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Topic 11

Shift, Not Drift: Towards Active Demand Response and Beyond

Final Report
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Table of contents

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Executive summary

The value and necessity of demand response as a flexibility means has been widely recognised among stakeholders and policy makers in Europe (e.g. EC, 2011a, 2012a, 2012b; Smart Grids Task Force, 2013; ENTSO-E, 2012b). The gradual roll-out of smart meters at residential level and the deployment of smart grids are expected to provide the hardware for demand response. Demand response also requires the active participation of consumers, who are rather passive nowadays. There are two paths for consumers towards becoming active demand response participants: a gradual **drift** during a potentially long period, or a timely **shift** following proactive actions from the government, regulators and market players to engage consumers. This report assesses how to realise this shift towards active consumers using a consumer-centred approach and does so from the perspective of contracts, as active demand response is mediated through contracts between consumers and intermediaries.

Chapter 1 sets the scene by introducing the context in which we perform our analysis and the main issues that need to be taken into account when aiming at the full activation of demand response. Within this chapter, we justify the consumer-centred approach of the report and the importance of contracts in engaging consumers to participate in active demand response.

Chapter 2 explores the issue of the range of contracts required for active demand response. We develop a consumer categorisation method which allows taking into account both the technical potential and the willingness of consumers to participate in demand response. We demonstrate that there is a need for an adequate range of contracts to reflect different consumer categories. Furthermore, we identify the challenges in contract selection and then move on to measures which could facilitate the selection process.

Chapter 3 explores the issue of the impact of intermediaries on consumers by analysing their incentive-based business model. Such impact is twofold. First, different intermediaries might be incentivised to facilitate or take up some but not all demand response services. Second, their ability to capture the full value of demand response services and incentives to share this value with consumers can also differ. Our evaluation shows that there is no clear best intermediary, but the coexistence of different intermediaries can increase the competition, ensure an adequate range of contracts, and enhance the benefit sharing with consumers. Furthermore, we identify what may hinder an adequate range of intermediaries and propose possible safeguard measures and remedies.

In both Chapters 2 and 3 the analysis has been undertaken within the current retail market design in Europe, which is characterised by a substantial reliance on TSOs in balancing the electricity market transactions. Chapter 4 exposes the consequences of such a market design, and demonstrates that a real shift towards active demand response requires a major conceptual shift in how we think about electricity markets: consumers need to be recognised as a source of flexibility for the electricity system and they need to be encouraged to become active providers of flexibility. Therefore, policy of empowerment and protection should be designed as such that consumers must be empowered to play a new role and at the same time must not be overly protected if this would prevent them from taking up this role.

Chapter 5 draws out a number of recommendations for action at EU level based on the conclusions on consumer empowerment and protection (Chapter 2) and retail market design (Chapter 3). The timing for the implementation of these actions is also identified.

1. Introduction

1.1 Context

Traditionally, electricity systems are operated on the basis that the supply is adjusted to follow the load in real-time; meaning that the flexibility to maintain balance between electric power supply and demand is mostly provided by the generation side, which is dominated by centralised, large-scale flexibly dispatchable (fossil fuel and hydro based) power plants.

Nowadays, the European electricity systems are evolving towards a generation mix that is more decentralised, less predictable and less flexible to operate due to the large-scale integration of renewable and distributed energy sources in order to meet the 20-20-20 targets (EC, 2009a, 2010c). Some countries even target a higher share of renewables in the electric power supply (e.g. Germany, 80% by 2050 (Bundestag, 2012), the Netherlands, 37% (NREAP, 2010) and Spain, 40% (NREAP, 2010) by 2020). In this context, additional flexibility is expected to be provided by the demand side (Figure 1).

Indeed, in the short run, demand response can make balancing easier by shifting demand to times when there is more renewable power available and it can help manage congestion by peak-shaving; thus, helping the integration of renewable energy sources in the electricity system and reducing the high operation costs of flexible generation units. In the long run, this operational value of demand response can lead to reduced or postponed investments in network reinforcement and flexible thermal generation, and to less investment to meet decarbonisation targets as the electricity system is used more efficiently.

This **value and necessity** of demand response as a means of flexibility has been recognised widely among stakeholders and policy makers in Europe. For example: '*Active participation of the users connected to the grid is of crucial importance to keep the system balance between generation and demand and considering at the same time grid inherent constraints. Consumers are the key stakeholders on the electricity demand side, and can play a role on the electricity supply side too (prosumers)*' (ETP SmartGrids, 2012). The Energy Efficiency Directive of 2012 considers demand response to be '*an important instrument […] to take action on consumption and billing information and thus provides a*

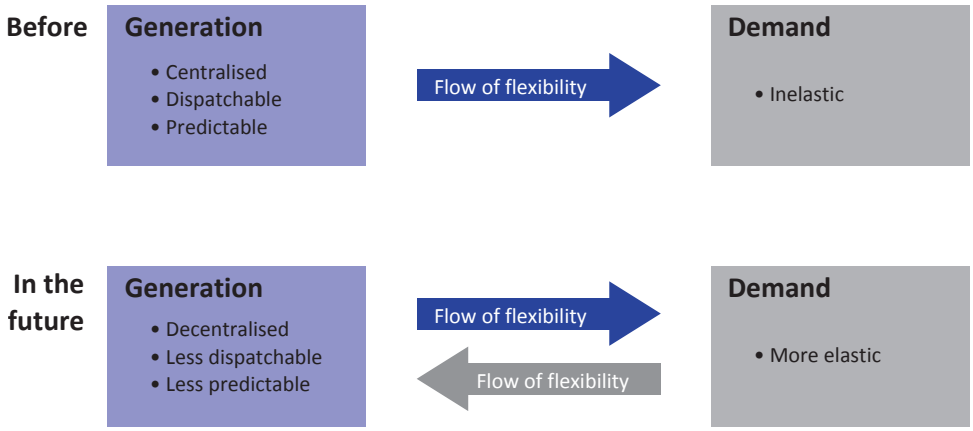

Figure 1. Paradigm shift of electricity system operation – demand as sources of flexibility
Source: own depiction

mechanism to reduce or shift consumption, resulting in energy savings in both final consumption and, through the more optimal use of networks and generation assets, in energy generation, transmission and distribution' (EC, 2012b). The Internal Market Communication calls for '*stronger demand response in distribution networks*' (EC, 2012a). The Smart Grids Task Force's mission statement points out the changing role of the consumer: '*consumer empowerment and the engagement of energy market participants through the use of new technology will contribute towards a paradigm shift in the operation of the internal energy market*' and '*smart grids can be a useful tool in enabling consumers to take action to more effectively manage their energy consumption*' (EC, 2011b). In its energy policy for consumers, the Commission adds that with smart grids present, consumers can become more active players in the market (EC, 2010a), and these smart electricity grids are seen as a key challenge for accommodating massive integration of renewable and decentralised energy sources in the Strategic Energy Technology plan (EC, 2007a).

In fact, empowering consumers to be active participants in the electricity markets is also put forward as a policy goal itself. In the Third Package directive on the internal electricity market, it is stated that '*the implementation of intelligent metering systems […] shall assist the active participation of consumers in the electricity supply market*' (EC, 2009c). Additionally, the Energy Efficiency Directive demands that advanced metering infrastructure takes into account a more active consumer/prosumer (e.g. with regard to data provision to consumers or minimum functionalities of enabling infrastructure that could benefit the consumer) (EC, 2012b). The European Regulators and European Consumer Organisation state, in their joint vision on energy customers for 2020, that '*responsibilities shift and consumers are increasingly expected to become more active in energy markets*' (CEER and BEUC, 2012).

In contrast to the wide consensus on the value and necessity of demand response in smart grids, there is little consensus on how to engage consumers or align industry incentives. There are several **challenges** for demand response to play its expected role of flexibility provider. First, there is lively debate on the role of different actors, incumbent (TSO, DSO, suppliers, etc.) or emergent (aggregators, manufacturers of appliances and devices, retailers in other sectors than electricity, ICT companies), in the organisation of smart grids and demand response (e.g. CEER, 2011a; Smart Grids Task Force, 2013; Ruester et al., 2013b). The split incentives of intermediaries and the distribution of value of demand response along the value chain explain the difficulty to reach consensus on the appropriate business model for demand response (Consumer Focus, 2013a). Indeed, if the whole value were to be passed on to the responding consumers, industry would not be engaged, and if industry did not pass sufficient value to the consumers, the latter would not participate in demand response. A second challenge exists in the roll-out of smart appliances and enabling advanced metering infrastructure (smart meter). A recent survey of pilot studies on demand response demonstrates that smart appliances and enabling infrastructure significantly improve the responsiveness of consumers to dynamic price signals (Faruqui et al., 2013). Yet, there appears to be a chicken-and-egg problem: without the infrastructure, smart appliances and demand response cannot be used to their expected potential and without demand response through smart appliances, the limited benefits of the enabling infrastructure do not justify the costs of its roll-out (Smart-A, 2009a; EA Technology, 2011; ETP SmartGrids, 2011). Furthermore, the minimum functionalities for these smart technologies to ensure their added value for consumers are not yet firmly established; instead being part of a European Commission Recommendation (EC, 2012c). Several mandates to standardise appliances and in-

frastructure to ensure its interoperability are still on-going: M/441 for utility meters (EC, 2009b), M/468 for electric vehicles (EC, 2010d) and M/490 for smart grids (EC, 2011c). Current research also focuses on how consumers can offer demand response with their current and future smart appliances (Smart-A, 2008; Sustainability First, 2012a) and what the benefits could be for the electricity system (Smart-A, 2009b; Sustainability First, 2012b).

While these studies and a number of on-going pilot projects provide valuable insights on what consumers can offer when they participate in demand response programmes and what the benefits and barriers are for the incumbent and emerging electricity market actors, we observed that they either implicitly or explicitly treat the consumer primarily as an object of changing consumption patterns for financial incentives (e.g. Braithwait and Kirsch, 2006; Frontier Economics, 2012).

This implicit assumption of passiveness of consumers would lead to a gradual **drift** to demand response. Drift means to wait for consumers to become more active spontaneously, *if and when* they become aware of the financial incentives that are designed for them from a top-down perspective. It will take time, and current pilot studies, with some exceptions, are not very encouraging (CER, 2011; Frontier Economics and Sustainability First, 2012; Redpoint Energy and Element Energy, 2012; Stromback et al. 2011).

Nevertheless, demand response will always depend on the engagement of consumers. Considering other liberalised sectors, such as telecommunication, transport and health care, in which consumers are taking a more and more active role in managing their consumption patterns and the associated risks, it could be expected that the same activeness could happen in the electricity sector. Indeed, if the expected potential of demand response is to be realised and the anticipated wider system gains are to be achieved, consumers need to become more active and start to make deliberate decisions about their consumption patterns.

The activeness or engagement of consumers will allow a **shift** towards demand response. In this option, government, regulators, and both incumbent and emerging market players must take proactive steps to assist consumers in becoming aware of what demand response implies for them in terms of benefits and costs, to empower them with necessary tools and knowledge to actively participate in demand response. To date, this dimension of demand response remains relatively under researched; yet empowering and engaging consumers to make the transition from passive to active can be considered a major challenge for successful demand response take-off (Lewis et al., 2012; Delmas et al., 2013).

1.2 Scope and analytical approach

This report takes a consumer-centred approach, investigating how the consumer[1] can or could participate in demand response and how to shift to active demand response participation.

First, the scope of the analysis is defined as follows:

> First, we focus on consumers (and prosumers, who consume and generate electricity) connected with the distributed system level, meaning **residential and Small and Medium-sized Enterprise (SME) consumers**, hereafter 'consumers', because industrial con-

1 Throughout the report, consumer refers to any natural or legal person buying electricity whose consumption is measured by a single meter. A consumer can then be a single person, a household, a commercial business, a school, etc.

sumers, given their size and skills and facing less market barriers and transaction costs than residential and SME consumers, already have the possibility to be active today if they want to; even if industrial demand response is often still limited (Sustainability First, 2012c). Furthermore, the establishment of a well-functioning retail market for electricity cannot rely on active industrial consumers solely, while the majority of retail consumers remain passive. Bearing in mind that industrial consumers and residential and SME consumers are very different, we draw lessons and insights from the industrial experience with participation in demand response.

Second, we focus on **active demand response**, defined in this report as '*changes in electric usage implemented directly or indirectly by end-use customers/prosumers from their current/normal consumption/injection patterns in response to certain signals*'. This definition implies that (1) we only look at consumers acting voluntarily, excluding demand response that is mandatory or without any compensation; and (2) we do not consider stand-alone generators on the distribution level as they are not consumers. Furthermore, we highlight the distinction between 'demand response' and 'energy efficiency': the latter is about using less energy while maintaining the level of end-use services, whereas demand response also implies using more electric power when the electricity system is in need of such a response, e.g. when wind power is abundantly available.

Third, this report does not attempt to quantitatively estimate the potential of demand response, but could be considered instrumental for future studies that intend to provide such estimates. Indeed, without knowing how consumers can or could participate in demand response, it is difficult to make a robust estimation of the overall potential of active demand response.

Fourth, the time horizon of the report assumes the readiness of the smart appliances and enabling infrastructure ('the hardware'). We are aware that full take-off of active demand response will only be possible on a large-scale after smart grid roll-out. Indeed, while demand response is already happening today, e.g. with electric boilers charging overnight with simple day/night time-of-use tariffs, participation in demand response could be strongly enhanced by smart grids (Faruqui et al., 2013). The hardware deployment proceeds with different speeds in European Member States, though (EC, 2012d). Hence, for this report what matters is not a fixed time horizon, but when the hardware is in place. But this does not mean we recommend waiting on the hardware. On the contrary, we need to proactively prepare consumers to engage in active demand response in order to ensure that consumers are ready and willing to use the hardware effectively as soon as it is in place.

Fifth, the time horizon also assumes that regulated end-use tariffs have been abolished, which is in line with the EU rules on the internal energy market (EC, 2012a). In the presence of regulated electricity prices, consumers do not have sufficient incentives to participate in demand response, since they are also not exposed to (and not even informed regarding) the real costs of electric-

ity supply. As a result of the deformed signal sent through these regulated tariffs, consumers are prevented from capturing the full benefit from demand response. This in turn can lead to a problem of adverse selection, where, e.g. consumers who have the most significant impact on the system peak – and thus a high potential for demand response – refrain from participating in demand response as the regulated tariff for them entails a lower energy bill than would be the case if they were charged a tariff that better reflected the market price of energy.

Next, the analytical approach of this report is explained as follows:

In order to stop the drift and really shift, we need to understand consumers' behaviour from the perspective that they are truly active participants in the electricity system. Following such a perspective, we do not limit our report to the potential of financial incentives for demand response but explore **a wider set of costs and benefits** that consumers would be exposed to from the perspective of contracts and intermediaries. We undertake this analysis first in the context of the current electricity retail market design in Europe; then we investigate the limitations of the current market design and the risks it poses for a real shift to active demand response. This stage of the investigation leads to the identification of a major market design challenge for the retail market.

1.2.1 A focus on contracts

As previously stated, demand response can generate value by delivering various services to electricity systems. Even if, in principle, consumers can offer their demand response services without the intervention of an intermediary, residential and SME consumers face several barriers that may lead them to choose to participate in demand response through a contract signed with an intermediary. But instead of being a passive and uninformed recipient of this contract, active consumers will be in a position to be aware of the multiple impacts of contracts on them and to be able to choose and even negotiate the contracts.

Contract terms can encompass a wide set of costs and benefits, as well as risks and responsibilities, which are, however, not necessarily made explicit to consumers. Without understanding the full implication of the contract, a consumer can hardly be mobilised into an active consumer. Also, the counterparty of the contract – the intermediary – may have different incentives in designing the contracts and passing on benefits to the consumer. Therefore, to become active, consumers must have confidence in, and be assisted by intermediaries in their participation in demand response, instead of just being 'captured' by them as passive objects.

Our report then takes this key role of contracts in the transition as a starting point towards active demand response and in shifting consumers towards being active participants in electricity markets. Through our analysis of the contract and the counterparty – the intermediaries, we systematically scrutinise the various factors affecting the consumer's engagement. These factors culminate in the **necessity of an adequate range of contracts** (Chapter 2) and a **need for a diversity of intermediaries to offer these contracts** (Chapter 3) in order to engage different categories of consumers. In each chapter, we put forward pragmatic recommendations regarding necessary policy and regulatory measures to empower and engage consumers to participate in active demand response.

1.2.2 The Key Challenge: rethinking market design

Active demand response means – or should mean – that consumers/prosumers transcend the level of being merely better informed consumers and in fact become active participants in the electricity market: contributing to the reliable operation of the system by providing flexibility. The question arises whether the current retail market design, which assumes an inelastic and passive demand side, is suitable to allow consumers to make the transition to active 'consumership'.

We argue later in the report that a market design that accommodates this active role of consumers is the **real-time market**. In this real-time market both the supply side and the demand side are responsible for their positions in terms of generation and consumption. Any player with an open position, in other words an imbalance, at the time of clearing the market will just be 'disconnected' from the system. Such a market design is a way to largely dissocialise the balancing costs, and thus fully reward consumers for being active. Indeed, consumers will only become fully incentivised to be active market participants if they are exposed to both costs of imbalances and benefits of flexibility in the long term. Therefore, consumers must be empowered to play a new role and at the same time must not be overly protected if this would prevent them from taking up said role.

Our report then **revisits the contracts and intermediaries in the real-time market** (Chapter 4), discussing the changes that are induced by the new market design.

1.3 Structure of the report

The report is organised as follows: in Chapter 2, we focus on the **demand response contracts** through which consumers are likely to participate in demand response, and in Chapter 3 we examine the role of **demand response intermediaries** that consumers sign this contract with. The analyses of Chapters 2 and 3 are carried out under the assumption that the parameters of the current retail market design remain essentially unchanged. In Chapter 4, we investigate whether a new retail market design can better accommodate the new active role assumed by consumers. In this respect, we revisit contracts and intermediaries under the assumption of a **real-time market**. Furthermore, we scrutinise the **role of the European Commission/EU institutions** in implementing recommendations derived from our analysis. Finally, a glossary is included in order to clarify the terms used throughout the whole report.

2. Necessity of an adequate range of contracts

It is to be expected that residential and SME consumers, hereafter referred to as 'consumers', will participate in demand response through contracts. This report distinguishes 'demand response contracts' from 'electricity supply contracts'. An electricity supply contract arranges the provision of electric power to a consumer by an electricity supplier. A demand response contract, on the other hand, governs the relationship between the consumer, who adapts his consumption in response to a signal, and the counterparty that provides this signal. Such distinction is necessary, first, to focus the analysis on demand response only, regardless of whether it is offered separately from or included in a supply contract. Second, in many countries, emerging market players are effectively proposing stand-alone demand response contracts to consumers, providing an alternative to the demand response contracts offered by incumbent suppliers. Hence, our analytical distinction does not necessarily imply that consumers participating in demand response have to manage two separate contracts, one demand response contract and one supply contract[2]. They could be merged into one contract, obeying the principle of disaggregated billing that will be presented in Chapter 3.

In this chapter, we demonstrate that it is necessary to have an adequate range of contracts in order to reflect, first, the variety of consumer load mixes, and second, the variety of consumer preferences. Indeed, without appropriate contracts that reflect different **consumer categories** according to what consumers are able to do, and what they prefer to do with regard to their electricity consumption, consumers will not be engaged. Next, we discuss the challenges of selecting a contract from a range of contracts and providing recommendations to facilitate this process.

To this end, we discuss:

1. The type of contracts that could be offered by the intermediaries: Section 2.1 *Range of contract types*;

2. Consumer categorisation according to the consumer load mix: Section 2.2 *First reason: Variety of consumer load mix;*

3. Consumer categorisation according to consumer preferences: Section 2.3 *Second reason: Variety of consumer preferences*;

4. The challenges for consumers to select a contract from the range and how to facilitate consumer choice: Section 2.4 *Challenges and Recommendations for contract selection*.

2.1 Range of contract types

Based on the existing literature[3], experiences from industrial consumers' demand response and practice in recent as well as on-going pilot projects, we distinguish five types of contracts that could be offered in the electricity market: (1) *time of use (TOU) pricing*, (2) *dynamic pricing*, (3) *fixed load capping*, (4) *dynamic load capping*, and (5) *direct load control*. Every conceivable set of contract terms, i.e. the establishment of price intervals, quantities, termination fees, start and end date, access to consumer data, rights to

2 By convention in this report, when 'contract' is mentioned we refer to a demand response contract. Whenever we refer to an electricity supply contract, this will be done explicitly as 'supply contract'.

3 Contracts have been discussed, e.g. by Borenstein, 2005; Brattle, 2011; DOE, 2006.

remotely control appliances, etc., should then belong to either one contract type or a hybrid of these types.[4]

We first systematically classify the different contract types with regard to the technical features, being form of signal and volatility of the signal; the latter encompasses both notice time and granularity.

The form of the signal is either price or volume:

- Price-based contracts: use a tariff for electricity as the signal form to trigger a change in the consumption;
- Volume-based contracts: constrain the load, i.e. the instant electric power consumption, to a contractually defined floor and/or cap;

For either of those contracts, the signal volatility can be low (static) or high (dynamic):

- Static contracts: the signal is established with long notice for a number of predefined, relatively extended intervals; volatility of the signal is low;
- Dynamic contracts: the signal is established with short notice and for shorter intervals that better reflect wholesale market trading intervals; volatility of the signal is high.

Next, we discuss for each contract type the high-level terms imposed on customers. These terms are not limited to the financial compensation that can be expected for such a contract, but they also include price and volume risk, complexity and loss of autonomy/privacy by the customer of the contract.[5]

- Price risk: this criterion reflects the uncertainty of the price for the consumer; in some contracts, the consumer might end up with a higher bill than expected if he does not respond.
- Volume risk: this criterion reflects the uncertainty of the power that will be available to the consumer; in other words, with certain contracts the consumer might have access to less power than is needed for all wanted end-use services, or he might have to consume more than expected if his current consumption does not meet his floor restriction.
- Complexity: this criterion refers to the difficulties consumers could have with understanding what is expected of them, e.g. having to deal with signal volatility, or learning the impact of different appliances on power consumption.
- Autonomy/privacy loss: some contracts affect the degree of freedom in consuming power by limiting the total load or controlling the individual appliances; the consumer is then also expected to reveal some personal information with regard to, e.g. what appliances he has and when he prefers to use them. Autonomy (being in control) and privacy (disclosure of personal information) are distinct issues that are, however, closely related. Such loss of privacy and autonomy requires a clear legal and regulatory framework to demarcate the responsibilities and rights of the consumer, the counterparty and other involved parties like the actors responsible for metering or data handling.
- Financial compensation: the contracts include

4 Hybrids of multiple contract types are conceivable, e.g. direct load control added to TOU pricing or TOU/ dynamic pricing added to fixed load capping.

5 It is worth noticing that this selection of criteria does not aim at an exhaustive evaluation; instead, we intended to focus on criteria that could discern the impact of different contracts on consumers.

a financial compensation, directly or indirectly, that should correspond to the imposed terms in the contract.

An overview of all these features can be found in Table 1. In what follows, we evaluate each contract type according to these features.

Static price-based contract: **TOU pricing contract**

- Description: fixes tariffs for different intervals (e.g. 8.00h-22.00h day-tariff and 22.00h-8.00h night tariff), typically predefined upfront at the start of the contract;
- Passes on some price risk to the consumer, but includes no volume risk;
- Simple to understand;
- The consumer remains in total control over his consumption without having to compromise in terms of privacy;
- The financial compensation to be expected for this contract is limited and indirect through the savings made by consuming less in the more expensive intervals.

Dynamic price-based contract: **Dynamic pricing contract**

- Description: fixes hourly tariffs with day-ahead or hour-ahead notice, typically reflecting wholesale price variations;
- Passes on much price risk, but has no volume risk;
- More demanding in terms of complexity as the signal changes frequently, requiring minimum levels of automation;
- The consumer remains in total control of his consumption and the related personal information;
- The consumer might expect a higher financial compensation, but due to the price risk the final compensation will depend on his performance to consume less when prices are high.

Static volume-based contract: **Fixed load capping contract**

- Description: fixes load caps and/or floors for different intervals (e.g. 8.00h-22.00h day-tariff and 22.00h-8.00h night-tariff). Both the intervals and prices are predefined upfront at the start of the contract;
- Passes on a limited amount of volume risk, but does not include price risk;
- Complexity is high because the consumer has to learn how to use his appliances to meet the contractual floors and caps;
- The consumer loses some autonomy/privacy because of the load constraints: e.g. having to disclose when cap can be low or must be high;
- The financial compensation to be expected from this contract is limited.

Dynamic volume-based contract: **Dynamic load capping contract**

- Description: fixes hourly load caps/floors with day-ahead or hour-ahead notice, possibly reflecting wholesale market conditions. But the prices are typically predefined.
- Passes on high volume risk, but no price risk;
- High complexity of adapting load frequently, requiring minimum levels of automation;
- The consumer will have to reveal more information about the timing of his consumption and is possibly restricted in what he can consume (e.g. the power cap could preclude simultaneous cooking and washing), implying a loss of autonomy/privacy;
- The consumer might expect a higher financial compensation.

We further distinguish a *control-based* contract in which the consumer cedes the control over specific appliances to the counterparty in the contract. The consumers are therefore not expected to react to any signals themselves.

Control-based contract: **Direct load control contract**

- Description: a clearly identified part of the consumer's electricity consumption is effectively placed under the control of a third party. This third party then automatically and remotely shuts down, starts up or cycles electric appliances at the consumer's premises; direct load control contract is an incomplete contract that can be complemented by another contract type for the part of the load not subject to direct control;
- There is no price and no volume risk for the consumer;
- The consumer loses all autonomy and will have to disclose personal information regarding which appliances can be used when by the third-party for establishing the contract;
- The financial compensation can be limited or high depending on the size of the load subject to third-party control.

We note that, for prosumers, contract provisions addressing the self-generation can be considered as overlapping a generation contract to the demand response contract. Therefore, they are not included in our contract range.

These contract types have different functional requirements in terms of metering and control: for instance, smart meters should be capable of recording consumption on a configurable time basis (CEER, 2011a), i.e. the intervals defined in the price-based and volume-based contracts, and they should be capable of remotely controlling the power to execute the load caps in volume-based contracts and allow the load control (possibly through a link to individual appliances) in control-based contracts.

Table 1: Range of contract types: technical features and high-level terms imposed on customers

Contract type	Signal form	Signal volatility	Price risk	Volume risk	Complexity	Autonomy/ Privacy loss	Financial compensation
Time of Use pricing	Price based	Static	Low	None	Low	None	Limited
Dynamic pricing	Price based	Dynamic	High	None	High	None	High potential
Fixed load capping	Volume based	Static	None	Low	High	Limited	Limited
Dynamic load capping	Volume based	Dynamic	None	High	High	Limited	High potential
Direct load control	Control based	Predefined	None	None	None	High	Limited/ High potential

Source: Own assessment

2.2 First reason: Variety of consumer load mix

The first reason for an adequate range of contract lies in the fact that the potential of consumers to participate in demand response can be associated with their 'load mix'; and there are as many load mixes as there are consumers. The categorisation of consumers according to their load mix would then help to distinguish consumers in terms of the flexibility of their load and, consequently, how responsive they can be to the different signals provided by the different types of contracts.

In this section, we first define consumer load mix. Second, we demonstrate how the appropriateness of a contract for a consumer depends on the match between his load mix and the technical features of the contracts.

2.2.1 Consumer load mix

We categorise consumer load (appliances) into five load types (how appliances are used to provide end-use services) that together make up the consumer *load mix*: (1) storable load, (2) shiftable load, (3) curtailable load, (4) base load, and (5) self-generation (Figure 2).

Consumer load, i.e. the power consumption from the electricity grid, can first be categorised in *storable load* and *non-storable load*.

1. **Storable load**: the power consumption and the end-use service are decoupled by storage that can be in the form of (electrochemical) batteries or thermal inertia.

Next, non-storable load can be further categorised in *shiftable load* and *non-shiftable load*.

2. **Shiftable load**: power consumption can be moved in time without affecting the end-use

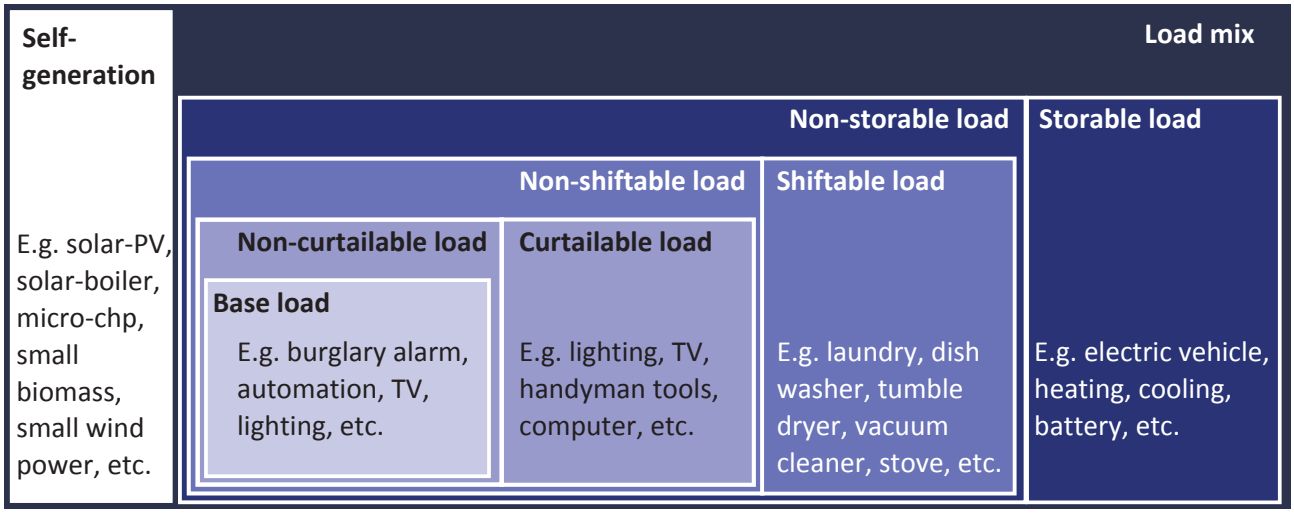

Figure 2. Load mix made up of different proportions of storable load, shiftable load, curtailable load, base load and corrected for self-generation

Source: own depiction

service. Shiftable load often involves a non-interruptible process like a laundry cycle and thus involves some planning.

5. **Self-generation**: power generation at the premises of a consumer, reducing the net load. Dispatchable self-generation can be used as back-up power.

Non-shiftable load then is further categorised in *curtailable load* and *non-curtailable load*.

3. **Curtailable load**: power consumption cannot be shifted without affecting the end-use service, but the service can be interrupted instantly.

The remaining non-curtailable load can be classified as *base load*.

4. **Base load**: the end-use service needs instant power and cannot be interrupted or shifted in time.

The load refers to net electric power consumption from the grid and is thus equal to the total power consumption corrected for *self-generated* power by the prosumer.

Together, the different proportions of these load types make up the consumer load mix; this load mix could then be qualified by its dominant load type: e.g. a 'curtailable load mix' then has a dominant share of curtailable load. Consequently, consumers with a dominant share of base load can be seen as the least flexible, while consumers with a dominant share of storable load can be considered the most flexible.

Finally, it is important to note that the load mix of consumers is not static; it can change over time. Indeed, taking into account that the load mix depends not only on the appliances but also on the lifestyle of the occupants of the house, there are several circumstances that can lead to a significant change of the consumer's load mix; the acquisition of new appliances (such as an electric vehicle) and the job switching by one of the occupants are examples of such circumstances.

2.2.2 Appropriate contract for a load mix

We now associate these load mixes to the static or dynamic nature of the demand response signal.

- A *curtailable load mix* can interrupt load instantly and is thus particularly able to respond to dynamic signals. Dynamic pricing or dynamic load capping can be appropriate contracts for this consumer category.

- A *shiftable load mix* needs some planning of load and thus benefits from static signals that are notified well in advance and are less volatile within day. TOU pricing or fixed load capping fit well for this consumer category.

- *Storable load* allows using load so flexibly that it can respond to both static and dynamic contracts. Furthermore, the decoupling of power consumption and end-use services makes this load suitable for a contract with third-party control. A direct load control contract, as well as all other contracts might then be appropriate.

- Finally, some consumers might have a base load mix, which has limited flexibility and is not suitable for participation in demand response. This consumer category might not find a contract that is appropriate for their load mix.

So, to offer appropriate contracts for each consumer's load mix, an adequate range of contracts should be present.

2.3 Second reason: Variety of consumer preferences

Besides the technical ability, the engagement of a consumer to participate in demand response depends on his individual 'preferences' regarding the costs and benefits that he associates with his participation.

- *Costs* refer to what the consumer perceives as something asked from him by the counterparty.

- *Benefits* refer to what the consumer perceives as compensation in return for his participation.

Such costs and benefits are associated with consumer related criteria such as altruism and prosocial motivation (Delmas et al., 2013), price risk, volume risk, complexity, loss of autonomy/privacy, and financial compensation. These criteria have been used to differentiate the contract types (Table 1), except for altruism and prosocial motivation, which are intrinsic to consumers and thus independent from all contracts.

Consumers make an individual evaluation of these criteria. For instance, loss of autonomy can be a cost for one consumer whilst a benefit for another; and different consumers might attribute different value to the same criterion. So, depending on the individual consumer's preferences, different contracts might then be appropriate; illustrated here for two possible consumers.

- A very well-educated consumer who is risk-seeking in order to increase his financial compensation, but is also concerned about his privacy.

  - Benefits: high potential for financial compensation, high price risk, no loss of privacy;

- Costs: complexity and autonomy.

  Dynamic pricing might be the most appropriate contract for consumers with these preferences.

- A vulnerable consumer might have less income and be less educated and more willing to outsource the handling of complex technology, even at a small cost.

  - Benefits: low complexity, high loss of autonomy, low price risk;

  - Costs: volume uncertainty, limited financial compensation.

  Direct load control, TOU pricing and fixed load capping might be appropriate contracts for this category of consumers.

Similarly to what has been discussed for the consumer load mix, also the preferences should not be considered stable over time. The way consumers valorise the different contract terms may change over time, e.g. due to information acquired from experiences with demand response. For instance, one could expect that the averseness for complexity may decrease over time, since consumers will gradually be better informed and more confident to actively participate on demand response.

2.4 Challenges and Recommendations for contract selection

It has been demonstrated that an adequate range of contract types, including the aforementioned five contract types, is needed to reflect different load mixes and consumer preferences. However, consumers might still find it difficult to select the right contract type for them from this range, and furthermore, find the most appropriate contract terms for that contract type.

First, we identify the challenges in contract selection; second, we discuss how to facilitate the selection process.

2.4.1 Challenges in contract selection

The contract selection process for consumers can be decomposed in four steps, including: (1) qualifying their load mix, (2) recognising their preferences, (3) selecting an appropriate contract type, and (4) finding the best contract terms. Each of these steps can be a challenge for a consumer.

1. Qualifying the load mix: consumers might not be aware of how their use of appliances affects their ability to participate in demand response (e.g. just considering all load as base load); they might also not be aware of the possibilities of their load to be used more flexibly; or they might lack the skills to tap into the flexibility potential (e.g. they do not know how to programme their washing machine).

2. Recognising consumer preferences: consumers might not be aware of costs and benefits that are implicitly present in the contracts; they might not reveal their preferences; they might also lack the skills to properly evaluate costs and benefits.

3. Selecting an appropriate contract type: a consumer's load mix might not be aligned with his preferences regarding the costs and benefits related to his participation in demand response (e.g. a consumer with a curtailable load mix – dynamic contracts, who prefers low uncertainty and low complexity – static contracts). In the light of consumer rights in Europe, it should be clear that the consumer makes the final decision in this regard and he cannot be forced to enter a specific contract type (EC, 2007b, 2010b).

4. Selecting the best contract terms: contract types are generic forms of contracts; the consumer will still need to find an actual implementation of it. The lack of comparability in contract design might then prevent a consumer from identifying the best contract terms; the variety in contract terms might become too large to be able to choose.

2.4.2 Recommendations for contract selection

The following recommendations help to overcome the challenges for contract selection. First, we present 'consumer profiling'. A second recommendation consists in the introduction of 'contract comparison tools'. The third recommendation is the monitoring and 'optimisation of the contract range'. Fourth, 'protection of personal information' must be ensured regarding the information consumers reveal before, during and after selecting a contract. Fifth, for 'vulnerable consumers', consumer profiling and contract comparison tools might not be sufficient and additional assistance might be necessary. Finally, as a sixth recommendation, the 'promotion and dissemination of pilot projects' can help to develop the suggested tools for consumer empowerment.

For a successful implementation of some of the recommendations, for instance 'consumer profiling' and 'contract comparison tools', effective communication with consumers is prerequisite. In order to reach out to different consumers, various communication channels should be considered, including internet, information desks, telephone, paper, etc. Information should be disseminated on how and where the consumer can access the tool should he not have internet at home: information sessions could, e.g. be organised at the city or district level by the local government or a consumer association.

The presented tools do not only remedy specific issues, but they contribute to the gradual building of consumers' trust in demand response.

2.4.3 Consumer profiling

We discuss first what consumer profiling for demand response encompasses, then how it facilitates consumers to select an appropriate contract. Finally, we also refer to important steps that may be necessary in the implementation of such methodology.

Consumer profiling is an instrument that helps a consumer in making explicit (1) his load mix, (2) his preferences and (3) how the contract types can be associated to load mix and preferences; thus dealing with the first three aforementioned challenges in contract selection. Moreover, the unique features of consumers in terms of load mix and preferences are sufficient to evaluate the potential responsiveness of different consumers. Thus, the categorisation of consumers according to these features may be considered as an accurate classification of consumers.

- The load mix can be made explicit by including a survey on consumer load using the typology

of load types in Section 2.2.1; the survey should also provide general information on how appliances can be used in different ways and where to get specific information on, e.g. automation.

- Preferences can be made explicit by including criteria like uncertainty, complexity, autonomy/privacy, financial compensation, etc. in a survey, which allows consumers to assess what they consider as costs and benefits of their participation in demand response.

- Contracts can be made explicit by including information on the technical features and terms they impose on consumers, e.g. by providing tabular information on the contract features as in Table 1.

Consumer profiling then helps consumers (1) by facilitating contract selection, (2) by educating consumers, and (3) by correcting/adjusting past choices.

- *Facilitating contract selection*: profiling allows a consumer to find the appropriate contract for him that recognises his explicit load mix and his explicit preferences.

- Profiling itself *educates* consumers on load mix and preferences, and allows them to make deliberate choices on, e.g. investing in new appliances or using appliances differently.

- Profiling can also help to *correct or adjust past choices* by pointing out the inappropriateness of a contract for a consumer in a particular situation, or by informing the consumer that another contract is more appropriate if he changes his preferences or load mix over time. Changing contracts should be an easy and efficient customer-oriented process.

For the development of consumer profiling, it is advised to scrutinise and learn from the example of investor profiling in the financial sector. Investor profiling was installed to make investors more aware of their preferences regarding financial risk and to check in a restrictive way the appropriateness of certain investments for an investor's risk profile (EC, 2004, 2006b). Moreover, it is necessary to define which entity (or entities) should be responsible for implementing profiling. Since demand response is a market activity, the intermediaries who propose the contracts would have an interest to provide a proper consumer profiling as it provides them accurate information for building their customer segmentation. However, to avoid excessive intrusion and facilitate market supervision, high level guidelines on the profiling methodology needs to be provided by national authorities. It is stressed that consumer profiling needs to be conducted in full transparency with the consumer and can only be started with the consent of the consumer.

Contract comparison tools

First, we explain why we need a contract comparison tool in addition to consumer profiling; next we discuss the requirements for such a tool.

Consumer profiling helps a consumer to select an appropriate contract type, but there could exist many different contract terms for this type (Box 1). A contract comparison tool, then, directly addresses the aforementioned fourth challenge in contract selection by raising consumer awareness and facilitating comparison.

To fulfil its function, a contract comparison tool has to satisfy a number of requirements regarding: (1) quality of the provider, (2) quality of the methodology, (3) transparency of the information, and (4) ex-post evaluation.

1. Quality of the provider: the provider of such a tool must be certified and highly trustworthy. Therefore, only an impartial and fully independent actor can provide such a tool. Possible providers of a comparison tool are the regulator or a newly created regulated actor, but there is also the possibility that a non-regulated entity provides such services as long as activity itself is regulated and ensured to be fully independent.

2. Quality of the methodology: the parameters that are compared and the method of comparing them must be clearly defined by the regulator to avoid dispute on interpretation of contract terms and to ensure the reliability of the tool. CEER's Guidelines of Good Practice on Price Comparison Tools could be a starting point for the design of such a contract comparator (CEER, 2012a).

3. Transparency of the information: to ensure that all contracts include those contract terms that are used for contract comparison some harmonisation in contractual design might be justified (EC, 2010b; Ofgem, 2013). The establishment of minimum contract terms to be defined in each contract can help in that regard. These minimum terms could include price, volume, intervals, termination fees, notice times, data access right, appliance control rights, etc. The comments by Consumer Focus on the quality of comparison sites could be useful for the identification of those parameters (Consumer Focus, 2013b).

4. Ex-post evaluation: the consumer must also be able to compare his electricity bill to the performance he was expecting from his contract; allowing him to switch contracts if necessary. Thus, electricity bills require also transparent information on demand response participation (EC, 2006a, 2010b). Furthermore, consumers should have access to their cost and consumption data with a frequency that is to be agreed upon between the consumer and the intermediary, especially if billing is only annual.

Optimising the range of contracts

One standard contract will not allow all consumers to participate in demand response, whereas having too many contracts, might make it impossible to compare and choose the best contract, even with tools to assist in contract selection. Thus, an adequate range of contracts involves a trade-off between having the market offering unlimited tailored contracts adapted to individual needs (one extreme) and having only one standard contract for all consumers (another extreme); illustrated in Box 1. The national regulatory authorities could play a role in optimising the range of contracts for consumers' interest (Ofgem, 2012). Some harmonisation of contract design is necessary to allow the regulators to efficiently monitor the range of existing contracts before trying to reduce or increase the range.

Therefore, the national regulatory authority could impose a notification requirement for every contract that is going to be offered on the market. This notification should include the signal type and volatility (see Table 1) allowing the regulator to connect the new contract to one of the contract types. Such harmonisation can also help to directly reduce transaction costs for consumers, e.g. by reducing complexity and facilitating comparison, thus lowering searching costs.

Protection of personal information

To participate in demand response, the consumer is required to reveal personal information: first, to facilitate the contract selection process (revealing load mix and preferences), and second, to comply with the contract terms with regard to the sharing of data and personal information. Furthermore, we have illustrated that volume-based and control-based contracts imply a loss of privacy to different degrees: limited for the load capping contracts and high for direct load control contracts.

The consumer must be confident that personal information and data will only be used for clearly consented purposes. Adequate data protection rules should therefore be implemented to overcome challenges one to four (EC, 1995; Article 29 Data Protection Working Party, 2013).The starting principle must be that the consumer is in control: any request for access to information should be explicit about exactly what information is wanted and with which frequency, and the requested data must only become available to the requesting entity after the explicit consent by the consumer (CEER, 2011b).

Protection of vulnerable consumers

In the light of the on-going work in the Citizen's Energy Forum's Vulnerable Consumer Working Group and of the development of an energy policy for consumers, we can observe here that additional assistance and protective measures for vulnerable consumers are justified; in fact, a basis already exists in the framework of the internal market for electricity (EC, 2009c, 2010a):

- E.g. a definition of vulnerable consumers should be established;
- E.g. a default contract to participate in demand response should be established;
- E.g. special measures to inform and educate vulnerable consumers should be established, for instance, in association with local social services centres.

Other measures could also be considered at Member State level, such as protecting vulnerable customers through social welfare systems.

Vulnerable consumers in the context of demand response could be (CER, 2011; Consumer Focus, 2013a), but are not limited to:

- Low income consumers: these consumers have fewer loads to respond, reducing their abilities to participate in demand response and they might end up without any contract;
- Poorly educated consumers: these consumers might not understand the additional complexity and uncertainty that they are expected to deal with as active consumers; they might not understand the consumer profiling process and the contract comparison tool and still make wrong contract selections;
- Consumers with load mix limitations: these consumers might be willing to participate in demand response but their personal situation restricts how they can use their load and they might end up without any contract, e.g. a consumer with health problems might not be able to lower heating during peak hours.

From the examples provided above, one can foresee that the group of vulnerable consumers is not static. As mentioned before, circumstances regarding consumers' ability and willingness to participate in demand response can change and so it is also expected that the

circumstances that make them vulnerable may also change over time.

Promotion and dissemination of pilot projects

The contract selection represents a new challenge for consumers as well as for policy makers, intermediaries, etc. Therefore, the development of the contracts as well as of the supporting contract selection tools will be a learning process for all stakeholders. The pilot projects on demand response, which currently aim at testing the acceptability of the new technology and related commercial arrangements with consumers, could be of great added value to this process.

Nowadays, there is already a significant number of pilot studies on demand response, some still on-going (ADDRESS, 2010; Stromback et al., 2011; Frontier Economics and Sustainability First, 2012). Despite the number of existing studies, the lessons learned concerning the consumer and the contracts from the existing set of studies are limited and insufficient to feed the debate on how to engage and empower consumers to participate in demand response. There remains a need to promote more contract-oriented pilot projects in the future in order to reach a consensus on the understanding of a consumer's engagement. Additionally, consumers should also be made aware of the output of these studies to show them the potential benefits for society and for themselves.

It is also noted that, due to the local character of demand response, pilot projects are mostly conducted in a decentralised way; and so is the dissemination of their output. The resulting lack of coordination between different projects, as well as the limited dissemination of results prevents different stakeholders from sharing their experiences and improving the understanding of consumers' engagement. Currently, reporting in pilot studies is mostly focused on the technological developments, while it should also be oriented to provide output to feed into the consumer-focused policy making (Lewis et al., 2012). Indeed, information relevant for the development of decision-making tools, such as consumer profiling and contract comparison tools, could be tested in pilot projects and the results could be compared across the projects. Therefore, in order to extract the most value from these projects, there is a need to establish reporting guidelines so that the output can be easily disseminated and benchmarked.

Box 1. Tailored versus standardised contract terms

To make participation in demand response attractive to consumers, contracts should match the load mix and the preferences of the consumer regarding costs and benefits. Hence, tailored contract terms seem a good way to build the required confidence with the consumer to sign a demand response contract that accommodates his individual preferences.

Tailored contract also imply that there are many contract options for the consumers. This subsequently implies a risk that the number of possible contract terms to choose from would increase to uncontrollable levels. There is a trade-off between tailored contracts and some standardisation in the establishment of specific contract terms. An equilibrium must be found to ensure a minimum degree of freedom to tailor contract terms for consumers while limiting the maximum number of options that would create confusion or difficulty for consumers to choose, or for regulators to regulate.

This idea could be translated into practice by making sure that options exist for each contract type or some hybrids, while limiting the variation in contract terms for a certain contract type. For instance, the British regulator, Ofgem, having recognised the impact that offering numerous tariffs can have for consumers' choice, is already planning to take a similar action within the retail market. Indeed, under the argument of difficult comparison of different tariffs and the increased lack of transparency, Ofgem plans to intervene in the market by limiting the electricity tariffs that can be offered to four (i.e. limiting both the typology and the variation of contract terms). The inclusion of basic information on the cheapest tariff and advice on how to select a tariff is another measure under discussion to empower consumers and reduce complexity (Ofgem, 2012).

3. Need for an adequate range of intermediaries

Even if in principle consumers can offer their demand response services without the intervention of an intermediary, domestic consumers and SMEs face certain barriers to directly participate in the energy markets such as market rules defining too high thresholds, and the transaction costs and risks that are too high if managed at the individual level. The first set of barriers could be removed by changing the market rules, while the second set of barriers still remains. That is why there is a need for intermediaries to facilitate the residential and SME consumers to deliver demand response.

Intermediaries (also referred as 'aggregators' in other studies) are then entities that facilitate the demand response transaction between consumers, who provide flexibility, and demand response procurers, who use flexibility to optimise their businesses, through contracts as the ones discussed in the previous chapter (Figure 3). Very different entities can play the role of intermediary for demand response, and different entities may have a different impact on consumers. Due to such differences, we argue in this chapter for the need of an adequate range of intermediaries (Sections 3.2 and 3.3). Moreover, we also discuss the factors that could hinder the emergence of a variety of intermediaries for demand response (Section 3.4) and provide recommendations on how to overcome these barriers (Section 3.5).

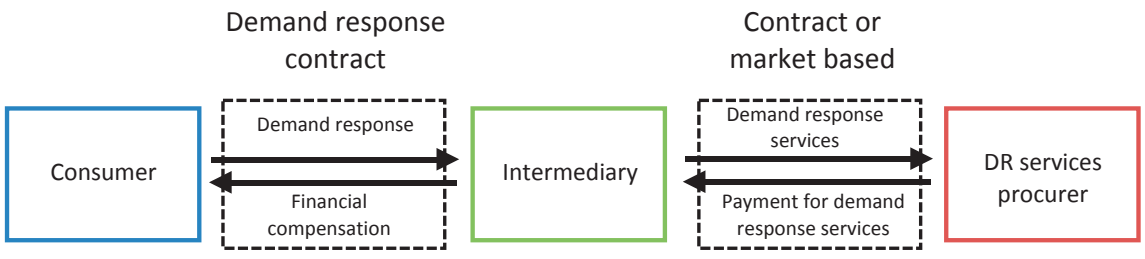

Figure 3. Interaction between consumers, intermediaries and procurers of demand response services
Source: own depiction

3.1 Variety of intermediaries

Before discussing how different intermediaries may impact consumers, it is necessary to categorise the potential intermediaries for demand response. For analytical purposes, the large variety of entities that may play this role in the future is broken down into three representative intermediaries:

- **Supplier**, which refers to the entities that, besides being an intermediary for demand response services, also provide supply services to the consumer. This then includes any company or legal person that sells electricity to final customers, including integrated suppliers-DSOs.
- **Third-party**, corresponding to a for-profit entity having the provision of demand response services as his core business within the electricity sector without being a procurer of demand response services. ESCOs, for instance, are a potential third-party intermediary.
- **Consumer cooperative**, which refers to a non-profit entity composed of an aggregation of consumers. These entities are typically small and localised, e.g. organised at the neighbourhood level or by consumer associations.

3.2 First reason: Intermediary preferences for the demand response contracts

An intermediary's preferences towards certain demand response contracts would be primarily related to the services that these contracts would enable, hereafter called demand response services. Since different demand response services may have different requirements in terms of consumer responsiveness, the interest of a certain intermediary in certain demand response services can make him inclined towards certain contracts.

In this section, we first present the typology of demand response services. Second, we discuss the interest of each intermediary in different demand response services by looking at his incentive-based business model. Then, we discuss the matching between the technical features of each demand response service and the features of each demand response contract. The outcome of this analysis will then reveal the possible preferences of certain intermediaries over certain contracts.

3.2.1 Typology of demand response services

Demand response as a means of flexibility can have an impact both in the short term, for efficient and reliable operation of the total electricity system, and in the long term, for adequacy optimisation of this electricity system. Indeed, it can offer a diverse set of services to the electricity system. Within this section, we present a typology of demand response services, including a discussion on their specific technical requirements and on their procurers.

We consider that demand response can offer five different types of services[6] to the electricity system:

1. Portfolio optimisation, which is used by market players to meet their load obligations at minimum costs by arbitrating between generation and demand response on different time horizons. This service is procured by suppliers and other wholesale actors.

2. Structural congestion management, which

6 The demand response services discussed in this report are a selection of possible services that have been discussed in the literature (e.g. DOE, 2006; Ofgem, 2010a; Frontier Economics, 2012); it is not meant to be an exhaustive list of flexibility services that could be offered now or in the future through active demand response.

aims at solving congestion in the transmission system 'that can be unambiguously defined; is predictable; is geographically stable over time; and is frequently reoccurring under common circumstances' (ENTSO-E, 2012a). This service is procured by TSOs and DSOs.

3. Occasional physical congestion management, which aims at solving physical congestion which is unpredictable and occasional, e.g. caused by distributed generation and renewable energy sources. This service is procured by TSOs and DSOs.

4. Balancing of the electricity system, which refers to the 'procurement of balancing reserves (capacity) and balancing energy by the TSO to perform balancing, meaning all actions and processes, on all timescales, through which TSOs ensure, in a continuous way, to maintain the system frequency within a predefined stability range' (ENTSO-E, 2013). In other words, the TSO balances demand and supply by procuring fast sources of flexibility. This service is procured by TSOs and in the future potentially also by DSOs.

5. Ancillary services, which refer to 'a range of functions which TSOs contract so that they can guarantee system security. These include black start capability, frequency response, fast reserve, the provision of reactive power and various other services' (ENTSO-E, 2012c). This service is procured by TSOs.

As these services help resolve different problems in the electricity system, they have different requirements in terms of reaction time, duration and firmness, as summarised by Table 2.

- *Reaction time* refers to how fast flexibility is required to respond to the activation signal in order to provide the expected service. For certain flexibility services, such as wind power balancing, activation can only be decided at very short notice due to the unpredictability of wind; as a result, only the flexibility means with very short reaction time can fulfil this service.

- *Duration of response* refers to whether flexibility is required only to cover a short-lived perturbation of the system or whether it has to last over a longer time interval like for structural problems. It complements reaction time as it expresses the required persistency of the response after it has been called.

- *Firmness of response* is required when a default on the flexibility offer would distort the reliability of the electricity system. For instance, system services that are close to real time must be firm to ensure a secured operation of the electricity system.

3.2.2 Interaction between demand response services and demand response contracts

We have discussed in the previous section that in order to provide different services, demand response needs to fulfil different technical requirements. We have also discussed in Section 2.1 that different demand response contracts have different technical features. Then, it is expected that there is a relation between the contract types and the demand response services. Indeed, the requirements of the demand response services need to be adequately reflected in the contract features to ensure technical requirements are met by the consumer's demand response. Table 3 offers an overview of the plausible matching.

Table 2: Technical requirements of different demand response services in terms of reaction time, duration, and firmness

Service type	Reaction time	Duration	Firmness
Structural congestion management	Slow	Long	Low
Portfolio optimisation	Slow	Long or short	Low
Occasional congestion management	Fast	Short	High
Balancing services	Fast	Short	High
Ancillary services	Very fast	Short	Very high

Source: own assessment

Some general insights of matching the demand response services to the contracts can be drawn from the Table 3:

- Demand response services requiring firmness match with volume based contracts and in particular with direct load control contracts if, additionally, the response should be fast and available at very short notice.
- Demand response services which require less firmness could be met by price based contracts.
- The optimisation of structural electricity system issues can be handled by static contracts that match with the need for a persistent signal over a longer interval; whereas services that need to be fast and variable are better embodied by dynamic contracts.

3.2.3 Business model: intermediary preference towards demand response services

One might expect that any intermediary would al-

Table 3: Matching between demand response services and demand response contracts*

Contract type	Structural congestion management	Portfolio optimisation	Occasional congestion management	Balancing services	Ancillary services
Time of Use (TOU) pricing					
Fixed load capping					
Dynamic pricing					
Dynamic load capping					
Direct load control					

*Blank spots in the table indicate that requirements of demand response service are not sufficiently reflected in demand response contract features

Source: own assessment

ways offer all demand response services in order to maximise the overall value of demand response. This expectation, however, may not be materialised because in reality, intermediaries can have divergent business objectives which make them attribute more or less value to certain services. Moreover, these services can differ in terms of risk, which might be perceived differently by different intermediaries. Hence, the business model of the intermediaries, i.e. making profit out of selected demand response services, can differ. This sub-section then discusses how the interest in demand response services can differ for different intermediaries by first analysing the intermediary's core business and second their risk preferences.[7]

Core business

Out of the three considered entities, one has another core business in the electricity system: the supplier (selling energy), while the other two (third-party and consumer cooperatives) could establish their business only with demand response. If the core business of the actor is not demand response intermediation, the incentives for being an intermediary could somehow be affected by the incentive in their core business. Here we discuss two cases:

1. In the case that certain demand response services can be for self-use, the intermediary might have a higher incentive to procure those services.

    - Supplier: might focus on self-optimisation of its portfolio of generation and demand;

2. In the case that certain demand response services are in conflict with the intermediary's core business, he might have a preference for not procuring it.

    - Supplier: core business is to sell energy, whereas demand response may be used to reduce the consumer's load. Demand response can thus be competing with supplying more energy;

The two effects discussed above could explain the possible preferences of the supplier towards a limited number of demand response services.

Business risk preferences

The risk preference is another factor to explain why an intermediary could be inclined towards certain contracts. Intermediaries that are more risk averse might turn away from those demand response services whose business risk is perceived as too large.

These business risk preferences can be attributed to limited skills with concern to trading in different energy markets. Or the limited size of the demand response business can turn away the intermediary from markets with large exposure due to volatility. For instance, the balancing market is often smaller in size, less liquid and more volatile than the day-ahead spot market. In some electricity systems, procurement of ancillary services and congestion management tools might be non-market based and thus less transparent, increasing business risk for market players.

Risk averseness might potentially be higher for those intermediaries that have no vested business in the electricity system. Indeed, these actors are more likely to lack a robust core business that provides a financial cushion. Out of the considered actors in this report,

7 Note that this report does not aim to provide an exhaustive overview of intermediary incentives, but instead focuses on two incentive issues that show a potentially biased relationship between the demand response intermediary and certain demand response services. More information on intermediary incentives can be found in reports discussing the value of demand response (e.g. DOE, 2006; Ofgem, 2010a; Frontier Economics, 2012).

the commercial third party and the consumer cooperative fit this profile, but suppliers could also be less or more risk averse.

The intermediary's risk preferences can thus further narrow down his preferences towards demand response contracts.

In conclusion, different intermediaries may have incentives to target specific demand response services and, consequently, to prefer specific types of demand response contracts. As seen in Chapter 2, an adequate range of contracts is necessary in order to better fit different consumers' load mixes and preferences. The intermediaries' preferences towards demand response contracts could then affect consumers, by reducing the range of contracts available.

Nonetheless, intermediaries' differing preferences towards demand response contracts are not necessarily an issue for consumers. In fact, even if not all the contracts are offered by a single intermediary, they could still be available if different intermediaries coexist. Thus, a range of contracts matching different consumers' preferences would still be available, but it would be offered by different intermediaries.

3.3 Second reason: Intermediary impact on consumer surplus

Another reason why an adequate range of intermediaries is necessary lies in the fact that different intermediaries differently may affect consumers' benefits, i.e. the financial compensation that consumers receive from their participation in demand response. This financial compensation is related to the value of the flexibility services that the intermediaries procure from consumers via the contracts. Consumers' surplus discussed in this section refers to the value of the financial compensation that consumers receive by participating in demand response.

The impact of intermediaries on consumers' surplus can be twofold: first, the overall profit captured from demand response may differ depending on the entity playing the role of intermediary; and second, different entities may split the profit with the consumer differently. In what follows, we present an analysis of the twofold impact, then summarised by Table 4.

The overall profit

The overall surplus (*the size of the cake*) that can be captured by different types of intermediaries can be associated with (1) the openness of the intermediary towards the different services and (2) the costs of trade for this intermediary in providing different demand response services.

- The *openness towards the provision of different demand response services* can be hindered by the misaligned incentives with the core business of each entity and by his risk-averseness. Within the previous section, we have already assessed this issue by looking at the preferences towards the provision of certain services. Indeed, if the intermediary does not have the incentives to provide all demand response services, the maximisation of the benefit extracted from demand response might be impeded. However, it is also shown in the last section that it is not clear which intermediary would be able to capture the most value from demand response, since none of the entities would be fully open towards all the services that can be provided through demand response.

- The *costs of trade* refer to the costs different entities need to bear in order to play the role of

intermediary and this is strongly linked to both the skills of each entity and the economies of scale that can be achieved by the different entities. A supplier should have the necessary skills and, consequently, have a low cost of trade compared to a third-party and a consumer co-operative. It seems more difficult for the third-party to achieve high economies of scale due to higher costs to acquire customers, which is a typical problem for the new market players. However, commercial third-parties may have other businesses that, even if not energy related, already have a customer base which may reduce the costs related to customer acquisition. The consumer cooperative might be the model with the highest costs of trade, not only because the consumer cooperatives are usually extremely local (e.g. neighbourhood level), but also because they are commonly formed by customers who do not have specific training or experience in the sector. It is worth noticing that the economies of scale achieved by each of these entities could be very different; indeed, there are suppliers with relatively low number of customers and there could be third-party intermediaries with relatively high number of customers.[8]

Profit sharing with consumers

Different entities share the captured surplus (*the slice of the cake*) with consumers differently; how they share can be associated with (3) their business orientation and (4) the competitive pressure they are facing.

- The *business orientation* refers to whether an entity is profit-based and, consequently, willing to maximise its own profit or not. This has implications on the incentives for different entities to share the profit from demand response with consumers. Being profit-based, suppliers and third-parties have the main goal of maximising their own profit. This may imply that as intermediaries they would, on the one hand, try to increase the overall profit from demand response, but, on the other hand, would also reduce the customers' share of the profit. Nonetheless, it is worth noticing that this effect may be reduced by the presence of high competition pressure, as discussed in the following criterion. The consumer cooperative is a non-profit entity, and so the whole profit is to be shared between the consumers.

- Finally, the sharing of profits with the consumers is also related to the *competitive pressure* each entity is faced with. Indeed, when an entity is profit-based, the higher the competition, and the fairer the distribution of profits with the consumers might be. When the competition level is high, an entity is willing to reduce its own profit share in order to attract more customers; while in the absence of competition, a customer's choice is reduced and so there would be no need for the intermediary to provide more attractive incentives. Even if this issue could also apply to consumer cooperative, it is mainly relevant when assessing how supplier and third-party would share the profit with consumers. Currently, it is recognised that in some countries, although in theory the retail market is liberalised, in practice there may still be only one supplier and a consequent lack of choice for consumers (EC, 2010a).

8 For example, we could consider the case where a large telecommunications provider offered demand response services to its customers (see Section 3.4.1 for a more detailed analysis of this case).

The above analysis shows that different intermediaries can indeed have a different impact on consumers' benefit, while there is not a clear best. There seems to be a trade-off between the preference for specific demand response services and the costs of trade, so that the intermediary that maximises the overall profit from demand response may vary, e.g. depending on the most profitable services. Moreover, we have also discussed the fact that the coexistence of different intermediaries will increase the competition level, leading to a fairer distribution of profits and, consequently, higher consumer benefit. It seems therefore necessary to ensure an adequate range of intermediaries and proper competition in order to safeguard consumers' benefit from demand response participation.

3.4.1 Market power issues

The potential abuse of market power by a dominant intermediary may inhibit other intermediaries from participating in the demand response market, which may have negative implications for the consumers (as referred to in Sections 3.2 and 3.3). Indeed, this dominance in the demand response market by a single entity may not only lead to an absence of an adequate range of contracts and services provided, but it may also imply reduced incentives for the intermediary to fairly share the demand response benefits with the consumer.

Table 4: Possible impact of intermediaries on consumers due to their entity

Intermediary	Openness to different services	Costs of trade	Business orientation	Competition pressure
Supplier	Low: conflict with core business	Low	Profit-based	Limited
Third-party	High	Medium	Profit-based	Variable
Consumer cooperative	Medium: averse to high risk services	High	Non-profit	Variable

Source: own assessment

3.4 What may hinder an adequate range of intermediaries

In the previous two sections, we have already discussed the importance of ensuring an adequate range of intermediaries. However, the existence of such a range of intermediaries may be inhibited by (1) market power issues and (2) the existing market rules and regulations for the provision of different demand response services. Within this section, we then explain how these conditions may limit the emergence of an adequate range of intermediaries.

In this section, we present three distinct situations in which the dominance[9] in the demand response market by a single intermediary is likely to happen, namely: (1) high concentration in the supply market; (2) existence of integrated supplier-DSO; and (3) existence of an integrated business model for demand response and the deployment of smart appliances and/or enabling infrastructure.

9 To avoid any misunderstanding, we only claim that the market distorting effects from abuse of a dominant position must be avoided or corrected.

Dominant supplier

Market power in the supply market may be transferred to the demand response market, due to the established large customer base and customers' familiarity with the supplier. Indeed, while this horizontal integration of businesses would lower customer acquisition costs for the supplier to enter the demand response market, it would simultaneously increase those costs for the new demand response intermediaries that would neither have an established customer base, nor the confidence from the consumers. Moreover, since a supplier would provide bundling of services, it would be difficult for the consumer to distinguish between the costs associated to the supply of electricity and the benefits resulting from the participation in demand response. The potential ambiguity regarding the actual benefits resulting from demand response participation, would make it difficult for consumers to evaluate the demand response offers of other intermediaries against the bundled one provided by the dominant supplier.

Hence, due to the already established contractual arrangements, a dominant supplier for domestic consumers and SMEs has a high probability of becoming the dominant intermediary in the market for demand response.

Integrated supplier-DSO

In certain regions, a DSO may integrate other businesses besides the operation of the distribution network. Indeed, there are situations where the DSO is also a supplier, a producer, a trader, or a vertically integrated supplier/producer/trader. If we consider the latter, the supplier-DSO (being vertically integrated) would have more information about the regulated demand response services as well as about the load profile of consumers than any other intermediary. Moreover, similarly to a dominant supplier, he would also benefit from the established large customer base and customers' familiarity and the provision of a bundle of services (misleading the assessment of other intermediaries' offers).

Thus, due to the already established contractual arrangements and the advantage on data access, there is a high probability that an integrated supplier-DSO would become a dominant intermediary in the market for demand response.

Dominance related to the deployment of smart appliances and/or enabling infrastructure

The deployment of smart appliances (or enabling infrastructure) may be financially supported by a demand response intermediary, who is interested in enabling demand response to increase his intermediation business. However, as a prerequisite for the support provision, the intermediary would probably require the ownership and/or the right to control the appliances acquired (or the developed infrastructure). In either case, this deployment activity would provide an advantage to this intermediary in relation to the others, leading to the existence of a dominant intermediary. Indeed, within this situation, the appliances/infrastructure deploying intermediary could have privileged access to consumer information; and in some cases, it could even impede the data access for other intermediaries. Moreover, this may also lead to a lock-in effect, since the intermediary investing in the appliances/infrastructure may impede (or make difficult) the switching of intermediary by consumers. Indeed, when investing in appliances/infrastructure, the intermediary would either claim the ownership of the acquired goods or at least require a long term contract in order to ensure the payback of his investment.

Accordingly, an intermediary that would support the deployment of smart appliances and/or enabling infrastructure would likely have a dominant position in the demand response market, mostly due to the uneven access to data compared to other intermediaries and the lock-in effect.

Concluding, we can say that this dominance in the demand response market by a single entity may emerge mainly due to four main factors:

- The **familiarity** of existing entities, with whom consumers already have a contractual arrangement, provide an advantage to entities who have other business in the power sector;
- The **bundling of services** and the respective billing may make it difficult for consumers to compare the offers made by different intermediaries;
- The **preferential or discriminatory access to data**, either due to the bundling of services or to the ownership/control of the enabling infrastructure, hampers all intermediaries to have equal footing;
- The **lock-in of consumers** to a certain intermediary may also be seen as a potential barrier to the emergence of a wide range of intermediaries.

3.4.2 Market rules and regulation for the provision of demand response services

Flexibility services are already offered in different energy markets (e.g. spot market and balancing market) or procured through bilateral mechanisms (e.g. congestion management services and ancillary services). However, existing market rules and regulation for flexibility services have been developed in a context without demand response and with a large focus on the generation flexibility. This may imply the undervaluation of demand response resources compared to traditional flexibility resources in the existing energy markets. Moreover, the possible discrimination against demand response as compared to other flexibility sources to provide certain services may also lead indirectly to the discrimination of certain intermediaries. Indeed, as discussed in Section 3.2, different intermediaries may have different preferences regarding demand response services, and so the preclusion of providing the services they are inclined towards may prevent them from being an intermediary for all demand response services.

In what follows, we present some examples of existing market rules and regulations that may limit the participation of different intermediaries in the existing energy markets.

Market rules:

The markets where flexibility services are currently offered, namely the spot market and the balancing market, have strict rules and commitment requirements that need to be fulfilled by the actors willing to participate. Some of these requirements may impede some of the demand response business models presented in this section to take place. For instance, in France, residential demand response is not allowed to participate in the spot market, even when several consumers are aggregated. Here, the main barriers seem to be related to the firmness and marginal impact of demand response in the spot market, which are currently under the investigation of the French

regulator (CRE, 2007, 2010). Similarly, the balancing market may also not be effectively open to the residential demand response in some countries, due to the very strict requirements such as minimum bidding volume, minimum bid duration and binding up and down bids (Ruester et al., 2012b).

Even though some of the existing market rules make the participation of demand response difficult for intermediaries, one should recall that these rules were designed to ensure the proper functioning of the different marketsat at a time when demand response was not yet considered a means of flexibility. Thus, it would be advisable to revisit the existing rules in a context where demand response is present, while assessing which rules are strictly necessary to ensure the proper functioning of the markets.

Regulation:

The procurement of congestion management services and ancillary services is often not fully market based, but managed through bilateral contracts, tenders with generators and even mandatory provisions. Moreover, existing regulation does not always incentivise the procurers of these services (TSO and DSO) to consider demand response on equal footing to other flexibility sources. For instance, regulatory incentives for grid operators at the transmission and distribution level often focus on capital expenses (expansion of the grid). As congestion management through demand response implies an increase of operational expenses instead of capital expenses, a DSO or TSO might prefer grid investments that can be added to the regulatory asset base. Such an element of traditional rate of return regulation would hinder the deployment of innovative solutions that are less capital intensive (Prüggler and Bremberger, 2011). If the regulatory framework in place does not provide a level playing field between demand response and other sources of flexibility, intermediaries' business models that target regulated flexibility services might be seen as infeasible as the procurers of these particular services, i.e. DSO and TSO, might not show interest in demand response. Hence, also for the services whose procurement is not market based, there is a need to adapt regulation in order to allow for demand response to compete with other flexibility sources, so that an adequate range of intermediaries may emerge.

Furthermore, the definition of network tariffs may also need to be revisited; network tariffs should provide correct signals to the market players regarding network constraints so that the demand response could be optimised to deliver the highest value for the overall electricity system. In the past, network congestion often has been positively correlated with high electricity prices as they both have been occurring during the peak load periods. On such occasions demand response could serve both purposes at the same time: reducing the local congestion and electricity generation costs. Nowadays, with more renewables in the generation mix, the electricity price could be low when power generation from renewable sources is abundantly available. In that case, demand response incentives are consistent with shifting load to periods of low price; causing, instead of mitigating, constraints in the local network. To resolve this challenging situation, it is important that the network tariff also send signals about the network constraints so that the network users, including the demand response intermediaries, can assess all incentives related to the grid **and** the commodity. This way, the individual decisions of market players could work towards the overall interest of the power system. The network design is out of the scope of this report, though; it has been discussed in detail in CEER (2011a), Ruester et al. (2012a, 2013b) and Eurelectric (2013).

3.5 Recommendations to achieve an adequate range of intermediaries

In the previous section we have identified which conditions may hinder the emergence of an adequate range of intermediaries, including the presence of a dominant intermediary (who uses his market power to impede new entry), and the market rules and regulation that limit the role of intermediaries in providing different flexibility services through demand response. Thus, it is necessary, on the one hand, to avoid the development of dominant intermediaries, and on the other, the regulatory framework must also be corrected to ensure non-discrimination of demand response over other flexibility sources.

First, in order to allow for different intermediaries to emerge, there is a need to leverage the advantages of the incumbents and facilitate the market entry for new market players. To do so, the following actions could be considered:

1. The development of a **licensing scheme** specific for demand response intermediaries would help to increase the confidence of consumers in new entrants in the electricity sector. Such license then ensures that the entity fulfils the necessary conditions to provide this service, including conformation with minimum set of contract terms, switching process, etc. Currently, in some EU countries there is already a similar scheme for suppliers so that any actor willing to provide supply services must fulfil certain predefined conditions, which are recognised by the attribution of a license. The experiences with such supplier licences should be further analysed with regard to the benefits for consumers, the compliance of suppliers with the license terms, the administration costs, etc.

2. The obligation to provide **disaggregated billing information** frequently enough so that intermediaries who provide a bundle of services may facilitate the comparison of offers from different intermediaries. Indeed, this would facilitate the use of comparison tools, as described in Section 2.4.2, helping consumers to find the best contract for them and, consequently, the best intermediary. We have seen in the previous section that the bundling of services, and respective billing, may make the assessment of different offers very difficult due to the aggregation of the different services' costs into a single bill. The EU directive for end-use energy services (EC, 2006a) already requires informative billing to be provided to consumers; nonetheless, the mandate is mostly aimed at the recognition of actual energy costs by the consumers. Thus, it may be necessary to require that the financial compensation of consumers' flexibility is also made explicit in the bills. Additionally, as discussed in Section 2.4.2, the consumer should have the right to get information on his consumption and costs (commodity and network related costs) with a frequency – that can be higher than the billing frequency – and through a communication channel of his choice.

3. Moreover, there is a need to ensure a **non-discriminatory access to data** for the different intermediaries. For instance, regulation should prohibit the information transfer from the regulated activity to the deregulated activity, so that an integrated supplier-DSO would not have an information advantage compared to other intermediaries. Any data sharing then requires prior consent by the consumer with the exception of metering data required for the regulated activities.

4. Finally, in order to counteract the potential switching difficulties caused by the integration of demand response with smart appliances (or enabling infrastructure) deployment, one could consider extending and promoting the existing **independent dispute resolution mechanisms** (ERGEG, 2010; CEER, 2012b) to reduce switching costs. In general, switching costs from one intermediary to another should be as low as possible to increase competition between intermediaries. Nevertheless, termination fees representing upfront investments made by the intermediaries could exist; in that case, they should be reasonable and clearly established in the contract terms.

Regarding the existing market rules and regulation on the provision of flexibility services, change may be necessary to avoid discriminatory treatment of demand over other flexibility resources. Nonetheless, it is important to stress that the call for a non-discriminatory treatment for demand response does not imply an artificial bias towards procurement of demand response as compared to other flexibility means. A level playing field does not guarantee that all demand response services be offered, but it should guarantee that the value of demand response can be monetised if it is a competitive solution.

- In what refers to **market rules**, there is a need to revisit them in a context with demand response, to understand whether all the commitment requirements are still valid in such context. For instance, there are already some on-going regulatory efforts to open the balancing market to demand response. In France, there is a demonstration project to test the possibility of allowing a third-party intermediary aggregating residential demand response to participate in the balancing market (Box 3). The European FP7 project Ecogrid EU presents another innovative way to allow participation of demand response in real-time markets: it tests a bid-less real-time market where residential consumers will be able to directly, or indirectly through an intermediary, respond to prices reflecting the real-time electricity system imbalance without any restriction to size (Ecogrid EU, 2011).

- Moreover, regarding the procurement which is not market based (including congestion management and ancillary services), output-based **regulation** may be considered so that all flexibility means can be equally considered. For instance, in the UK, Ofgem's RIIO[10]-regulation rewards companies that innovate and run their networks efficiently by offering incentives focused on delivering 'results' without focusing on particular means to achieve those results (Ofgem, 2010b). Indeed, since 2010, networks have been regulated on a TOTEX basis, i.e. their revenue is based on a combination of capital and operation expenses. In Italy, the regulator AEEG has started to adopt output-based regulation for certain services of DSOs[11] (Lo Schiavo et al, 2013). The Orkney Islands (Box 2) represents an interesting case in which innovative regulation allowed the DSO to consider, on equal terms, all flexibility means (the 'innovation') including curtailment of wind power in order to deal with congestion (its main target), avoiding building an expensive submarine cable to the Scottish mainland (the 'conservative' approach), while allowing further connections of distributed wind power (other benefits) to

10 RIIO stands for Revenue = Incentives + Innovation + Outputs.

11 This output regulation applies to the investments for the purpose of service quality and distributed generation connection; while incentives to reduce energy losses and to improve security of supply/congestion management are still input-based.

the local distribution grid. Such regulation allows a level playing field to be established for demand response. It is noteworthy that such output-based regulation also implies significant operational challenges for the regulated actors. TSOs/DSOs not only need to verify the technical viability of new flexibility sources, but also need to ensure the coordination and communication with flexibility services providers so that these services are provided timely and with the anticipated quality. It could then be anticipated that the business model as well as the competences of the regulated actors would evolve with such regulation innovation (Ruester et al., 2013b).

4. A retail market design that accommodates active demand response

Throughout the previous two chapters of the report, the analysis has been undertaken under the current design of the retail electricity market which assumes low elasticity of the demand side (e.g. Lijesen, 2007; Allcott, 2011; Torriti, 2012). In this chapter, first it is explained why the current retail market design severely reduces the incentives for consumers to become active. Then a new market design that accommodates active demand, the real-time market, is presented. Afterwards, we re-visit the analysis of contracts, intermediaries, as well as the recommendations drawn in the previous chapters in presence of the real-time market. We highlight that this new market design fits in a long term vision of the electricity market, where the tools introduced in Chapters 2 and 3 have reached maturity and consumers have gained confidence and experience with managing their demand.

Box 2. Orkney Islands – innovative regulation to regulate innovation

The Orkney Islands are located near the Scottish mainland and have an abundant presence of wind power turbines. But the full potential of wind resource is still not fully captured. The connection of more wind turbines, however, was impeded by congestion on the submarine cable connection to the mainland when local demand on the Islands was at its lowest level. To remove this constraint would require a high capital cost, which due to the insufficient number of consented renewable developments, is not yet justified (SSEPD, 2012). To allow further connection of wind power, an innovation of regulation was introduced to encourage innovative solutions that relieve the network bottleneck.

Distribution grid innovations can be stimulated by three schemes in the UK: 1) the Innovation Funding Incentive (IFI) scheme that is a form of innovation input-based regulation, providing R&D funding for grid innovation by grid companies; 2) the Registered Power Zone (RPZ) scheme that is a form of innovation output-based regulation. 3) the Low Carbon Networks (LCN) Fund, which is introduced as part of the electricity distribution price control arrangements that run from 1 April 2010 to 31 March 2015.

The distribution network operator on Orkney Islands, SSEPD, has deployed several innovative solutions thanks to the aforementioned regulatory incentives. For instance, the Active Network Management (ANM) scheme has been established to connect additional distributed generation through the Registered Power Zone (RPZ) scheme (Meeus and Saguan, 2011). Furthermore, SSEPD has launched the 'Tier 1' project through LCN fund, which aimed to procure congestion management services from third-party Energy Storage Providers (ESPs). To this aim, SSEPD ran a commercial tender process that was open to all potential ESPs, including those aggregating the demand side storage sources such as hot water thermal storage. The ESP was selected at the end of the tender process in 2012, and entered into a three-year contract with SSEPD. The energy storage system will work with the existing ANM scheme requesting absorption of excess renewable energy that would otherwise be constrained from the network. Valuable lessons have been gained in terms of design of the commercial incentives, risk assessment of service-based contracts, as well as the coordination between the DSO and flexibility service providers (SSEPD, 2012).

4.1 Weaknesses of current retail market design

Apart from the existence of regulated retail tariffs, the current retail market design starts from the assumption of low elasticity of the demand side. This assumption consists of at least two facts: first, the supply contracts are by default offering unlimited electricity supply to consumers; second, the balancing responsibility is shared between suppliers and the TSO, the former socialising the balancing costs among his customers, while the latter socialises part of the balancing costs among all network users (Vandezande, 2011). Such arrangements hinder the participation of consumers in active demand response, as explained in the following:

1. The balancing costs are not made explicit to consumers.

   First, consumers are not aware of the concept of balancing. Traditionally, given the absence of remotely readable meters or smart meters at the consumer level, suppliers use aggregated load profiles for their portfolio management. Individual real time imbalance thus cannot be measured; hence, neither suppliers nor consumers are aware of individual imbalances. Moreover, suppliers have the obligation to provide unlimited supply to residential consumers and SMEs who do not need to predict their power consumption and try to obey this prediction as large industrial consumers.

   Second, consumers are not aware of the financial consequences of imbalances. In the absence of individual imbalance accounts, suppliers spread out total balancing costs over all their customers so that each customer only pays a flat rate for each kWh consumed. Therefore, the balancing costs are socialised among a supplier's customers.

   Third, the balancing costs that are borne by the suppliers are not all the incurred costs. Under the current electricity market design, suppliers only have partial responsibility to procure the flexibility sources to balance their portfolio, while in many countries TSO still procures the tertiary reserve on market players' behalf. In most cases, only the activation costs of the tertiary reserve is allocated to those causing the imbalances, while the costs of reserved capacity are socialised among all network users.

2. The benefits of providing flexibility are also not fully transferred to consumers.

   First, consumers are deprived of the possibility of expressing their willingness to pay for guaranteed supply. The unlimited supply implies that all consumers opt for the highest supply security.

   Second, consumers are deprived of the opportunity of valuing their flexibility to reduce their own imbalances. Since there is no individual account of imbalances, the consequences of individual actions cannot be measured. Thus, consumers cannot be compensated for reducing their imbalances.

   Third, the opportunity for active consumers to valorise their flexibility to mitigate others' imbalances may also be reduced. This is the case if the TSO does not procure demand response as one of the flexibility sources for balancing.

Therefore the current market design is not well-suited to activate consumers: neither can passive consumers see the costs of their imbalances, nor can active

consumers be rewarded for their flexibility. Yet, the expected large-scale integration of distributed and intermittent power generation calls for a fully activated demand response to deal with the balancing of demand and supply at a more local level than has been the case in the past (ETP SmartGrids, 2011). Moreover, the smart meter makes it possible to keep (more) individualised accounts of imbalances, thus allowing the allocation of balancing costs as well as the attribution of flexibility value to individual consumers.

In this context, it is thus necessary to rethink the market design with the anticipated active role of consumers in mind. It is argued in this chapter that in the long term there is a need to move away from the current balancing market to a '**real-time market**'.

4.2 Real-time market: reveal willingness to pay for electricity supply in real time

The real-time market implies that both the supply side and the demand side have the obligation to express their willingness to buy and sell electricity in real time. Such willingness could be expressed as one price/volume bid, or as a range of price/volume bids. It implies that residential consumers and SMEs will make deliberate choices about their electricity supply; they will not consume electricity for a price that they are not willing to pay. All market actors generate and consume what they have contracted. The system operator plays the role of market clearer and curtails generation or consumption if power generated/consumed is more than what the actor has declared in the real-time market.

The real-time market accommodates active demand response, which is expressed by the willingness of consumers to pay for electricity in real time. It is worth noting that the real-time market does not imply that all consumers are exposed to full volume and price risk. Ahead of the real-time market, market players, including consumers, will have the possibility to hedge against the risk of the real-time market in the forward markets, which can close 30 minutes, 15 minutes or even less minutes[12] before the real-time clearing. In these forward markets, market players can continuously adjust their positions to create a baseline as close to the expected real-time consumption as possible. Only the deviation between this baseline and the realised consumption/generation is subject to the clearing of real-time market. As a result, demand response would become an effective tool for consumers, or their intermediary, to manage their consumption portfolio.

Furthermore, the real-time market allows the task of system operators to procure reserves to be reduced as their role is changed into executing the contractual arrangement of market players. As a result, the socialisation of these capacity reservation costs is substantially reduced, making the real-time market price a better reflection of balancing costs.

4.3 Revisiting the contracts

In the previous two chapters, the demand response contracts are discussed as distinct from the supply contract for analytical purposes, and for that they are and could be provided by actors other than supplier. This has already given rise to dispute between a sup-

12 There is still a need for a gate closure well ahead of the real-time because technical and organisational reasons (e.g. unexpected loss of a generation unit or a power line); the TSO is still responsible for the interval in between to keep the system balanced; the resources the TSO uses to manage the oscillations during such interval would mainly consist of primary and secondary reserves.

plier and a third-party intermediary regarding the balancing responsibility, as illustrated by the case of Voltalis in France (Box 3).

With the implementation of the real-time market design, this issue will disappear. Consumers will have three options to manage their electricity consumption:

1. Buying electricity in the real-time market according to their willingness to pay,

2. Buying/selling forward directly to reduce the price and volume risk of buying in real-time market (hedging), and express their willingness to pay or sell in real-time market for non-hedged consumption,

3. Delegating the tasks of option (2) to an intermediary.

In option (3), the intermediary's task becomes almost the same as the one of a traditional supplier in a retail market, which is to buy/sell forward on behalf of the consumers and to manage the open positions, either short or long; except that consumers' willingness to pay for guaranteed electricity supply is integrated in the contract.

Hence, there would be no distinction between the demand response contract and supply contract under the new market design; only electricity supply contracts would exist. The demand response is then incorporated in the supply contract, which defines allocation of price and volume risk from the real-time market between the consumer and the intermediary. Therefore, the criteria we have used to characterise the demand response contract in Chapter 2 (see Table 1) still apply to the supply contract under the new market design.

Box 3. The residential load curtailment program in France

In France, there is currently a demand response program targeted at residential consumers, undertaken by Voltalis, a third-party intermediary.

The program 'effacement diffus' is a direct load control program for residential consumers, used by Voltalis to provide balancing services. Within this program, the intermediary offers a financial compensation to have the right to curtail load for a certain period of time. The sources of load curtailment are water boilers and electric heating systems (thermal inertia ensures the maintenance of comfort for consumers), and the interruption of load can be between 10 to 30 minutes of their full cycle (Voltalis, 2013).

In France, the supplier is obliged to provide residential consumers with unlimited electricity at a fixed price. Moreover, as the load curtailment is controlled by a distinct entity, the supplier is obliged not only to guarantee that electricity can be supplied (he has to buy forward) but also to pay for the imbalances, in case the customer is curtailed by the demand response intermediary. In the academic literature, it has been demonstrated that this situation may create an unbalance between consumer and supplier surplus as well as distortions in wholesale market price formation (Glachant and Perez, 2010; Hogan, 2009; Chao, 2010).

Concerned about this conflict between suppliers and a third-party demand response intermediary, the French National Regulatory Authority (CRE) has published in 2009 a proposal for the revision of the existing market rules, including the rules for the balancing mechanism, and advocating an obligation for the demand response intermediaries to compensate suppliers (CRE, 2009). In the meantime, CRE proposals for new rules obliging third-party intermediaries to ask consent from all suppliers of the consumers in their demand response portfolio have been presented to the French Competition Authority, who has ruled against it, considering that the new rules could impede the participation of other intermediaries in the balancing market (Autorité de la Concurrence, 2012).

4.4 Revisiting the intermediaries

With the new market design, the role of the intermediaries as discussed in Chapter 3 changes drastically.

In the context of the real-time market, all intermediaries act as suppliers (or better, managers of forward and real-time transactions) for consumers. Therefore, the core business of the supplier is to optimise his portfolio of load (and possibly generation). If the demand does not respond or is not asked to respond, the supplier assumes the full risk in the real-time market, whilst if the demand responds, the supplier may use the flexibility acquired from the consumer to optimise his portfolio. As a result, there should be no conflict of interest for any intermediary to make the best use of demand response[13], as compared to the intermediaries under the current retail market design, whose incentives for using demand response can be affected by their different core businesses (see Chapter 3).

4.5 Revisiting the recommendations for contracts and intermediaries in the real-time market

In conclusion, the analysis of the contracts in Chapter 2 still applies in the context of the real-time market, but it applies to the supply contract, as there is no stand-alone demand response contract under the new market design. Consequently, choosing the right contract for consumers is even more important because the contract not only needs to match the load mix and the consumer preferences, but also needs to reflect consumers' willingness to pay for guaranteed electricity supply. Therefore, the consumer profiling, as recommended in Chapter 2, should also include consumers' preferences for guaranteed supply.

In contrast, the variety of intermediaries discussed in Chapter 3 is drastically reduced to a single type, the supplier, unbundled or integrated with a DSO, as all deregulated intermediaries act as suppliers. Nonetheless, the recommendations regarding the dominant intermediaries are still valid, albeit with a different purpose – instead of allowing for different intermediaries to emerge, they allow the introduction of more suppliers in the retail market to foster competition.

Moreover, it is necessary to guarantee that the three options to manage consumption referred to in Section 4.3 are available for all consumers, i.e. consumers can choose between managing their electricity consumption via an intermediary – option (3) – or by themselves – options (1) and (2). Although most consumers might choose option (3) due to reasons such as transaction costs, it is important to ensure that consumers who wish to manage their demand by themselves do have access to all markets. Thus, the recommendations regarding the revisit of market rules (as discussed in Chapter 3) are still valid.

Finally, the recommendations regarding the regulation on the procurement of flexibility services also apply. In the real-time market, the regulation should also be adapted to incentivise a market-based procurement of congestion management services and a non-discriminatory treatment of demand side flexibility compared to other flexibility sources.

5. The role of the EU

Throughout the report we have put forward several recommendations for empowering or protecting consumers to participate in demand response and to be-

13 Note that the previously distinct services of portfolio optimisation and balancing services have merged into a single service of portfolio management.

come active market participants. We also have made recommendations with regard to market rules and regulation to allow demand response intermediaries to procure flexibility resources offered by consumers and to sell flexibility services in the different markets and procurement mechanisms. We consider these recommendations necessary to make a shift towards active demand response; they should therefore be implemented through appropriate policy and regulation. As previously stated, our study is based on the assumption that smart meters are in place and retail prices are deregulated. Hence we do not make specific recommendations on this aspect.

This chapter is dedicated to investigating the role of the EU in implementing these recommendations. To this aim, we first discuss on which grounds the EU involvement is necessary, then which actions should be implemented by the EU at different time horizons.

5.1 The necessity of EU involvement

Although active demand response is a key instrument in realising the European-wide goal of a low carbon energy system, demand response is effectively organised in a decentralised and disaggregated manner with contractual relations being established between intermediaries and individual consumers. Given this decentralised and local character of demand response, national and even local authorities may be best placed to monitor and supervise the formation of these contracts and to ensure the shift to active demand response.

Nevertheless, the national and local initiatives might not be sufficient to realise such shift, as it implies a fundamental change from the traditional centralised and top-down market structure towards the decentralised and bottom-up market structure. To make such change, Member States might adopt a different market design and implement it at different paces. This diversity would have an impact on the construction of the internal electricity market, which justifies EU involvement.

Furthermore, given the expectations on the active role of consumers in the future energy systems, EU intervention is justified on grounds of consumer interests, be it in coordination with local and national governments. In fact, this coordination is already taking place in the framework of the Third Package, which calls for measures for consumer protection, but leaves it to the individual Member States to decide how to organise consumer protection and to determine the powers and duties allocation among authorities.

Third, EU involvement is also important for building confidence in markets and in active demand response. As previously mentioned, altruism and prosocial motivation are non-negligible reasons for consumers to participate in active demand response. The EU can also play a unique role in raising awareness of European citizens about the potential benefits of demand response for the society as a whole.

5.2 Recommendations

The actions which could be implemented by the EU **in the short term** include:

1. Establishing guidance in the form of good practice codes or, if necessary, binding regulations for **consumer empowerment and protection**, i.e. to ensure that there are adequate mechanisms in place to allow consumers to make an informed choice based on their load mix and preferences. These instruments should include an obligation to be placed on intermediaries to

provide a 'consumer profiling' (Chapter 2), as well as an obligation on national authorities to set up reliable, independent tools for 'contract comparison' (Chapter 2).

2. Developing **transparency rules** for contracts and billing, consumption and cost information. Rules of conduct must ensure that consumers have easy access to disaggregated billing information when demand response is bundled with other service offers (Chapter 3).

3. Extending the existing **dispute resolution mechanisms** to active demand response and ensuring the independence of such mechanisms. The existing mechanisms should be extended to demand response so that consumer interests are fully protected and also to guarantee that consumers can switch without undue costs or time loss to new types of contracts with different intermediaries (Chapter 3).

4. Considering new consumer protection measures – to ensure adequate levels of data protection as well as to set up additional assistance for **vulnerable consumers** (Chapter 2).

5. Promoting **pilot projects on contracts**. Existing pilot studies are mainly focused on the technological issues of demand response, whereas our analysis shows that a technology push that disregards contracts would be probably ineffective, since it does not guarantee the engagement of consumers (Ruester et al., 2013a). Therefore, the EU needs to consider the re-orientation of the Strategic Energy Technology (SET) Plan, to further include 'pilot contract projects'.

6. Setting up a **database of pilot studies** to facilitate the dissemination and extrapolation of project results on an EU wide basis. Thus reporting guidelines also need to be developed. The database could be integrated in the existing Smart Grids Platform or a dedicated platform could be established.

The actions to be implemented gradually **during the transition** include:

7. Facilitating **market entry** for new market players (Chapter 3). Consumer confidence in new entrants can be enhanced through the introduction of a mandatory licensing or certification system based on common criteria and the EU should ensure that these licences or certificates are recognised across the Union by all national regulators. Licensing conditions should be harmonised at the EU level (Chapter 3).

8. Ensuring **non-discriminatory access to all segments of electricity markets** for all market players, including residential and SME consumers (Chapter 3). Where markets are either already cross border or have the potential to have cross border impact, EU guidance and, in some cases, EU intervention is needed to ensure that these markets are contestable and open to all new entrants and new services. As far as the services that have to be procured locally with primary local impact are concerned, the EU should promote best practices in non-discriminatory procurement of flexibility sources (such as output-based regulation), so that the value of demand response can be monetised if it is a competitive solution (Chapter 3).

9. Ensuring that national authorities monitor the **non-discriminatory access to data** relevant for demand response to prevent the transfer of information from the regulated activities to the

deregulated activities in integrated suppliers-DSOs (Chapter 3).

In the long term, the EU plays an important role in the retail market design.

10. The Third Package already provides a basis for integrated EU wide balancing mechanisms. In the longer term, the realisation of an **integrated European wide real-time market** could be the next logical step towards a smart European energy market (Chapter 4). This market can then be gradually opened to residential and SME consumers as active flexibility providers that contribute to the system reliability, while these consumers continue to have the option to use an intermediary if so preferred.

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Annex 1: Glossary

Active demand response

Changes in electric usage implemented directly or indirectly by end-use customers/prosumers from their current/normal consumption/injection patterns in response to certain signals.

Ancillary services

Range of functions which TSOs contract so that they can guarantee system security. These include black start capability, frequency response, fast reserve, the provision of reactive power and various other services.

ENTSO-E, 2012c

Balance responsible party

A market participant or its chosen representative responsible for its deviations between generation, consumption and commercial transactions within a given imbalance settlement period.

ENTSO-E, 2013

Balancing services

Procurement of balancing reserves (capacity) and balancing energy by the TSO to perform balancing, meaning all actions and processes, on all timescales, through which TSOs ensure, in a continuous way, to maintain the system frequency within a predefined stability range.

ENTSO-E, 2013

Base load

Load used to perform end-use services that need instant power and cannot be interrupted or shifted in time.

Curtailable load

Power consumption that cannot be shifted without affecting the end-use service, but the service can be interrupted instantly.

Demand response contract

Contractual arrangement between a consumer and a demand response intermediary, regulating both the response required by the consumers as the signals and compensation provided by the intermediary.

Demand response intermediary (Aggregator)

Entity that establishes the link between the consumer and the demand response procurers, while baring part of the risks. The relationship between this entity and the consumer is governed by a demand response contract.

Demand response license

Certification attributed to different actors, that ensures their ability to play the role of demand response intermediary.

Demand response procurers

Power system actors who solicit flexibility services that can be provided by demand response. One actor may procure more than one service, and the same demand response service may be procured by different actors. Potential procurers are suppliers, DSOs, TSOs and other wholesale market players.

Demand response services

Flexibility services necessary for the proper functioning of the power system that can be provided by demand response, including: balancing services, ancillary services, congestion management and portfolio optimisation.

Direct load control

Predefined control based contract where a clearly identified part of the consumer's electricity consumption is effectively placed under the control of a third party. This third party then automatically and remotely shuts downs, starts up or cycles electric appliances at the consumer's premises.

Dynamic load capping

Dynamic volume based contract that fixes load caps and/or floors for short intervals with day-ahead or hour-ahead notice.

Dynamic pricing

Dynamic price based contract that fixes hourly tariffs for short intervals with day-ahead or hour-ahead notice.

Electricity supply contract

Contractual arrangement between a consumer and a supplier, assigning the service of electricity supply of the first to the latter.

Enabling infrastructure

Power system infrastructure that is necessary to allow different actors to take full advantage of the smart grid roll-out. This includes smart meters, communication infrastructure, et cetera.

Energy efficiency (improvement)

Means the ratio of output of performance, service, goods or energy, to input of energy. 'Energy efficiency improvement' means an increase in energy efficiency as a result of technological, behavioural and/or economic changes.

EC, 2012b

Fixed load capping

Static volume based contract that fixes load caps and/or floors for different intervals, typically predefined upfront at the start of the contract.

Imbalance/Open position

Deviations between generation, consumption and commercial transactions of a Balance Responsible Party within a given imbalance settlement period.

ENTSO-E, 2013

Load mix

Composition of the consumer's load regarding the different load types. The load mix is characterised by the proportions of each load type on the overall load, being unique for each consumer.

Occasional congestion (other congestion)

Occasional congestion is the physical congestion which is unpredictable. E.g. caused by random conditions for distributed generation and renewable energy sources.

Physical congestion

Physical congestion means any network situation, either described in a Common Grid Model, or occurring in real time, where power flows has to be modified to keep the Transmission System within agreed security limits.

ENTSO-E, 2012a

Portfolio optimisation

Arbitrage between generation and demand response used by all market players to meet their load obligations at minimum costs.

Prosumer

A consumer who also owns electricity generation, which is placed at the consumption site. The generation can be from renewable energy sources or not.

Real-time market

(Local) market for final settlement of open positions between actual generation and consumption of electricity, cleared by TSO (or DSO).

Self-generation

Power generation placed at the site of a consumer that reduces the net load that is taken from the electricity grid.

Shiftable load

Power consumption that can be moved in time without affecting the end-use service. Shiftable load often involves a non-interruptible process like a laundry cycle and thus involves some planning.

Smart appliance

Appliance or device that is capable of modifying its operation in response to signals received from the electricity network or a communications system.

EA Technology, 2011

Smart meter

Advanced metering systems that support secure bidirectional communication upstream and downstream and allows advanced information and management and control system for consumers and service providers.

EC, 2009b

Storable load

The power consumption that can be decoupled from the end-use service by storage that can be in the form of (electrochemical) batteries or thermal inertia.

Structural congestion

Congestion in the transmission system 'that can be unambiguously defined; is predictable; is geographically stable over time; and is frequently reoccurring under common circumstances'

ENTSO-E, 2012a

Time of use pricing

Static price based contract that fixes different tariffs for different intervals, typically predefined upfront at the start of the contract.

Annex 2: Conclusions of Industrial Council Meeting (based on report version "V0", February 2013)

Serge Galant
Technofi

Submission date: 1 March 2013

1. Background

The present annex aims at shedding light on the first round of discussions about the first draft report on "Shift, not drift: Towards active demand response and beyond".

2. The issue

The issue raised by the report can be summarised as follows: "active demand response brings new ways of optimising the full electricity system, but consumer confusion should be avoided".

3. What lacks in the first draft report: completeness issues?

The report must address the following items:

Lessons to be learned

CEER has published a study on the conditions for the take-off of active demand response in 2011.

ENEL Distribuzione is experimenting with smart meters in Italy since 2007.

The French system operator is conducting an experiment with 100 MW of aggregated active demand response participating in the French balancing mechanism.

Industry is already participating in demand response, what lessons can be drawn from their industrial experience.

The methodology

A review of active demand response per main areas of consumption: consumers, building, industry, etc. provides an estimate of the potential of active demand response.

The impact of entry barriers for intermediaries and other regulatory barriers that hamper the non-discriminatory treatment of demand response should be discussed.

Recommendations should be clear on how to implement them.

4. What is still fuzzy and must be clarified?

Set the scene and the time frame of the recommendations

The scope, including the time horizon for the recommendations, needs to be clarified. This includes revisiting the narrow definition of active demand response'. The report should clarify that active demand response is a means to further optimise the flexibility of the electricity system in terms of investments and operations.

Methodology

It is advised to clarify where the potential value of active demand response lies, how it can be monetised and how consumers and intermediaries can see and capture the benefits of active demand response.

5. **What are the potential incoherencies in the first draft which must be addressed?**

The report aims at highlighting policy options to make the transition towards active demand response

The business models of demand response intermediaries must lean on 'win, win, and win' principle: the intermediary wants to make a profit, the electricity system must be optimised and the consumer must see some benefits.

Annex 3: Comments from Project Advisers

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Submission date: 17 June 2013

The report on Demand Response is very comprehensive and presents the research of good quality. It covers in a complex way the economic and legal relations between energy users and various parties operating in electricity markets allowing for the demand response of energy end-users.

My comments can be seen as the suggestions from the expert point of view indicating the elements which can be added to the report and how the structure of the report and its writing can be improved.

The report scope is good and very comprehensive. It does not relate to the problems already solved such as demand response of some electric devices such as electric water boilers which are usually covered by time of use tariffs. Such tariffs can be treated as some category of demand response.

What should be added to this report is the energy customer segmentation splitting energy customers is several groups which have different styles of life, and resulting energy use profiles, and which react in various ways to incentive to response actively to varying prices of electric energy. For example such groups can include: a couple of pensioners, a family with children when one parent stays at home, a group of young workers or students sharing an apartment, etc.

Also, Chapter 4 could be slightly improved by the addition of conclusions relating to the specific topics discussed in this chapter, when preserving the overall conclusions in the end of the report.

My suggestions to the framing of this report embrace:

- More clear statements of project objectives are advisable

- New findings/added value should be more highlighted

- Formulate recommendations and conclusions in each chapter of the report and overall conclusions in the end of the report.

Annex 4: Conclusions of Public Consultation (based on report version "V2", May 2013)

Summary of the public consultation about the THINK # 11 report on "Shift, not drift: towards active demand response and beyond".

1. The public consultation

The report which was put into public consultation aimed at using a consumer centered approach to propose policy recommendations that enable active demand response (DR) in view of meeting consumer's benefit. The link between the present day European policies and this work addresses also:

- The search for an incremental flexibility of the electricity system,
- The progressive arrival of prosumers[14], thanks to renewables, who will be acting more "real time" than todays' consumers to maximize the cumulated benefits of being a prosumer

This in turn highlights why active demand response (DR) is of interest.

Two questions are then raised:

What are the policy options which would help engaging consumers to actively participate in DR in the EU27?

To what degree EU-based intervention / coordination / harmonization might facilitate (accelerate) the deployment of DR contracts

2. Respondents

The responses of the following people or organisations have been analysed:

- **ANEC**, The European Consumer Voice in Standardisation
- **ENDESA Group**, an electric utility company in Spain.
- **CEER**, The Council of European Energy Regulators
- **ESMIG**, The European Smart Metering Industry Group
- **EURELECTRIC**, The Union of the Electricity Industry is the sector association which represents the common interests of the electricity industry at pan-European level, plus its affiliates and associates on several other continents.
- **GEODE**, an association founded in 1991 and made of European independent distribution companies of gas and electricity, representing more than 1200 companies in 15 countries, both private & public owned, which serve a population of 100 million people
- **ORGALIME,** The European Engineering Industries Association
- **Sustainability First**, a registered charity in the UK with a focus on practical policy development in the areas of sustainable energy, waste and water

14 both producing and consuming electricity

Overall, the respondents have challenged the report on the following topics:

- The scope of the report
- The typology of the markets addressed in the report
- The barriers which prevent such markets from expanding
- The prerequisite to remove such barriers
- The underlying vision which would support DR expansion
- The related role of the field players
- The (over) protection of consumers
- The role of intermediaries in such contracts
- The policy recommendations

3. The scope of the report

The report needs a clear definition of what is included and excluded from its scope: the text needs to acknowledge explicitly that the exclusions are for the purpose of making the report 'manageable' and that in practice there are interactions which the report may not capture.

For instance:

- Energy efficiency: many trial findings suggest that one of the effects of time-related pricing is that it may also incentivize permanent demand reduction at high-cost periods – as well as time-shifting of load.
- Distribution level generation: on-site generators are in effect also consumers, since their onsite generation tends to displace imported electricity at high-cost times It thus becomes a customer load-shift or load-reduction response

It is then a pity that the scope of the report remains limited to residential and SME consumers, while the potential for DR is higher and more easily accessible by industrial consumers. Since DR is already largely applied in this market segment, the report could have drawn more lessons learned from these real life applications.

The definition of 'active DR' in the report includes only voluntary DR schemes. This might forget the economic / cost-efficiency case for mandated DR – for example mandated ToU tariffs. In practice, mandation may make sense in terms of driving the most cost-efficient outcome available from DR, since all customers would be incentivized to shift their load – including to some extent those with a high peak use. Such tariffs have been adopted in Italy and also, prospectively, in Ireland, to help tackling major generation and / or transmission capacity constraints. For ToU tariffs which are always voluntary, there is a risk that existing behaviors are simply reinforced – rather than creating a universal incentive to time-shift. So, customers with a low peak-time use will choose a voluntary ToU tariff. But, rationally, customers with a high peak-time use would not opt for a voluntary ToU tariff if that would penalize their consumption pattern. This is not to advocate mandation – but simply to point out the dilemma of 'voluntary' versus 'mandation'. Not least, mandation entails some significant issues around customer choice, retail com-

petition and political acceptability - which is why it will not be considered for adoption in some places but may be considered in others. Clearly, mandation requires both public acceptance / support and a very clear public understanding of the underlying economic / cost-saving arguments for that approach.

The report should attempt to estimate the potential savings to be made by consumers from participation in demand response or the risks/costs of doing so. For the time being, it is impossible to know the percentage of consumers who would be interested in the different contracts. Pilot projects are not reliable enough about what can be expected, considering the participating test persons already are a priori interested in the new technologies. A representative recruitment and a sound methodology are needed to demonstrate the feasibility of demand response. In the case of smart meters, around 90-95% of consumers opted out of pilot participation. In European countries where the electricity market liberalization has been slow, consumers should still be puzzled by demand response contracts.

The report lacks also assessing a realistic scope for consumers willing to shift demand e.g. how much demand could a consumer move from one time period to another and for what period could demand be postponed, without adversely impacting consumers. Contract conditions should thus allow a certain degree of flexibility in consuming electricity: constraints on choice (hours, use of infrastructures) can undermine individual freedom. Even when consumers are aware of high imbalance costs, they often are hardly able to change their behavior.

4. The typology of the markets addressed in the report

The report addresses the possible tools to be used in order to involve consumers in DR. It proposes matching schemes for contracts-intermediaries-DR services that are new, thanks to an innovative way of thinking. Yet, it gives a too "disaggregated" vision, which does not capture the whole economic perspective of this new market / activity.

DR is a low margin, high risk business. This will be a volume-based activity: thus managing flexibility resources separately via intermediaries is highly questionable. Moreover it is unclear why the client needs to know how his particular DR contract works in reality for his intermediary or the market: the technical complexity of the back office work will remain "out of sight" of the client.

The report should emphasize more the market options and the impacts on the electricity system, which are indeed very complex.

Traditional and real time markets

The concept of a real-time market as proposed in the report looks promising. Yet, the concept of the demand side bearing a share of responsibility for the system appears risky[15]. Making end-customers responsible for their own load balancing in a real-time market is far removed from being customer oriented, since it may lead to obvious resource inefficiencies. Trading within liberalized markets is about letting market players optimize their actions according to

15 For instance, customers are not responsible for the sustainability of food supply unless we include campaigns to encourage customers to buy local products, which is the equivalent to encourage energy efficiency

costs and preferences. The report seems transferring risk to the party which has limited control over the management of that risk. A more useful alternative should be to discuss possible financial penalties if usage surpasses certain thresholds (a bit like monthly phone contracts). This issue would need much more study and discussions.

Electric system impacts

The increase in renewables in the grid and an increase in the level of demand response will require the development of new models for system management. The daily and hourly profiles of electricity demand at system level differ with respect to the profiles of consumption and power flows in medium voltage distribution networks and of consumption and power flows in low voltage distribution networks. A flat demand profile at system level allows for the reduction in the need for new generation capacity and system services. A flat power flow profile in distribution networks allows for a reduction in the need for distribution capacity and decreases the losses in distribution networks.

As a consequence, different consumer responses are best placed to flatten system demand or to flatten the power flow profiles in distribution networks. Further, power flow profiles vary across local distribution networks. Generally, the consumption patterns, the use of voltage levels and the characteristics of the generation set differ significantly across countries. These national conditions determine different values for the benefits at system level and at distribution level which can be achieved in each country through demand response measures.

This theoretical scenario is suitable for areas where it is possible to have a flat demand profile. However, in a demand response environment with price signals from the wholesale market affecting the customers' use of electricity, it is likely that a larger amount of energy will be used when the price is low. This can cause constraints in the local network

5. The barriers which prevent such markets from expanding

The report should more strongly underline some basic barriers that obstruct the development of demand response markets. It should also suggest possible measures to overcome these obstacles:

- Price regulation at household level – still present in 18 out of 27 EU member states – prevents customers from realizing the value of (shifting) their consumption.

- The electricity price elasticity is low. Given current pricing structures, only a small part of the overall electricity bill can be influenced by DR measures.

- Cost-reflective network pricing is necessary to ensure adequate revenues for DSOs in the new Distributed Energy Resource environment. It would also incentivize demand side participation.

6. The prerequisite to remove such barriers

The report should better underline the two prerequisites to remove existing barriers:

- Price signal, which is the key to getting consumers involved in DR, is currently missing due to regulated tariffs in many European Member States

- Network tariffs must be adapted to the new DR environment in order to ensure that system revenues do not fall

A number of ways of managing tariffs do exist, among others:

- A flat non-flexible network tariff, combined with a well-functioning demand response market with price signals that reflect wholesale prices. This could result in the need for significant investments in the network but increased transparency for the customer;

- Capacity-oriented network tariffs, semi-flexible, a limited number of predictable tariffs combined with demand response signals from the wholesale market. This would result in the optimization of the local grid with a possibility to balance network constraints. This alternative means that the customer could have, as an example, a network-tariff based on kW. This alternative would mean that there are a couple of different grid tariffs but not too many as to make it extremely complex for the customer;

- Highly flexible and innovating pricing formulas for network tariffs combined with demand response with price signals from the wholesale market. This would result in optimizing of the local grid meaning a minimum of network constraints but a possible result is conflicting price signals from the wholesale market. This could increase complexity and confusion for the active customer and for other actors on the competitive market if not properly addressed.

It must be acknowledged that there is likely to be an increased diversity in tariffs, which may lead to a higher complexity. This poses new opportunities and threats for customers' possibility to make price comparisons. The report acknowledges (2.4.1) that from a householder viewpoint, a future world of active DR contracts is potentially a very complex world. In noting the sentiment in the report that consumers should be empowered and not necessarily over-protected, it is also important not to under-estimate the potential for future complexity as household DR energy markets develop. Ofgem's Retail Market Review has recently high-lighted a need for 'simpler, clearer, fairer' approaches in GB retail markets. In future, in a DR world with multiple contracts and multiple offers (ToU, CPP, direct control, load management etc.), it will be increasingly hard for a customer to make good personal choices - and know how to make straightforward comparisons - notwithstanding the helpful suggestions in the report for customer profiling, comparison tools, model contracts etc. Regulatory frameworks and regulatory principles and approaches for customer protection for household and small customers in a competitive DR world are likely to need significant attention from national regulators. For example, on effective comparison tools, avoiding contract or tariff lock-in, enabling continued customer switching, all the data protection issues, identifying major gaps in current consumer protections which a digital smart tariff world might herald, understanding the impact of bundled services (energy, non-energy), and, not least, understanding whether current metrics (e.g. switching rates) for assessing the health of the retail market are still 'fit for purpose' in a smart energy world. In July 2013, Sustainability First will publish the eighth report from its GB Electricity Demand project 'Electricity Demand and Household Consumer Issues' – and that report discusses these questions of consumer safeguards in a smart energy world in some detail.

7. The underlying vision which would support DR expansion

The vision supported by regulators and which must be stressed in the report consists of four key areas:

- Reliability – in the physical supply of energy, and in commercial systems and processes that provide continuous access and affect customer service levels, such as billing. It also means reliability in the processes that allow problems and disputes to be resolved transparently, fairly and quickly.

- Affordability – such that charges are clear and kept to fair and reasonable levels for all customers, reflecting value for money at a level consistent with funding necessary investments to develop energy networks and to achieve energy policy targets (for example renewables), taking into account the real needs of customers. This can be secured through network regulation and other appropriate measures, if and when necessary, and by providing customers with effective choice over truly competing offers and new, innovative services. Energy sector specific measures as well as wider social policies also have an important role to play, especially for the poorest and more vulnerable.

- Simplicity – in how information is provided to customers, and especially residential consumers, such that it is easy for them to understand their bill and better manage their energy consumption, making the choices that are right for them. It also means simplicity and transparency in how key processes that affect customers operate. Many customers, and especially many residential consumers, want to be able to take quick and simple decisions in energy markets.

- Protection & Empowerment – to ensure access to energy supplies, and to guard against unfair commercial practices and unsatisfactory outcomes, recognizing the diverse needs of customers, in particular the most vulnerable in society. For customers to be engaged, to take choices and to exercise their rights as energy customers, based on trust in, and knowledge of, how the energy sector operates. As responsibilities shift and consumers are increasingly expected to become more active in energy markets (through developments such as demand response, smart metering, micro-generation or energy efficiency measures), the Vision recognizes their right to choose by whom and how their energy is to be provided and charged. Although this freedom could be framed by regulation, offering meaningful choice for customers (including residential consumers) is a key way to ensure their full protection.

8. The related role of the field players

This report presents five different contact types "that could be offered in the electricity market". A clarification on the role of the DSO/metering operator in this respect should be brought. The DSO/metering operator is a neutral market facilitator, responsible for the basis of demand response. The DSO/metering operator enables smart metering systems capable of recording consumption on a configurable time basis.

For metering, reference should be made to the GGP on Regulatory Aspects of Smart Metering for Electricity and Gas. Ref: E10-RMF-29-05.

Demand Response aims at increasing the electricity system flexibility: it is also part of energy efficiency measures and can enable more effective integration of renewable generation into the energy system. Information from Smart Meters in combination with market information (such as energy prices) can enable the customer through their smart equipment to take actions that reduces pressure on the energy system at times when energy resources are in highest demand.

An important feature of the smart grid is the ability for electricity producers and customers to effectively change their electricity usage depending on the current energy supply and demand situation. A producer could start a generation facility when the energy price reaches a certain level and the customer could choose to activate energy storage facilities such as hot water accumulators when the price is low. Energy prices are expected to be more volatile in the future due to greater renewable generation capacity which will less readily adapt its output to changes in demand.

The DSO, as the operator of the metering system, acts as an enabler of demand response functions for the market by providing the physical infrastructure for the market and also by providing actual consumption information. In most Member States, the DSO is responsible for metering as an integrated part of the grid. The customers are always the owners of their data. It is important to realize that metering data belongs to the customers themselves. The DSO is responsible for ensuring that customers' data is distributed only for regulated duties (e.g. billing). Any other data sharing must be approved by the customer.

The role of intermediaries is addressed below.

9. The (over)protection of consumers

The report says that "customers must not be overly protected". In fact, all consumers need to be adequately protected. Empowerment and protection are not mutually exclusive. The description of a real-time market on page 10 argues that it is essential for consumers to be exposed to the full risks (e.g. being disconnected) and benefits. The report fails to explore how consumers can be incentivized to participate in demand response without forfeiting the right to adequate protection. Consumers need to be protected against both price and volume risks.

The report does refer to vulnerable consumers, but assumes that this is a fixed group of people. Consumers move in and out of vulnerability as their circumstances change and their vulnerability is also dependent on the situation. This needs to be reflected in the way that help is provided and protections developed.

Experience in other markets (e.g. financial services) suggests that consumers could be exposed to unscrupulous intermediaries, with consumers being misled or mis-sold complex products which are unsuitable for them and leave them exposed to large financial risks or penalties. The assumption on page 20 that consumers will be able to make an informed assessment of their preferences for each of the criteria listed is highly questionable. What information will be given to consumers to enable them to make this assessment? The regulatory measures proposed in the report need to be strengthened, including more specific protection for consumers in vulnerable circumstances (a better word than vulnerable customers). There does not appear to be any proposal for consumer protection against intermediary comparison services.

10. The role of intermediaries in DR contracts

Active demand response contracts should not necessarily be separated from electricity supply contracts, since the integration of supply and DR (including possible DSO tariff signals) could be a way to promote of broad acceptance of DR.

For household customers, it is more likely that the ESCO model prevails, meaning that demand response will just be a part of an energy services product, which could also include energy supply, micro-generation, information, remote control, etc. (depending on the 'package' the customer chooses). This would then invalidate the assertion that the supplier's role necessarily clashes with DR and energy efficiency. As the main interface with the customer, a supplier's priority is to provide what customers really want to buy. Therefore many energy suppliers already offer energy efficiency products and services to meet the expectations of their customers. In some markets not only are customers interested in buying such products from their energy supplier, it has become a 'must provide' service.

It appears therefore too early to tell what customers want: consumers must be allowed to choose amongst market players, making demand response a commercial activity

As a consequence, regulated agents should not interfere with these activities. While DSOs will play the role of neutral market facilitators, suppliers will offer products that are easy for the customer to understand and effectively manage any complexity in costs (e.g. variable grid tariffs). When DR and energy efficiency services are provided by DSOs or TSOs, these players would have a competitive advantage over third parties offering the same services (captive market with margins guaranteed by regulation).

Moreover, the report should stress more strongly that intermediaries should not offer DR services to end users independently of the concerned balance responsible party (BRP), otherwise the latter will have to cope with unpredictable and hence un-forecasted changes in its portfolio and will bear the imbalance risks of actions initiated by other parties. For instance, if an intermediary concludes a DR contract with an enterprise that uses electricity for cooling (e.g. industrial deep freezers for vegetables) and shifts part of the load of this end user from hour A to hour B without informing the concerned supplier (=balancing responsible party), the nomination of the latter will be affected and he might face imbalance costs during the concerned hours due to this intervention of the intermediary. These costs would increase end-customer prices: this can be avoided by putting in place the right framework governing industry processes.

Finally, the report refers to the possible risk whereby a dominant position in the energy supply market might lead to a dominant position in the related DR market. This assumption might not be a valid argument (recommending that DR should not be offered by energy suppliers in general and by dominant players in particular). Moreover there is no direct link between the presence of a dominant supplier in a retail market and the market dynamics (competitiveness, quality of the services). Preventing (dominant) suppliers from offering energy services could become counterproductive and hamper the development of DR. Furthermore it is not compliant with the freedom for any company to offer products and services within a liberalized market.

The recommendations to achieve an adequate range of intermediaries should be improved:

1. Licensing scheme: The draft report states that "Currently, there is already a similar scheme

for suppliers so that any actor willing to provide supply services must fulfill certain predefined conditions, which are recognized by the attribution of a license". The existence of licenses for suppliers varies across Member States. It is suggested to add: "… in some EU countries there is already a similar scheme for suppliers …"

2. Disaggregated billing: the customer should have easy access to comprehensive data on his/her consumption and cost. However, the customer might not want to receive this information only through the bill, especially when frequency of billing is annual. The customer must be able to choose from different communication channels and frequency of information.

3. Non-discriminatory access to data: information sharing is one key factor when considering customers´ reliability in the market. Sharing data is important, but it has to be done with the customer in the driver seat. The draft report should take the following into account regarding customer control of metering data: As already mentioned in chapter 2.4.2.4, it is always the customer that chooses in which way metering data shall be used and by whom, with the exception of metering data required to fulfill regulated duties and within the national market model. The principle should be that the party requesting information shall state what information is needed, with what frequency and will then obtain the customer's approval for this. Full transparency on existing customer data should be the general principle. For instance, when a service provider is in charge of information on the customer's voltage quality the customer should in this case be able to a) know that this data exists, and b) receive information on the explicit data. This information could be subject to a reasonable fee.

4. Independent dispute resolution mechanisms (DRM): DRM bodies must work to ensure customers know this tool is available to assist them by communicating widely on the availability of DRM; Customers should contact the trader in the first instance when they have a complaint. DR should be used if the trader/customer cannot resolve the complaint; the independence and integrity of the DRM body should be ensured, to promote customers' trust in the process. The DRM body's funding should be transparent; The branding of DRM bodies and any trader complaint handling and complaints services should be distinct and not create any confusion for customers; and where a trader is part of a vertically-integrated company, relevant authorities should monitor closely whether this affects customers' rights and market competition market.

Last but not least, the role of consumer co-operatives is much less developed than those of other market players. These cooperatives are not well defined, although they could play a vital role in the demand response market.

11. The policy recommendations

Although the actual recommendations section suggests that there should be no intervention unless the market does not function, other sections of the report seem to propose regulations for a market which has not yet had a chance to strongly develop. As a mat-

ter of fact, following some of the suggestions of the report might prevent any demand response market from taking off.

Intermediaries accessing data on network congestion

It might be a too high level recommendation that could raise new issues in full contradictions with the future Network Code on Load Frequency Control and Reserves (still a draft) that describes in Article 50 a method for distribution network congestion management, whereas demand response seems more suitable than the proposed open access to network congestion data to all market players.

Need for large scale demonstrations

Incentives for R & D projects are needed and DSOs being responsible for the secure operation of the electricity system will need to lead the testing of new solutions through. This is the way to evaluate and test the benefits of innovative intelligent technology, estimate costs, learn about customer behavior, barriers to overcome and lay the foundation for possible further deployment.

DSOs are essential in the deployment of Smart Grids which will allow developing Demand Response: it is necessary that all DSOs, small, medium and large, are able to participate in these R & D projects. Larger and more numerous R & D funding programs than the currently exist are needed on a national and European level. Such funds should be accessible to all network operators regardless of their size.

CEER Response to DRAFT THINK REPORT "Shift, not drift: Towards active demand response and beyond"

24 May 2013

1. Introduction

The Council of European Energy Regulators (CEER)[1] welcomes the draft THINK Report "Shift, not drift: Towards active demand response and beyond" in the interest of engaging consumers to participate in demand response. The report will be a useful addition to the current debate on demand response. CEER recognises the potentially significant value for consumers as well as for the industry from the efficient use of demand response and the importance of creating the right environment to unlock that potential. CEER has been and is continuing to explore this issue.

It is right to consider whether current market arrangements are appropriate to facilitate the efficient use of demand response across different participants in the electricity system as it evolves. We agree that regulation needs to empower and protect consumers such that they can engage effectively with the market for demand response products and services. Such regulation should be guided by the principles set out in the CEER customer vision, presented below.

CEER has during several years explored how to develop the European energy markets as to become attractive and beneficial for the consumers, where we have identified demand response as being one of the possible tools to engage them. The Climate and Energy Package[2] have further accelerated this aim. To clarify and highlight consumer interests, CEER and BEUC, the European Consumers Organisation, developed a joint 2020 Vision for Europe's Energy Customers[3]. It is a vision that puts customers first: a sector that engages with, and understands the diverse needs of customers, be they residential consumers, including the most vulnerable ones, or small businesses. A sector that anticipates future needs and takes steps to protect the interests of current and future customers. A sector that uses resources efficiently, ensures that their activities translate into social benefits, and offers all customers a fair and affordable deal for their services.

The Vision consists of four key areas:

- Reliability – in the physical supply of energy, and in commercial systems and processes that provide continuous access and affect customer service levels, such as

[1] CEER is a not-for-profit association in which Europe's independent national regulators of electricity and gas voluntarily cooperate to protect customers' interests and to facilitate the creation of a single, competitive, efficient and sustainable internal market for gas and electricity in Europe.

[2] http://ec.europa.eu/clima/policies/package/index_en.htm

[3] This includes electricity, gas and district heating. http://www.energy-regulators.eu/portal/page/portal/EER_HOME/EER_PUBLICATIONS/CEER_PAPERS/Customers/Tab3/C12-SC-09-07_3yrActionPlan_07Nov2012.pdf

billing. It also means reliability in the processes that allow problems and disputes to be resolved transparently, fairly and quickly.

- Affordability – such that charges are clear and kept to fair and reasonable levels for all customers, reflecting value for money at a level consistent with funding necessary investments to develop energy networks and to achieve energy policy targets (for example renewables), taking into account the real needs of customers. This can be secured through network regulation and other appropriate measures, if and when necessary, and by providing customers with effective choice over truly competing offers and new, innovative services. Energy sector specific measures as well as wider social policies also have an important role to play, especially for the poorest and more vulnerable.

- Simplicity – in how information is provided to customers, and especially residential consumers, such that it is easy for them to understand their bill and better manage their energy consumption, making the choices that are right for them. It also means simplicity and transparency in how key processes that affect customers operate. Many customers, and especially many residential consumers, want to be able to take quick and simple decisions in energy markets.

- Protection & Empowerment – to ensure access to energy supplies, and to guard against unfair commercial practices and unsatisfactory outcomes, recognising the diverse needs of customers, in particular the most vulnerable in society. For customers to be engaged, to take choices and to exercise their rights as energy customers, based on trust in, and knowledge of, how the energy sector operates. As responsibilities shift and consumers are increasingly expected to become more active in energy markets (through developments such as demand response, smart metering, micro-generation or energy efficiency measures), the Vision recognises their right to choose by whom and how their energy is to be provided and charged. Although this freedom could be framed by regulation, offering meaningful choice for customers (including residential consumers) is a key way to ensure their full protection.

These four key principles are all very important to take into account when developing demand response to ensure that consumers are put at the very centre of the energy market. Technical development will only succeed for the customer if it is based on the four key areas of the customer Vision.

In relation to the draft THINK report “Shift not Drift”, CEER below presents general comments regarding simplicity in demand response, vulnerable customers, aspects on the grid tariff in relation to demand response, real-time markets and finally relevant on-going and future CEER work. In an Annex, we present comments and suggestions to specific chapters in the draft report.

2. General comments

2.1 Simplicity in demand response

The draft report expects that residential and small and medium-sized enterprise (SME) consumers will participate in demand response through dedicated “demand response contracts” that are, in principle, distinct from “electricity supply contracts”. And that the electricity supply contract arranges the provision of electric power to a consumer by an

electricity supplier. A demand response contract, on the other hand, governs the relationship between the consumer, who adapts his consumption in response to a signal, and the counterparty that provides this signal.

To begin with, it is important to identify that the customer in this smart world will face a more complex situation, also in the sense of more contracts. For many customers, it may mean a change from one contract to two or three (or more?): for the grid and for the supply, and for the demand response. As a result, only those customers who have the will and the knowledge face a more beneficial situation – the possibility to reduced costs for their electricity consumption as well as being able to contribute to a better environment. Another aspect is the fact that electricity demand is relatively inelastic, hence, there is a need for extensive automation and remote control of appliances. This necessitates a very clear (legal and regulatory) framework to make clear the responsibilities and rights of each party involved (including the customer).

To prevent customers from experiencing the electricity market as too complex, risking non-activity, CEER recognises[4] that there are some key points in the market structure that need to be in place:

- Customers' understanding of information on the electricity market;
- Customers' offered easy ways of becoming aware (e.g. new contracts);
- Customers' trust in the market and thus wanting to participate; including customers' clear identification of potential financial benefits or incentives in order to become active;
- A non-conflicting grid tariff; and
- The absence of price regulation (without prejudice to regulated prices set for vulnerable customers provided they do not distort the functioning of the market).

Customer trust in the market can probably be regarded as the very basis for interest and activity. Trust can be built in various ways, but CEER emphasises that the service providers should aim to give customers appropriate information on offers, with the goal of creating customer awareness of how changes in lifestyle or occupancy can impact on household's consumption patterns and therefore their final electricity bill.

2.2 Vulnerable customers

The EU Member States choose, for various reasons, to support vulnerable customers in different ways, some by explicitly taking care of them within energy regulation, others by incorporating them in the regulation of the social welfare systems. It is of utmost importance to recognise and respect that Member States can use different solutions, as long as the goal is reached: to protect vulnerable customers. CEER therefore suggests an amendment in chapter 2.4.2.5 in the draft report (please see Annex).

The draft report states in the chapter on vulnerable customers that low educated consumers might not understand the additional complexity and uncertainty that they are expected to deal with as active consumers". CEER recognises that trouble in understanding these issues does not only relate to what we might regard as vulnerable customers. Simplicity is needed for a majority of customers, be they vulnerable or not. The draft report could consider having a special chapter on the importance of the customer perspective in general. To succeed in

[4] CEER Advice on the take-off of a demand response electricity market with smart meters (Ref: C11-RMF-36-03).

demand response schemes, reliability, affordability, simplicity, protection and empowerment are key.

2.3 Grid tariff aspects in relation to demand response

To avoid complicated situations when understanding the total energy cost, to facilitate comparison of offers and to enhance for intermediaries to develop offers to customers, it is important that grid tariffs comply with a demand response world.

CEER recognises[5] that the increase in renewables in the grid and an increase in the level of demand response will require the development of new models for system management. The daily and hourly profiles of electricity demand at system level differ with respect to the profiles of consumption and power flows in medium voltage distribution networks and of consumption and power flows in low voltage distribution networks. A flat demand profile at system level allows for the reduction in the need for new generation capacity and system services. A flat power flow profile in distribution networks allows for a reduction in the need for distribution capacity and decreases the losses in distribution networks.

As a consequence, different consumer responses are best placed to flatten system demand or to flatten the power flow profiles in distribution networks. Further, power flow profiles vary across local distribution networks. Generally, the consumption patterns, the use of voltage levels and the characteristics of the generation set differ significantly across countries. These national conditions determine different values for the benefits at system level and at distribution level which can be achieved in each country through demand response measures.

This theoretical scenario is suitable for areas where it is possible to have a flat demand profile. However, in a demand response environment with price signals from the wholesale market affecting the customers' use of electricity, it is likely that a larger amount of energy will be used when the price is low. This can cause constraints in the local network. CEER sees a number of ways of managing this, among others to have:

- a flat non-flexible network tariff, combined with a well-functioning demand response market with price signals that reflect wholesale prices. This could result in the need for significant investments in the network but increased transparency for the customer; or
- capacity-oriented network tariffs, semi-flexible, a limited number of predictable tariffs combined with demand response signals from the wholesale market. This would result in optimisation of the local grid with a possibility to balance network constraints. This alternative means that the customer could have, as an example, a network-tariff based on kW. This alternative would mean that there are a couple of different grid tariffs but not too many as to make it extremely complex for the customer; or
- highly flexible and innovating pricing formulas for network tariffs combined with demand response with price signals from the wholesale market. This would result in optimising of the local grid meaning a minimum of network constraints but a possible result is conflicting price signals from the wholesale market. This could increase complexity and confusion for the active customer and for other actors on the competitive market if not properly addressed.

[5] CEER Advice on the take-off of a demand response electricity market with smart meters.

CEER recognises that each NRA has to consider this in relation to network tariff-regulation in order to facilitate a well-functioning demand response. However, it is very important to note that pricing, for example time-of-use pricing, is part of the decisions made in the competitive market and should reflect the access to - and need for as well as the cost-reflectiveness of - energy at any given time. For suppliers to be able to give customers offers that reflect actual consumption patterns, DSOs/metering operators have to enable smart metering systems capable of recording consumption on a configurable time basis.

The DSOs' role with regard to demand response should be restricted to the basic requirements necessary to facilitate demand response. This is a delicate balancing act between a possible variety of innovative network tariffs and customer confusion and increased complexity for NRAs as well as reduced transparency. We also see the risks of increased complexity in network tariffs in relation to suppliers and energy service companies, when they will develop offers reflecting actual consumption particularly in Member States with multiple DSOs. Last but not least, the customer has no power in negotiating network tariffs – it is important to minimise the extent of the areas in the electricity market where the customer has limited possibilities to act. We should also remind here the main mission of the network operators i.e. security and reliability of the network.

CEER acknowledges that there is likely to be an increased diversity, which may lead to complexity, in the range of tariff offers. This poses new opportunities and risks for customers' possibility to make price comparisons.

2.4 Real time markets

In relation to the real-time market proposals in the draft report, CEER would like to highlight the need for further investigation and the sorts of principles that any potential future market model would need to adhere to.

The draft report notes that for demand response to develop there is likely to be a need for clearer price signals across the system - to encourage market participants to engage and enable them to benefit from demand response. The proposal to move towards a real-time market in which consumers participate alongside the supply side is one of a range of possible market models that have been identified. Further consideration needs to be given to whether this or other market models can best unlock the potential for demand response in a way that is consistent with the CEER-BEUC Customer Vision. This should include consideration of the consumers' ability to engage effectively in the market for demand response, as well as the appropriate roles and responsibilities of different participants, including TSOs, DSOs, suppliers, intermediaries and customers.

It is also worthwhile noticing that in several countries the imbalance costs are already (partly) passed to different market players. The TSO is usually responsible for balancing the system following the current European rules and in future the network codes. The procurement of the TSO ensures an efficient allocation of resources, including failure reserve. For an end user, the effort of being responsible for his/her balance seems to exceed the advantages. Furthermore, conformity with the future network code balancing is mandatory.

The concept of a real-time market has advantages but also obstacles which need to be addressed before taking a decision.

3. On-going and future work of CEER

In relation to the THINK report, CEER would like to highlight on-going, future and published deliverables by CEER.

The 2013 on-going customer work includes an analysis of the involvement of consumer organisations in the regulatory process; a review of how smart metering is progressing across Europe; and a review of current practices in terms of customers' access to information on the cost and sources of their energy as well as energy efficiency schemes. Advice will be formulated on data management for better retail market functioning and on electricity green offers.

In 2014 it is envisaged to investigate on Demand Response in Europe through a Benchmarking report. What are the existing electricity offers (Time of Use (ToU), dynamic and critical peak pricing) from suppliers? How do aggregators (and other similar actors) work and communicate with customers? Which are the regulatory barriers for these business models?

Published CEER documents related to the THINK report:

A 2020 Vision for Europe's energy customers

Advice on the take-off of a demand response electricity market with smart meters, Ref. C11-RMF-36-03, 1 December 2011

CEER submission to European Commission Consultation on Alternative Dispute Resolution (ADR) Ref. C11-RMC-46-03, 8 March 2011

GGP on Regulatory Aspects of Smart Metering for Electricity and Gas, Ref. E10-RMF-29-05, February 2011

ANNEX

Comments and suggestions to specific chapters in the draft THINK report "Shift not Drift"

Chapter 2: Necessity of an adequate range of contracts

General comment: CEER recognises the need for a range of contracts types, to customise the customers´ needs and to increase the competition in the market.

Chapter 2.1 Range of contract types

This chapter presents five different contact types "that could be offered in the electricity market". CEER suggests a clarification on the role of the DSO/metering operator in this respect. CEER regards the DSO/metering operator as a neutral market facilitator, responsible for the basis of demand response. The DSO/metering operator enables smart metering systems capable of recording consumption on a configurable time basis.[6]

Chapter 2.4.2 Recommendations for contract selection

We suggest adding the underscored word in the following sentence: "Fourth, consumers must be able to rely on protection of personal information they reveal before, during and after selecting a contract."

Chapter 2.4.2.1 Consumer profiling

Before concluding a contract, the service providers should aim to give customers appropriate information on offers, with the goal of creating customer awareness of how changes in lifestyle or occupancy can impact on household consumption patterns and therefore their final electricity bill. [7] Hence, what the draft report refers to as "customer profiling" is good, as long as it is conducted in full transparency with the customer (who is not always a "he"), and not started until there is a customer consent. We suggest that sentence be added.

Chapter 2.4.2.2 Contract comparison tools

CEER welcomes the recognition of our Guidelines of Good Practice on Price Comparison Tools.

Chapter 2.4.2.3 Optimising the range of contracts: model contracts

The draft report states that "the regulator might have a role in this optimisation of the range of contracts …". CEER agrees to this, while at the same time stressing that the decision to enter into this role must be made nationally.

Chapter 2.4.2.4 Protection of personal information

[6] CEER Advice on the take-off of a demand response electricity market with smart meters (Ref: C11-RMF-36-03)
[7] CEER Advice on the take-off of a demand response electricity market with smart meters (Ref: C11-RMF-36-03).

As has already been said above, CEER recognises that information sharing is one key factor when considering customers´ trust in the market. Sharing data is important, but it has to be done from the customer perspective. CEER would strongly recommend that the draft report take the following into account regarding protection of personal information and customer control of metering data:

It is always the customer that chooses in which way metering data shall be used and by whom, with the exception of metering data required to fulfil regulated duties and within the national market model. The principle should be that the party requesting information shall state what information is needed, with what frequency and will then obtain the customer's approval for this. Full transparency on existing customer data should be the general principle. For instance, when a service provider is in charge of information on the customer's voltage quality the customer should in this case be able to a) know that this data exists, and b) receive information on the explicit data. This information could be subject to a reasonable fee.[8]

Chapter 2.4.2.5 Protection of vulnerable consumers

The EU Member States choose, for respectable and various reasons, to support vulnerable customers in different ways, some by explicitly taking care of them within energy regulations, others by incorporating them in the regulation of the social welfare systems or a combination of both options. CEER therefore suggests the following change, underlined, in this sentence:
"In the light of the on-going work in the Citizen's Energy Forum's Vulnerable Consumer Working Group and of the development of an energy policy for consumers, we can observe here that additional protective measures for vulnerable consumers are justified; in fact, a basis already exists in the framework of the internal market for electricity (EC, 2009c; EC, 2010a):" <u>This does not hinder Member States for protecting vulnerable customers through the regulation of social welfare systems, or through specific measures or a combination of both option.</u>

Chapter 3 Need for an adequate range of intermediaries

General comment: From the customer point of view it is important to understand what a future scenario would look like, in light of the different intermediaries presented in the draft report. CEER would therefore suggest adding a figure, possibly after Figure 4, with the consumer in the centre, and then showing all the possible contract relations between the consumer and the intermediaries by names: supplier etc, not just one (as in Figure 4).

Chapter 3.5 Recommendations to achieve an adequate range of intermediaries

(1) **Licensing scheme**: The draft report states that "Currently, there is already a similar scheme for suppliers so that any actor willing to provide supply services must fulfil certain predefined conditions, which are recognised by the attribution of a license".

The existence of licenses for suppliers varies across Member states. CEER would therefore suggest the following addition:
"… <u>in some EU countries</u> there is already a similar scheme for suppliers …"

[8] Final Guidelines of Good Practice on Regulatory Aspects of Smart Metering for Electricity and Gas (Ref: E10-RMF-29-05, February 2011), recommendation E/G 1

(2) **Disaggregated billing**: CEER believes that the customer should have easy access to comprehensive data on his/her consumption and cost. However, the customer might not want to receive this information only through the bill, especially when frequency of billing is annual. The customer must be able to choose from different communication channels and frequency of information. CEER would therefore suggest the following addition:

”The obligation to provide disaggregated billing information frequently enough for intermediaries who provide a bundle of services may facilitate the comparison of offers from different intermediaries.

(3) **Non-discriminatory access to data**: The draft report states that “there is the need to ensure a non-discriminatory access to data for the different intermediaries. For instance, regulation could enforce mandatory information sharing regarding the regulated services with all market players and prohibit information transfer from the regulated activity to the deregulated activity, so that an integrated DSO would not have an information advantage compared to other intermediaries.”

CEER recognises that information sharing is one key factor when considering customers´ reliability in the market. Sharing data is important, but it has to be done with the customer in the driver seat. CEER would strongly recommend that the draft report take the following into account regarding customer control of metering data:

As already mentioned in chapter 2.4.2.4, it is always the customer that chooses in which way metering data shall be used and by whom, with the exception of metering data required to fulfil regulated duties and within the national market model. The principle should be that the party requesting information shall state what information is needed, with what frequency and will then obtain the customer’s approval for this. Full transparency on existing customer data should be the general principle. For instance, when a service provider is in charge of information on the customer’s voltage quality the customer should in this case be able to a) know that this data exists, and b) receive information on the explicit data. This information could be subject to a reasonable fee.

Due to the importance of reliability, CEER would suggest the following addition:
“Moreover, there is the need to ensure a non-discriminatory access to data for the different intermediaries, after consumer consent.

(4) **Independent dispute resolution mechanisms**: CEER recommends the following improvements for an effective Alternative Dispute Resolution (ADR)[9]:

1. ADR bodies must work to ensure customers know this tool is available to assist them by communicating widely on the availability of ADR;
2. Customers should contact the trader in the first instance when they have a complaint. ADR should be used if the trader/customer cannot resolve the complaint;
3. The independence and integrity of the ADR body should be ensured, to promote customers’ trust in the process. The ADR body’s funding should be transparent;

[9] CEER Position Paper on the Commission proposal Directive on Consumer ADR, COM(2011) 793, 12 March 2012

4. The branding of ADR bodies and any trader complaint handling and complaints services should be distinct and not create any confusion for customers;
5. It is important to ensure ADR systems operate efficiently and provide value for money; and
6. Where a trader is part of a vertically-integrated company, relevant authorities should monitor closely whether this affects customers‟ rights and market competition market.

CEER suggests that these six aspects are added in the draft report.

Chapter 5.2 Recommendations

The draft report states that ”Before intervention at any level is to be considered, well-functioning markets can already provide some elements needed for the transition to active demand response”. CEER recognises that well-functioning markets need cost-reflective prerequisites, among which the absence of non-conflicting end-user prise regulation is one. Since that is closely linked to the efficient development of demand response schemes, CEER suggest that this is highlighted in chapter 5.2.

Furthermore, CEER welcomes that guidance in the form of *good practice codes* can be developed.

The draft report suggests that *“transparency rules for contracts and billing information* should be developed. National authorities must ensure that consumers have access to disaggregated billing information when demand response is bundled with other service offers to allow them to evaluate the performance of their contract selection and to compare it with other contracts on the market”.

CEER supports the customers´ right to access to disaggregated data, and we would especially like to stress that having access to data a) does not necessarily mean that it must be presented only on the bill, the customer may prefer to have it on a customised website for example, and b) is not automatically the same thing as easily available or possible to understand - simplicity is sought and must be emphasised. In this regard, European Regulators issued the following recommendations[10]:

> **Information on actual consumption and costs, on a monthly basis, free of charge:** This recommendation only covers information, not billing. We believe that the customer (as well as those that both generate and consume electricity) should be properly informed - at least once a month - of actual electricity consumption and costs. This information should be free of charge. This enables the customer to regulate electricity consumption. With *remote data reading* through smart meters, information should be easily available and should be transmitted monthly to the relevant market actor.
>
> When communicating with the customer, the service provider should offer a choice of different channels to provide this information for free (e.g. sms, internet, call centre). Service providers need to take into account other means of communication such as paper. This could be offered at a reasonable fee. Vulnerable customers will need to

[10] GGP on Regulatory Aspects of Smart Metering for Electricity and Gas. Ref: E10-RMF-29-05

be especially taken into account. We do not state in this report which service provider should provide this information. The information must be presented in a customer-friendly way, bearing in mind that customers' understanding of the electricity market is key for their confidence and active participation.

Access to information on consumption and cost data on customer demand:
On demand, the customer (as well as those that both generate and consume electricity) should be able to access information on his/her up to date consumption and injection data and costs. When communicating with the customer, the service provider should offer a choice of different channels to provide this information for free (e.g. sms, internet, call centre). Service providers need to take into account other means of communication such as paper. This could be offered at a reasonable fee. Vulnerable customers will need to be especially taken into account. Concerning historical data, customers as well as those that both generate and consume electricity should have access to data at a frequency set nationally, free of charge.

CEER suggest revising the following in the draft report:

"Transparency rules for contracts, billing, consumption and cost information should be developed. National authorities must ensure that consumers have easy access to disaggregated billing information when demand response is bundled with other service offers to allow them to evaluate the performance of their contract selection and to compare it with other contracts on the market. When communicating with the customer, the service provider should offer a choice of different channels to provide this information for free (e.g. sms, internet, call centre). Service providers need to take into account other means of communication such as paper."

Concerning the need for new *alternative dispute resolution mechanisms*, we have already stated the following above:

1. ADR bodies must work to ensure customers know this tool is available to assist them by communicating widely on the availability of ADR;
2. Customers should contact the trader in the first instance when they have a complaint. ADR should be used if the trader/customer cannot resolve the complaint;
3. The independence and integrity of the ADR body should be ensured, to promote customers' trust in the process. The ADR body's funding should be transparent;
4. The branding of ADR bodies and any trader complaint handling and complaints services should be distinct and not create any confusion for customers;
5. It is important to ensure ADR systems operate efficiently and provide value for money; and
6. Where a trader is part of a vertically-integrated company, relevant authorities should monitor closely whether this affects customers‟ rights and market competition market.

Concerning the national need for introducing *new consumer protection measures*, CEER recognises that some countries may already have these measures in place (through data protection regulation, etc.). CEER therefore suggests adding the following:
"Fourth, national authorities should be required to investigate the need to introduce new consumer protection measures – to ensure adequate levels of data protection as well as to set up default schemes and if deemed necessary additional protection for vulnerable customers."

Concerning the *licensing conditions*, CEER recognises that some countries have licenses for suppliers, other do not. Before deciding on a mandatory licensing system, the benefits for the customers need to be investigated. How do countries that have a licensing system monitor the behaviour of the supplier? How common is it that a license is retracted due to bad behaviour? What are the criteria for receiving a licence? How much trust can a customer put in a once licensed supplier? What are the costs for administration? Etc. CEER therefore suggests that the paragraph is changed to reflect the need for analysis.

Concerning *disaggregated data,* please see previous page.

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THINK

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