and reduce costs of electricity for all consumers.

Implementation: This can be done as follows, in order to deal with the imbalance issue in the BRP rules, while not unduly ensuring Retailers for foregone sales:

- Volumes of DR delivered by the independent aggregator should be accounted for as equivalent to those from generation (i.e. as injection in the balancing perimeter of the BRP of the DR operator);
- Retailers of shed consumers should not receive any payment from consumers nor from the DR operator, neither directly nor as a result of BRP rules, designed as having the effect of offsetting foregone retail sales (i.e. payment for energy that has not been supplied);
- While DR will reduce the consumption of shed consumers, no penalty should be charged to their BRPs. And simultaneously, the BRP/Retailers should be paid for the energy they provide (and not for the energy that is not generated): this is easy to achieve among BRP/Retailers, as Retailers sell and bill this energy to customers.

Annex B:

The Benefits of Aggregation

Most consumers do not have the means to trade directly into the energy markets. They require the services of an aggregator in order to participate. Aggregation service providers are therefore central players in creating vibrant demand side participation and Demand Response.

The main function of aggregation is to identify and gather (“aggregate”) the flexibilities of consumers to “build” Active Demand (AD) services/capacity.

This aggregated capability:

- Improves the reliability of the services provided individually by end-consumers; and
- Helps utilities, grid and transmission operators to
 - o Shave peak power demands,
 - o Balance intermittent power generation,
 - o Increase security of supply, and
 - o Avoid unnecessary operations of CO2 intense power plants.

Aggregator Key Functions: Gathers (“aggregates”) the flexibilities of consumers to “build” Demand Response services: creates agreements with industrial, commercial, institutional and residential electricity consumers to aggregate their capability to reduce energy and/or shift loads on short notice. They thereby create one “pool” of aggregated load, made up of many smaller consumer loads and sell this as a **single resource**. These loads can include fans, electric heating and cooling, water boilers, grinders, smelters, water pumps, freezers etc.

Aggregators have the following key modules:

- Consumption and flexibility forecasting: Forecast flexibility in the short and long term (this forecasting is tuned as feedback & consumer understanding is achieved)
- Market and consumer portfolio management: Consumers’ and other players’ contractual relationship, long term operations (strategy) and risk management
- Settlement and billing: Assessing services delivery and performing billings
- Operational optimization: Algorithms (short term) to interact with other players selling and activating demand flexibility. Short term market price forecasting.

Demand Response, Aggregation and Reliability

Aggregation can achieve performance levels that equal or exceed that of generators. The ability to aggregate individual customers means that the system operator can operate the aggregated demand side capacity as a single resource. This latter provides the system operator with a diverse portfolio. One of the key benefits of aggregation is therefore the diversity of the aggregated portfolio (the many small loads making one large resource), which ensures that the committed capacity will be delivered by the aggregator, even when one particular consumer may not be able to perform¹¹.

The performance levels of Demand Response have been proven in existing markets in the US in numerous regions. For example, in ISO-NE, and PJM, and NYISO, the performance metrics of Demand Response are comparable to that of generation.¹² Figure 4 below shows an example from the PJM capacity market:

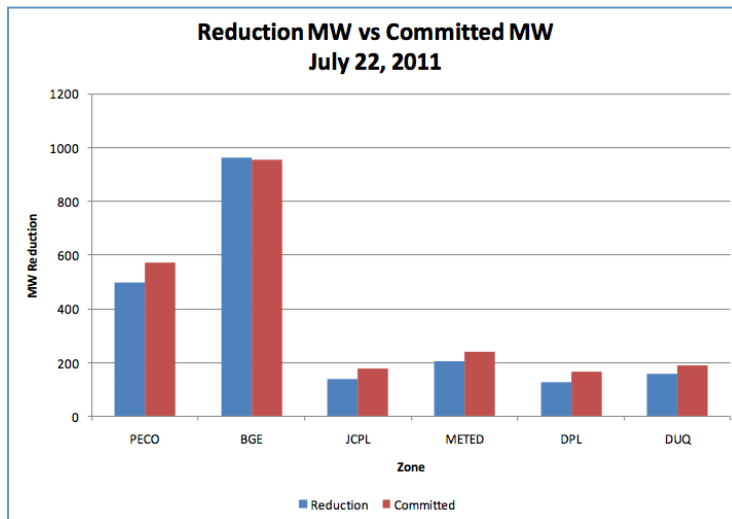


Figure 2: PJM 2011 Final Emergency Load Management (ILR/DR) and Economic Demand Response summary. Reduced MW vs. Committed MW per zone. Source: FERC

These numbers can be similar or higher than the level of reliability provided by generation resources within the same markets. Keys to Demand Response reliability are: aggregation, appropriate product definitions, communication requirements, baseline measurements and clear fair penalty structures.

¹¹ The aggregator will also never bid its full resource into a market – therefore if it has 100 MW of load available 70-80 MW will be bid into the market – ensuring that the aggregator can fulfil its reliability requirement.

¹² PJM 2011 Final Emergency Load Management (ILR/DR)