GEODE FACT SHEET

Enabling Demand Response:

A DSO perspective on customers' readiness, ability and willingness to engage

Introduction

The European energy system is going through a major transition. Large amounts of variable wind and solar generation are being introduced to the market. While, at the same time, customers are increasingly using more and more electricity which is impacting almost every sector, from transport to heating and beyond. And, while more renewable power is beneficial to the climate, it's starting to create production, balancing and consumption challenges in the electricity system.

One way to manage these challenges, with limited DSO grid investment, is to engage customers in demand response - adapting their energy usage to the availability of the power in the energy system. Such demand response activities are mostly performed by large industrial energy customers, however, new technologies and market-based solutions are emerging to allow residential customers to also become active players in the market.

Yet, while a lot of attention has been paid to the technical aspects that enable active customers, why is there less focus on the human side of the issue? Why do some customers become active? Why do many not? What kind of regulation is needed in order to encourage customers to be more active?

In this factsheet, as the local distribution grid is the customers' gateway to the market, GEODE highlights these questions from a DSO[1] perspective.

POLICY & REGULATORY REQUIREMENTS

- Encourage an active dialogue between the DSO and the customer. This is key to enabling demand response engagement.
- Promote cooperation between DSOs and aggregators. The aggregator is an important facilitator for involving customers in demand response activities.
- Regulatory incentives for the DSO to procure flexibility services. There is not an active customer without an active DSO.
- Encourage standardisation that enables demand response.
- Ensure the data privacy and avoid cybersecurity leaks.

[1] Distribution System Operator.

The Active Customer and Demand Response

According to the Electricity Directive[2], an active customer is defined as *"a final customer, or a group of jointly acting final customers, who consumes, or stores electricity generated within its premises located within confined boundaries or, where permitted by a Member State, within other premises, or who sells self-generated electricity or participates in flexibility or energy efficiency schemes, provided that those activities do not constitute its primary commercial or professional activity."*

The same Directive defines demand response as "the change of electricity load by final customers from their normal or current consumption patterns in response to market signals, including in response to time-variable electricity prices or incentive payments, or in response to the acceptance of the final customer's bid to sell demand reduction or increase at a price in an organised market."

It's clear then that active customers are at the core of the energy transition. Without active customers, demand response can't progress. Without demand response, there can't be a flexible energy system that integrates more and more distributed renewable energy sources.

Regulation Must Encourage Demand Response

Article 32 of the EU Electricity Directive states as follows:

"Member States shall provide the necessary regulatory framework to allow and provide incentives to DSOs to procure flexibility services including congestion management."

Despite this Directive provision, national regulation on DSOs and flexibility services are underdeveloped in many Member States, especially when it comes to incentives. With more renewable energy production being connected to the distributed grid and the electrification of the energy system, network congestion needs to be addressed through a market-based approach. This development must be supported within the regulatory framework for DSOs with investments in demand response services completed in step with grid reinforcements, in a cost-efficient way.

Regulatory policy is also important, but it must be matched with company policy and business development with regulation encouraging interaction between DSOs and customers so policy can be turned into action.

The Active Customer Today

While the number of active energy customers in Europe has increased substantially over the past number of years, there are still significant differences between the Member States when it comes to demand response. As such, although there has been a progressive deployment of smart meter technology and evidence of demand response activity across all customer segments, most activity was from large industrial customers.

As for residential customers, they have been found to be controlling and optimising self-consumption in combination with local generation (usually solar energy) while limiting interaction with the energy

[2] Directive (EU) 2019/944

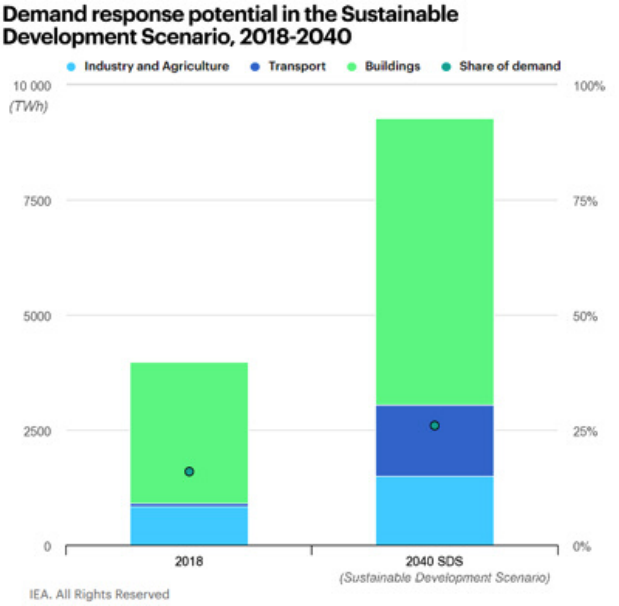
system. According to a recent report from smartEn[3], the countries with the highest volume and number of active customers are France, Germany, and the UK. However, when it comes to reaping the rewards of being an active customer, only active customers in Sweden and the UK can benefit from the system and this is due to more advanced developments in market solutions.

Source: *smartEn, Map on Prosumers - 2020*

Flexibility is still very limited in most European countries, although untapped potential exists on a global level.

Due to various market and technological barriers, the flexibility markets of Europe are in most cases only available to large industrial consumers.

According to IEA´s Sustainable Development Scenario, the global potential for demand response could reach around 10.000 TWh in 2040, with the highest potential found in buildings.[4]



Source: IEA, *Demand response potential in the Sustainable Development Scenario, 2018-2040*

Active Customers – Ability and Willingness

Smart meters are the starting point that give customers the ***ability*** to be active. They are closely followed by key technological "smart appliances," such as EV chargers, water heaters or heat-pumps, all integrating ICT. New technology is also being developed to upgrade and make conventional appliances smarter and able to communicate data more effectively.

In addition, suppliers of this technology put today a lot of effort into developing solutions that are easy for customers to use. These solutions are often "plug and play" and with the right technology, customers can procure the ***ability*** to be active very easily.

However, having the ***ability*** doesn't necessarily mean that customers are ***willing*** to be active. Willingness implies some sort of incentive, which will encourage abled customers to use their flexibility at the right time. Such incentives could be:

- Monetary
- Climate and environmental
- Interest in technology

[3] smartEn, *Map on Prosumers - 2020,* https://smarten.eu/wp-content/uploads/2020/12/the_smarten_map_2020_DIGITAL.pdf

[4] IEA, *Demand response potential in the Sustainable Development Scenario, 2018-2040,* https://www.iea.org/data-and-statistics/charts/demand-response-potential-in-the-sustainable-development-scenario-2018-2040

But are ability and incentives enough to make customers active? Unfortunately, not always. Experience shows that electricity is not a high interest product for most customers. Many customers have little interest or knowledge of their electricity costs. In fact, to enable customers to act on the incentives given, they need to be convinced of the benefits of engaging in demand response. Another pivotal aspect to consider is that all customers should be able to engage in demand response activities without having them interfere with their everyday life. In this respect, DSOs play an important role in enabling active customer engagement, as the natural link between the energy market and the customer. Not least, the DSOs need to gain the trust of their customers as a neutral market facilitator that enables them to act on the flexibility market.

Challenges for Active Customer Engagement

The DSOs and their active customers, together with regulatory authorities, are the enablers of the energy transition and are therefore creating the future customer experience. The success of demand response is strongly dependent on active customers' acceptance and engagement, but there are some barriers to be removed.

Missing transparency and information

Demand response is a new offering which requires customers to invest or change their behaviour. Thus, whether it be monetary or value based, a transparent business case is necessary. There might also be risks involved which may cause uncertainty around security of supply, investment, or personal data. However, without a clear understanding and the possibility for transparent calculation, flexibility might only become utilised by only a small circle of technology interested individuals, or centrally managed collective action in the form of energy communities.

Therefore, there is the need for well-defined, tailor-made products based on the needs and wishes of the customers. The products must provide value and be easy to understand and utilise. An active dialogue between the DSO and the customer is key for such an understanding.

Promoting technology and standardisation

To ensure customer adoption, the technology should be easy to install and use, for instance, it should come with a "plug and play" connection and excellent customer service and support. Standardised interfaces, components, data standards and data portals with transparent security and privacy measures are also key. However, today, the required digital infrastructures are still under development, along with efforts to standardise. Couple this with missing information, in conjunction with uncertainty around cybersecurity and GDPR, and there are serious barriers that must be overcome to improve customer engagement.

Missing smart system integration

A smart device can often be a gateway for customers to engage with demand response services. For instance, a solar energy installation can be connected to energy storage or an electric vehicle can be coupled with a charging station, and so on. However, missing intelligent grid infrastructure or even insufficient grid reinforcement could hinder a customer from purchasing a smart device.

Thus, new roles must be created now with qualified employees ready to handle these new challenges. It's also important that information on the status of the grid as well as usage data are available to all parties, thereby enabling optimalisation of power flows. This must be done in a transparent, secure and GDPR-compliant manner.

While active DSOs engaging in smart system integration is a prerequisite for enabling active customers, regulatory incentives are important to facilitate such development. There must be benefits for DSOs when choosing a demand response solution for a local energy system challenge that traditionally could have been solved with more grid reinforcement. DSO regulation in many Member States tends to favour grid investments over demand response projects. From a regulatory perspective, these two options for grid development need to be equally competitive.

Active Customers Require Active DSOs

Active customers require active DSOs. As the energy system becomes more distributed, decentralised, and unpredictable, DSOs need to adapt their operations to the daily life of the customer in a way that guaranties customer satisfaction. This interaction needs to be market based and on a voluntary basis.

Aggregators are also crucial as they can trade customers' flexibility, making them an important market actor for developing a flexible energy system. Active cooperation between DSOs and the aggregator is crucial for active customers.

Additionally, the relationship between DSOs and customers in tomorrow's energy landscape needs to be digital and highly automated. Anything less will seed the makings of a subpar customer journey and cause friction between customers and the electricity market. To combat this, policy and regulation need to be enacted that will enable DSOs to open active and easy dialogue with its customers.