



Empowering consumers

NAVIGATING THE CHALLENGES
IN THE ELECTRICITY SECTOR
TRANSFORMATION

Why do we need more engaged consumers in the electricity sector?

The electricity sector is currently undergoing a transformative change driven by decarbonisation, decentralisation and digitalisation. **Electricity is increasingly generated by renewable, weather-dependent power plants**, such as wind farms and solar PV installations, which are often smaller than the traditional power plants of the past and more distributed. Meanwhile, an increasing number of **consumers are expected to rely on electricity to heat their homes and charge their vehicles**, leading to a more intense and variable demand for electricity.

In this context, **the secure and efficient operation of the electricity system is increasingly under stress**. Greater flexibility is needed to ensure that injections of electricity into the grid are balanced with withdrawals from the grid, avoiding imbalances that may ultimately lead to a black-out. Similarly, **greater flexibility is needed** to ensure possible grid congestion is properly managed.

Electricity producers are therefore being called on to adapt and adjust the output of their power plants to the needs of the system. However, actions taken by producers will hardly be sufficient in the electricity system of the future.



In this scenario, the electricity consumption can no longer be taken for granted, regardless of what the conditions of the system are. **In the future, consumers may not have access anymore to all the kWh they want, any time they want, at the same price.** On the contrary, they will have to compromise on some of those dimensions, be it in the amount of energy consumed, the time of consumption, or its price.

At the same time, the emergence of markets where flexible consumption is valued will pave the way for new opportunities. **Consumers may have more space to express their preferences and possibly benefit,** also in monetary terms, **from responding to the needs of the electricity grid** by adjusting their consumption.

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Consumers, both large and small, will have to do their part and contribute to a more flexible system that can deal with an increasingly weather-dependent generation mix.

Why consumer engagement in the provision of flexibility can be a challenge?

While the case for consumer engagement in flexibility markets is clear from the point of view of the electricity system, **several barriers exist** which may prevent consumers from performing a larger role in those markets.



BEHAVIOURAL BARRIERS

Many **consumers often** do not know how energy markets work and **lack information about the role they could play** in them. This is even more the case with regard to the flexibility markets that have emerged only recently.

This lack of awareness is often compounded by a **lack of skills necessary to process information** on energy markets. Many consumers, particularly households and small businesses, struggle to grasp the benefits of flexibility markets and how their daily habits influence their energy use. The complexity of electricity bills and pricing can add to the confusion. This lack of understanding **discourages the exploration and adoption of new practices**, even when it would be rational to do that. Misinformation breeds misconceptions about energy usage and costs, deterring informed decision-making.

Finally, **consumers tend to stick with familiar choices**, even if better options exist. The effort required by any change and the emotional attachment to current solutions reinforce this bias. Trust in institutions also plays a role, impacting willingness to embrace change.



ECONOMIC BARRIERS

The economic benefits of offering flexibility are not always obvious for the individual consumer. **Costs may be larger than gains** due to a limited demand for flexibility by the operators of the electricity system, the impossibility to stack revenues from different markets, intense competition from larger flexibility providers, or the need to invest in dedicated devices that can generate only small amounts of flexibility.

Engaging in flexibility markets can also be a risky activity. Consumers can be obliged to invest and give up freedom in their energy consumption but may not get sufficient certainty about the return on their investment. Such risks can discourage some consumers altogether from entering in the markets for flexibility.

The way flexibility markets are set up can pose additional hurdles. **Burdensome and time-consuming procedures** can reduce the convenience of participation for consumers able to offer only small amounts of flexibility. A gap between the market price of flexibility and the cost borne by the consumers offering it can emerge and lead to a **rational decision of giving up.**

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Consumers are usually unaware of the benefits potentially deriving from their participation in markets for flexibility.



LEGAL BARRIERS

Laws and regulation can exclude, intentionally or unintentionally, some consumers, especially households and small businesses, from participating fully in flexibility markets, even when it would make economic sense for them to do so.

Legislators and regulators have often introduced limits and requirements that consumers cannot satisfy and that lead to their **exclusion from flexibility markets**.

When not explicitly excluded by laws and regulation, consumers may still have a reduced incentive to engage in flexibility markets due to **contrasting incentives set by regulation**, as it can be the case with network tariffs that hinder the adoption and use of new technologies for demand response, such as home batteries and vehicle to grid solutions.

In a similar way, certain rules that aim at consumer protection may have the unintended consequence of hampering the involvement of consumers in the emerging markets. Rules about contracts and data privacy can be examples in this regard. Finally, the **lack of dedicated rules mandating data transparency and interoperability** leaves some obstacles to consumer engagement unaddressed.

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Laws and regulation have been frequently designed having in mind the traditional providers of energy and flexibility, that is the classical centralised power plants with tens or hundreds MW of capacity.



TECHNICAL BARRIERS

Without an adequate mix of hardware and software in place, consumers are unable to play an active role in electricity markets and even more so in markets for flexibility. While technology is normally available, challenges in infrastructure deployment and **technical constraints exist**.

Smart meters and telecommunication networks are needed to measure the effective consumption of electricity by consumers over small time intervals and share that information with the market intermediaries and system operators. Without those meters and networks, it is impossible to assess how much flexibility consumers have delivered over time and compute how much they should be paid.

Barriers exist also with regard to the needed software. Complex interactions and closed digital systems obstruct data exchange, limiting innovative business models that rely on the data from several consumer devices to work. To provide flexibility without causing significant inconvenience to consumers, devices such as **home digital assistants, electric vehicles and heat pumps must be able to share data and be interoperable**, so that their functioning can be smoothly coordinated.

Complex and not interoperable protocols, architectures and different data setups only add to the confusion. It's like speaking different languages without a translator.

How can we foster consumer engagement?

Consumer engagement is a multi-step and multi-dimensional challenge. To navigate the barriers outlined above and enhance engagement in flexibility markets, proactive strategies and collaborative efforts are essential. By implementing targeted solutions and fostering a supportive environment, stakeholders can empower consumers to actively participate in shaping the future of energy consumption.



RECOMMENDATIONS TO ADDRESS BEHAVIOURAL BARRIERS

Unlocking the potential of flexibility markets in electricity means understanding how these markets affect consumers. Different groups of consumers have unique needs and behaviour, shaping how they engage with energy. Effective engagement strategies should align with evolving customer dynamics.

Therefore, **continuous learning about preferences** is key, aided by technology that tracks energy usage.

Awareness campaigns play a vital role in informing consumers about energy options, considering their specific needs and knowledge level. Clear communication about benefits and risks is essential, **helping consumers make informed choices without feeling overwhelmed.** Feedback on implemented actions empowers consumers to contribute to energy sustainability, building trust in the process.



RECOMMENDATIONS TO ADDRESS ECONOMIC BARRIERS

Unlocking the full potential of flexibility in electricity markets is a growing economic opportunity.

Overcoming barriers means maximising the value of flexibility for different stakeholders. Solutions include **supporting value stacking, reducing entry costs** (for instance, by fostering the deployment of new devices like smart meters) and **ensuring interoperability of electrical devices**.

Consumers should be able to choose an intermediary who facilitates their participation in flexibility markets independently of their energy retailers. This possibility enables consumers to **tailor their choices according to their needs and preferences**, fostering a more dynamic and responsive energy market.

In addressing **market and product design**, the focus lies on two critical aspects. Firstly, the reduction of administrative costs and the enhancement of data sharing mechanisms. Secondly, the necessity of clear product definitions and harmonisation to ensure seamless engagement and interoperability within flexibility markets.

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Through measures like default participation and transparent communication, consumers can overcome inertia and earn trust toward market actors.



RECOMMENDATIONS TO ADDRESS LEGAL BARRIERS

To unleash the full potential of electricity flexibility markets, it is crucial to overcome legal barriers to market entry while promoting healthy competition and empowering consumers.

Fair pricing mechanisms and safeguards against market manipulation ensure protection from volatile wholesale prices. Transparent, flexible energy contracts with clear termination clauses empower consumers to make informed choices.

Prioritising privacy and data protection, alongside streamlined regulations, fosters trust and compliance. **Harmonisation and interoperability** drive innovation, facilitating seamless integration of demand response solutions.

Digitalisation, supported by regulatory actions, incentivises system operators to embrace innovative solutions for grid management that rely on flexible consumption instead of the traditional physical expansion of the grid. Data access and interoperability requirements can ensure seamless data exchange that facilitates the emergence of new business models.



RECOMMENDATIONS TO ADDRESS TECHNICAL BARRIERS

To allow energy providers to identify and manage real-time variations in energy demand, **smart meters need to be deployed**. However, transparent consent from consumers to implement data sharing is essential, alongside **unified interfaces and industry standards for compatibility**. Energy intermediaries can offer support and training to improve participation, particularly for smaller customers. **Open-source solutions foster integration and transparency**, benefiting platform enhancement through community involvement.

To encourage consumers to participate in flexibility markets, it is important to provide **user-friendly and accessible platforms** that allow them to monitor and control their energy use. Completely automating some technical processes can also make consumers' life easier.





ONE NETWORK FOR EUROPE

The scope of OneNet is to create a fully replicable and scalable architecture that enables the whole European electrical system to operate as a single system in which a variety of markets allows the universal participation of stakeholders regardless of their physical location – at every level from small consumer to large producers.

OneNet is funded through the EU's eighth Framework Programme Horizon 2020, "TSO – DSO Consumer: Largescale demonstrations of innovative grid services through demand response, storage and small-scale (RES) generation" and responds to the call "Building a low-carbon, climate resilient future (LC)".

72 PARTNERS
23 COUNTRIES
28 MILLION EUROS
3 YEARS

3 PILLARS

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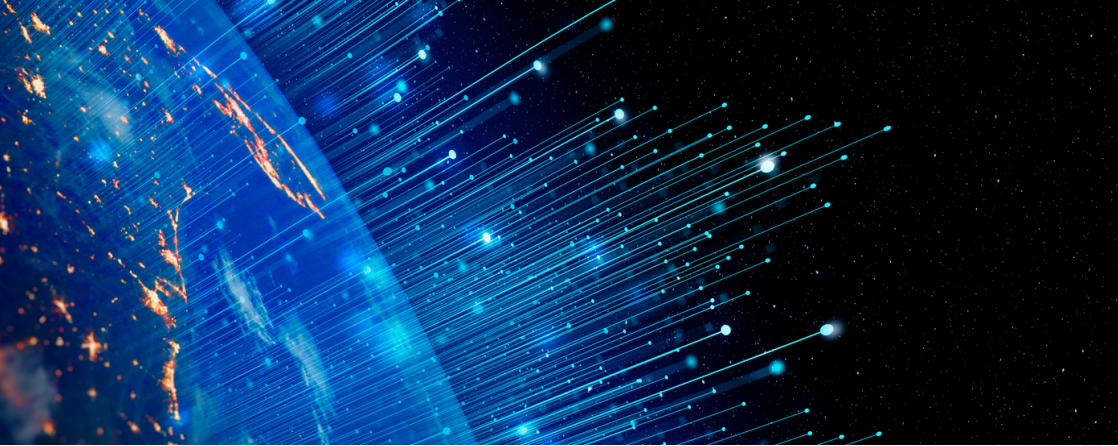
**DEFINITION OF A
COMMON MARKET
DESIGN FOR EUROPE**

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**DEFINITION OF
COMMON IT
ARCHITECTURES
AND INTERFACES**

3

**VERIFICATION OF
THE SOLUTIONS
IN LARGE FIELDS
TESTS**



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