smartEn
Smart Energy Europe

Supported by: THE smarter EUROPE

ACHIEVING COST-EFFECTIVE DECARBONISATION: TARGET AND MEASURES TO UNLOCK DISTRIBUTED FLEXIBILITY

smartEn Position Paper March 2021

Smart Energy Europe
Rue d'Arlon 63-67,
BE-1040 Brussels

+32 (0) 2 58 88 992
info@smarten.eu
www.smarten.eu

Introduction

The European Green Deal aims for a fundamental transformation of Europe's economy. As Commission President von der Leyen described, it represents nothing less than Europe's 'man on the moon' moment.

The clean energy transition is at the core of this process. The decarbonisation should be achieved cost-effectively and while maintaining stable electricity supplies for everyone. The best use of demand-side flexibility will be essential.

With growing shares of variable renewable energy supplies, the requirements for flexible capacity are going to increase, while fossil-fuel based dispatchable generation capacity will become increasingly unattractive due to the imperative need to decarbonise.

Demand-side flexibility is an accessible and competitive resource to meet the new requirements. Demand-side solutions can both bridge the gaps when wind or solar power are not producing enough electricity to meet regular consumption, and absorb electricity when renewable output exceeds regular use.

The case is even more pronounced with the growing electrification of transport, heating, and industrial processes. While the uptake of electric vehicles and electric heating systems increase the need for flexible power system management, they also offer enormous new potentials for demand-side flexibility – especially at the local level where system constraints need to be managed.

According to the European Commission's Impact Assessment for the European Clean Energy Package, the use of Demand-Side Flexibility could save Europe up to €5.6 billion annually, thanks to avoided costs for back-up generation, grid reinforcements and fuels.

As an important step towards realising this potential, the European Clean Energy Package grants demand-side flexibility solutions access to all energy markets and mechanisms. In this position paper, we assume that Member States will soon have made the most of this Package to implement it nationally so as to effectively open all markets, in particular to demand response through aggregation[1]. Yet, **even when the package is completely implemented, the flexibility potentials will be fully unlocked only if their full value is actually reflected in the market**. Currently, this is not the case as many distortive mechanisms and path-dependencies remain, including those that are hampering effective price-signals for flexibility.

With the present Position Paper, smartEn aims to outline much-needed new policy options to overcome market failures and fully valorise distributed flexibility in the European electricity markets.

[1] Member States are lagging behind the implementation of key provisions for demand-side flexibility as highlighted in smartEn monitoring report https://smarten.eu/wp-content/uploads/2020/11/FINAL_smartEn-EMD-implementation-monitoring-report.pdf (November 2020)

1. An effective market framework

An effective market framework is a pre-condition to enable flexibility in the European energy system. Three elements are essential in this context:

- an ambitious Climate and Energy Framework and its consequent implementation,
- the consequent opening of all markets,
- and the removal of distortive effects and mechanisms.

An ambitious Climate and Energy Framework

Along with the implementation of the "Do no significant harm principle"[2], **a meaningful carbon price that is fully consistent with Europe's overarching climate objectives is the most central driver in this direction.** For technologies and solutions whose investment costs and path-dependencies are particularly high, it may have to continue to be complemented by specific transitioning policies, while minimising distortive effects on the market signals.

Concretely, such a climate and energy policy framework would affect investments and incentives for demand-side flexibility solutions in different ways:

a. Conventional **polluting electricity generation assets would be pushed out of the market**, making space for innovative and clean flexibility solutions like demand-side flexibility.
b. The uptake of **electrification in heating, transport and industry** would not only boost the potential for demand-side flexibility, but it would also increase the need to make use of these distributed flexibility options to manage the system integration of electric vehicles and electricity-driven heating systems. A forward-looking climate and energy policy would ensure that a rollout of these technologies is done smartly so that vehicle charging points, buildings and devices have the capability to interact with the electricity system (see also the smartEn position papers on Electric Vehicles, Industry and Buildings).
c. The enforced **roll-out of variable renewable energy technologies** will naturally lead to higher price-variability on the markets, boosting the value of flexibility.

Consequent opening of all existing and new markets

The European Clean Energy Package, and in particular the revised Electricity Directive and Electricity Regulation, call for the consequent opening of all markets and mechanisms for decentralised energy resources and demand response. The full implementation of these requirements will be the foundation for demand-side flexibility to be realised. **This includes product definitions and market entrance conditions, access for new types of service providers, relevant data access and much more**.

[2] https://ec.europa.eu/info/sites/info/files/c2021_1054_en.pdf

Crucially, this also concerns the **adjustment of incentive structures for system operators to procure system services and congestion management via flexibility markets** to finally enable all available solutions to participate. The creation and opening of these markets represent an important revenue stream for demand-side flexibility, while unlocking the most cost-effective solutions for an efficient and robust system management.

Overcoming distortive mechanisms

Beyond the thorough implementation of existing legislation, an effective market framework would also need to overcome existing inefficient and distortive mechanisms and inherent barriers. These include the following elements the European policy frameworks and regulation should tackle as a priority:

- **price caps** at wholesale and retail level;
- blunting effects from **ill-designed and allocated taxes and charges**
- **historical overcapacities**, often reinforced through badly designed capacity mechanisms;
- regulated **system operation measures that favour conventional solutions** over demand-side flexibility;
- **badly designed renewable energy support mechanisms,** such as net-metering, that discourage market participants from providing flexibility;
- **inaccessibility of energy price signals** (both short term and long term) for market participants;
- crucially, **inherent path-dependencies** that favour existing solutions over innovative solutions, due to upfront investment costs, customer acquisition or other barriers.

If all these barriers were removed, the true value of flexibility could be expected to show in the markets and hedging products would develop, driving a strong natural uptake of demand-side flexibility as a highly competitive resource.

However, given the specific role of stable and reliable electricity supplies for Europe's society and economy as a public good, a complete removal of government-led market interventions is unlikely and even undesirable. Conversely, if market actors wait and count on government measures, the natural evolution of effective market-price signals and hedging for flexibility solutions will always be hampered.

Based on these considerations, an effective European market design should strive to come as close as possible to reflecting the real value of electricity and flexibility by removing the abovementioned barriers. Where this is not possible in a socially acceptable, competitive, and environmentally sustainable matter, interventions should be tailored to compensate for their existence.

2. Filling the gaps

Various measures have been considered to overcome the missing money problem for energy and flexibility. The present Position Paper lists some of them to tackle barriers to flexibility in different manners and timeframes.

Crucially, any of these measures should complement the above-mentioned opening and creation of markets – including for system services and congestion management - and cannot replace them.

a) A minimum DSF target of 10% of peak demand by 2030 in all Member States

While the European Union, national governments and regions are exploring and developing different tools for the deployment of demand-side flexibility, its emergence across the continent must not be delayed.

Within the context of Europe's climate and energy targets for 2030 to be formulated in the forthcoming Fit for 55 package (expected in June 2021), Europe should consider the introduction of a binding national demand-side flexibility target to help kick-start the uptake of demand-side flexibility across Europe.

smartEn recommends including this target formulation in the forthcoming revision of the Renewables Directive to accompany and support the achievement of an increased renewables target for 2030. Enshrining in EU law a target for demand-side flexibility would give political visibility to the contribution of demand-side flexibility to the cost-effective penetration of more variable renewables in the system.

Binding national targets have proved successful in various European policy areas, for example in the field of renewable energy. Such target would help market participants and governments gain experience with the availability and reliability of demand-side flexibility and pave the way for its further competitive deployment for cost-effective and robust energy system. It would also give important investment signals to market participants and kick-start the process of market development across Europe, while allowing Member States to implement measures tailored to their national circumstances.

smartEn recommends a minimum target for demand-side flexibility of at least 10% of peak demand by 2030, to be applied in each Member State.
A roadmap with milestones should be set by national governments to clarify how to achieve the 2030 target starting from a minimum reduction of 5% of peak demand through demand-side flexibility in 2025.

For the US market, it has been estimated that a demand-side flexibility capacity of 20% of US peak load by 2030 would be cost-effective and could even be worth more than $15 billion annually in avoided system costs.[3]

[3] Brattle 2019: 2019 Utility Demand Response Market Snapshot. https://sepapower.org/resource/2019-utility-demand-response-market-snapshot/

Unfortunately, research for Europe is still limited for the quantification of system efficiency improvements following the activation of demand-side flexibility, but figures for Europe could be expected to be similar.[4]
The Impact Assessment by the European Commission to support the proposal for a revised Renewables Directive could be a short-term opportunity to fill this gap and investigate this potential.

Such 2030 target should be achieved through the activation of demand-side flexibility in all end-use sectors, including smart and active buildings, electric vehicles through smart charging and industrial sites capable of adjusting their energy consumption to external signals.
Specifically, the activation of the so-called "non dedicated assets" should be prioritised to profit of the distributed flexibility of resources already deployed in the system (e.g. HVAC systems in our buildings, already electrified industrial processes and electric vehicles in parking lots and garages) to avoid additional investments and resources.

A target for demand-side flexibility would ensure a no-regrets option to start developing and adapting markets and mechanisms for a more efficient, more affordable, and cleaner energy system in Europe.

b) Dedicated products

Dedicated products for demand-side flexibility can be an effective interim measure to unlock innovative solutions and lead them to the market. Such dedicated products for system services can be implemented fast until a level playing field and non-discriminatory access to all markets are ensured.
A first step towards this approach has been implemented in Germany to ramp up industrial demand response through an interruptability scheme ("Abschaltbare Lasten") that consist of 1500 MW and allows the participation of assets from 5 MW size, or the aggregation of smaller assets to reach 5MW.

The 2021 revision of the Energy and Environmental State aid guidelines (EEAG) should define an enabling framework for these dedicated products to be shaped at national level.

[4] For the US, a demand-side flexibility of 20% of estimated peak load is considered economically attractive as discussed above. Similar research is missing for Europe, but the European Commission found in its Impact Assessment for the European Clean Energy Package from 2016, that the potential for Demand Response in Europe today is at 100GW, raising to 160 GW in 2030. As also mentioned by Commissioner Simson at smartEn Symposium on 17 November 2020, avoided investments at distribution level thanks to the procurement of distributed flexibility can be of the order of up to €5 billion per year up to 2030 (https://ec.europa.eu/commission/commissioners/2019-2024/simson/announcements/speech-commissioner-simson-smart-energy-europe-smarten-online-symposium_en)

c) White certificates for system efficiency

Following decades of positive experience in the United States, EU policymakers introduced Energy Savings Obligation Schemes (ESOS) in Europe through the Energy Efficiency Directive to advance energy efficiency among final energy consumers. Some Member States have adopted these schemes.

The current EU framework foresees an obligation on energy suppliers to achieve 0.8% savings/year among their clients through energy efficiency improvements. A White Certificate is attributed to obligated parties that have successfully achieved the target.

smartEn values the potential of these existing schemes and recommends either expanding its current scope or set up a specific framework for demand-side flexibility that would be similar, but separate from the ESOS. The objective would be to value and promote "dynamic" savings resulting from flexible electricity consumption. ESOS should evolve from their current scope on "static" savings and by doing that would contribute to increasing system efficiency by making demand more flexible.

According to this proposed scheme, both implicit (price-driven at retail level) and explicit (incentive-driven through the support of aggregators) demand-side flexibility should be fostered:

- Through the uptake of dynamic price contracts among their clients, suppliers, the obligated parties, should be able to obtain White Certificates if their customers' flexible load enables a certain amount (calculated in MWh) of savings or shifting/year,
- Aggregators should be also entitled to receive White Certificates based on the distributed flexibility (MWh) they can deliver at relevant moments[5]. Then obligated parties, i. e. suppliers, would purchase these certificates from aggregators to fulfil their annual obligation.

The revised Energy Efficiency Directive would offer the near-term opportunity to enshrine this new scheme in EU laws to support the application of the Energy Efficiency First principle at system level and boost the market development of distributed flexibility.

d) Reliability options

The abovementioned lack of incentives for market participants to invest in hedging could be overcome by making hedging mandatory, depending on the participants' requirements and needs.

[5] A Pay-for-Performance (P4P) scheme could be applied to compensate market parties (energy service providers and aggregators) able to achieve savings/shifting among end-users by activating their demand-side flexibility. The EU-funded project "Sensei" is applying the US Pay-for-Performance scheme in Europe https://senseih2020.eu/

One example of mandatory hedging was described by Pöyry (now Afry) in their concept of Reliability Options (Pöyry, 2014). According to this concept, reliability options form a contract between capacity providers (e. g. aggregators) and (ultimately) customers. Each time the reference price rises above the contract strike price, the seller pays the buyer for the difference. Sellers of reliability options would benefit from an upfront payment, while buyers benefit from security of supply and reduced exposure to price spikes.

Such options represent a hybrid between a physical commitment and a commercial option: the physical commitment delivers security of supply to the consumer and a supplementary revenue stream to deliver 'missing money' to the provider of flexibility. In parallel, the commercial option protects customers from scarcity prices in the spot markets and allows capacity providers to hedge price volatility.

Reliability options are consistent with the Electricity Market Design and provide an outlet for a market-based solution to protecting energy consumers from price spikes and systems failure, while revealing value of flexibility. It would also allow governments to overcome several of the existing distortive market interventions for security of supply. Removing these price distorting interventions would unlock the potential for flexibility.

The 2021 revision of the State Aid Guideline could offer the near-term opportunity to temporarily introduce this mechanism as a mandatory, regulatory scheme with a limited balance responsibility, price caps and bidding restrictions. It would be an alternative to traditional capacity mechanisms and present a market-based approach to unlocking demand-side flexibility based on price signals.

Conclusions

Climate neutrality must be achieved in the most cost-efficient way. Key is to leverage resources that can easily and quickly support a more variable energy system in the most cost-effective way. Distributed flexibility will be essential to run a system that is increasingly based on variable renewable energy sources.
However, the current energy market framework is characterised by a multitude of regulatory measures and inherent path-dependencies that hamper effective price signals and revenue options for demand-side flexibility and flexibility options at large.

In this context, no-regret options should be implemented without delay. These include an ambitious and effective climate and energy policy framework and its consequent implementation, as well as the full transposition of the European Clean Energy Package with the introduction and opening of market-based approaches for all flexibility solutions and their providers.

However, as evidence in most Member States show, these measures are likely not going to be sufficient to leverage the flexibility options necessary for the clean energy transition in the next years. The time is now to implement additional measures to overcome existing and structural barriers as presented in this paper:

- a **binding minimum national target for demand-side flexibility of at least 10% of peak demand by 2030**. While this is far below the optimal level of demand-side flexibility, such a minimum target would kick-start the process of market development across Europe,
- **dedicated products for demand-side flexibility** to unlock innovative solutions and lead new solutions to the market.
- **White Certificates** to value and promote "dynamic" savings resulting from a flexible consumption.
- **Reliability options** to make hedging mandatory, depending on the participants' requirements and needs.

This publication is possible thanks to the support of The smarter E Europe

"Creating a new energy world" – that's the goal of The smarter E Europe, the continent's largest platform for the energy industry. In this new energy world, electricity and heat are generated decentrally from renewable energies. The share of volatile electricity continues to grow due to the new deployment of photovoltaic installations and wind power sites. How renewable energies can be better integrated into our distribution grids is therefore one of the most important questions of the energy transition, to which The smarter E Europe provides answers.

The focus is on cross-sector solutions linking electricity, heating and transportation for an intelligent and sustainable energy supply. The topics comprise all the core areas along the supply chain – from the generation, storage, distribution and usage of electricity and heat to sector coupling.

The smarter E Europe brings together a total of four exhibitions to give energy industry players from around the world a comprehensive overview of the latest developments and trends. All of the events will take place from July 21 - 23, 2021, at Messe München:

- Intersolar Europe – The world's leading exhibition for the solar industry
- ees Europe – The continent's largest and most international exhibition for batteries and energy storage systems
- Power2Drive Europe – The international exhibition for charging infrastructure and e-mobility
- EM-Power Europe – The international exhibition for energy management and integrated energy solutions.

The smarter E Europe is organized by Solar Promotion GmbH and Freiburg Wirtschaft Touristik und Messe GmbH & Co. KG (FWTM). www.TheSmarterE.de

About smartEn - Smart Energy Europe

smartEn is the European business association integrating the consumer-driven solutions of the clean energy transition. We create opportunities for every company, building and car to support an increasingly renewable energy system. Our membership consists of the following companies:

The positions expressed in this document represent the views of smartEn as an association, but not necessarily the opinion of each specific smartEn member.
For further information about smartEn, please visit www.smarten.eu