CEDEC

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A European Electricity Market Design Fit for the Energy Transition

CEDEC Position Paper

Key Points

- The integration of European intra-day and balancing markets needs to be accelerated with a swift implementation of the network codes and increased dialogues and cooperation across national borders.
- A strong European Emission Trading Scheme is central to drive innovative and low-carbon investments in the energy sector, a strengthening of the ETS post-2020 should therefore be a priority.
- At the interface between markets and networks, the special role of Distribution System Operators (DSOs) needs to be recognised and supported with the provision of a toolbox, that allows them to neutrally facilitate the market while managing the grid, ensuring security of supply.
- DSOs should be – as it is the case in most Member States today – responsible for data management and communication. For this, they need a secure, reliable and fit-for-purpose data communication infrastructure.
- Data protection and consumer privacy are of utmost importance to ensure a smooth market functioning and consumer trust. DSOs, as regulated and neutral parties, are best placed to ensure this.
- To enable the necessary flexibility in an evolving energy market, demand sources must have equal market access as supply resources and have access to markets (forward, day-ahead, intra-day and balancing markets) to offer their services, provided they fulfil the criteria needed for these sometimes very specific markets.
- The roles and responsibilities of all market parties need to be clearly defined in a flexibility market design, for smooth functioning and security of supply.
- The elaboration of a traffic light concept is an important tool to ensure markets can function optimally, as long as possible, while defining tools for network operators to ensure grid stability and system functioning in case of critical situations of congestion.
- Prosumers shall be supported by stable, transparent and enabling regulatory frameworks and should carry responsibilities (i.e. for balancing) according to their means.
- Prosumers should bear network costs reflecting the services they receive from the public infrastructure, ensuring a fair allocation of costs between all consumer groups.

- To allow DSOs to recover their costs, a larger capacity component in the network tariffs should be introduced in distribution tariffs, reflecting the services provided by the DSOs.
- Greater and structured cooperation between Transmission System Operators (TSOs) and DSOs is needed for an optimal system planning and operation.
- Capacity remuneration mechanisms (CRMs) – if rightly designed and implemented - can provide the incentives to keep the necessary generation capacity available and stimulate investments in capacities and flexibility options to ensure security of supply.
- The right CRM design is crucial to avoid inefficient solutions and the lock-in of inflexible and the most polluting power plants.

Introduction

Europe's energy systems are in transition. Overall, generation from conventional, large-scale central power plants with transport by traditional energy networks, is increasingly replaced with small-scale, distributed plants with a variable production, facilitated by smartened energy networks. This development is the result of Europe's ambitious energy and climate agenda, as well as its strategy for energy security, and has been agreed by all Member States.
Now, it is time to reflect on how European energy markets, while integrating into a single internal energy market, need to evolve to accommodate these changes and to guarantee the well-functioning of the markets in the short-term. The affordability for consumer should be brought in line with the energy transition towards a sustainable and less import-dependent European energy system, while incentivizing sufficient long-term investments that contribute to a high level of security of supply.
CEDEC believes that the particular challenge for a new market design is to make it fit for consumers to become actively involved with the aid of emerging technologies, be it via high shares of (self-generated and variable) renewable energy, storage and demand-side technologies, and allowing for a fair competition with conventional sources and traditional suppliers. For this, a level playing field between established and new market actors is needed that allocates equal rights and responsibilities.

Integration of European markets and the integration of RES

An energy system with rising shares of variable renewables needs to be more flexible, responding on short-term supply variations. To enable this, more energy to balance these variations needs to be available in the short-term, on intra-day as well as balancing and ancillary services markets. At the same time, the more integrated these markets are across European national borders, the more liquidity will increase and competitiveness will be achieved. A lot of progress has been made in the integration of European forward energy markets and especially on a regional level, with initiatives such as the Pentalateral Forum and Nord Pool, which are **important steps towards an integrated European-wide market.**
While forward energy trading across European borders has become a reality, evermore important intra-day and balancing markets are still largely national. To speed up the integration and better

functioning of intra-day markets, the **European network codes must be adopted and implemented on national level as quickly as possible**.

To support the (early) implementation on Member State level, some stakeholder groups already exist (AESAG, BSG), but it is important to establish a permanent and efficient European structure for all network codes & guidelines involving all stakeholders, including Distribution System Operators (DSOs). ACER and ENTSO-E are working together to set up this structure around a number of Stakeholder Committees that will not only interact on EU level, but will need to have important exchanges with national and/or regional structures in the Member States.

Emission Trading Scheme

The European Emission Trading Scheme (ETS) is a central instrument the European energy transition, intended **to drive investments in sustainable and innovative low-carbon technologies, such as renewable energy, energy efficiency and demand-side technologies.** The current low carbon price, caused by the large oversupply of carbon allowances in the market, does not incentivise these investments. The introduction of a Market Stability Reserve is therefore a welcomed step to stabilise the system by making it **more resistant to external shocks, such as the recent economic crisis, and by– albeit slowly - reducing the current oversupply of allowances.**

Nevertheless, a further strengthening of the ETS for the period post-2020 is crucial to restore the carbon price as a key-driver for the energy transition. In the reform process, it will be crucial to ensure a fair effort sharing between all Member States and all sectors for the attainment of the 40% emission reduction target by 2030, giving no opportunities for free-riding. Free allocation of allowances in the electricity sector (i.e. district heating and cooling and highly efficient cogeneration) should be continued but not provide incentives to increase emissions. Instead they should be based on efficiency benchmarks that provide incentives for reductions in greenhouse gas emissions and for energy efficient techniques. A revision should be based on a transparent methodology and in cooperation with all involved stakeholders. Evidence should be provided by studies for every industry sector concerned, reflecting the technology progress. A review of benchmarks should be undertaken every five years to provide predictability and minimising administrative efforts.

DSOs as neutral market facilitators

As supply is becoming increasingly distributed with small units producing energy close to the consumers and often even on their roofs, the balancing of demand and supply becomes an increasingly local issue and has considerable impacts on the local grids. Congestions may occur at times of high feed- in of electricity and low demand and when not closely monitored might lead to grid instabilities and black-outs in the most extreme cases. In managing these processes, Distribution System Operators are taking an ever-more important role. They are managing the bi-directional electricity flows and step to establish continuously the demand-supply balance to ensure the highest level of security of supply, at all times.

Several instruments are being developed by the DSOs for dealing with non-steerable, locally generated power – local storage systems, smart charging of electric vehicles, flexible tariffs to support flexibility providers, etc. All off these need accurate data and reliable data communication systems to ensure the DSOs' mission critical activities and guarantee for the consumers an uninterrupted supply of high quality.

The emergence of new activities, actors and markets at local level address an **even more active grid manager and market facilitator role for DSOs.** Accordingly, the regulatory framework for DSOs should enhance their toolbox to perform their roles, and ensure adequate remuneration mechanisms in order to promote innovative investments.

Data Management, Data Communications and Privacy & Security

As mentioned above, DSOs are at the core of supporting the transformation, connecting distributed energy resources and empowering consumers to take a more active part in the energy system, for example, through smart meters in those Member States where a positive cost benefit analysis (CBA) justified the roll-out of smart meters and a decision for implementation has been taken.

To maintain a high quality of supply in this dynamic environment, DSOs will have to monitor their grid at all voltage levels. The progressive roll-out of smart meters (where applicable), the automation of the grid and the deployment of sensors will produce large quantities of data, which will have to be managed in an efficient way. DSOs have a long experience in data management; they are in most countries responsible of managing the data flows from meters at consumption and generation sites, in order to ensure the secure and reliable grid functioning, they are neutral facilitators of the market at the same time. [1]

By collecting, validating, processing and providing the data in a secure, efficient and non-discriminatory way on (de)-centralised data hubs to authorized market parties (i.e. suppliers, commercial demand aggregation service providers, etc.) they facilitate the market trading flexibility from all sources and opening up new business opportunities for market players. **As highly regulated entities, with a non-commercial intent, they are best placed to ensure a level-playing field for the competing commercial parties.**

It is clear that for many consumers and market parties the importance of the availability of data is critical, just like data privacy and data security. For this DSOs need to have a data communication system in place that reflects the mission critical importance of it with more specific requirements than the normal telecom operators could deliver. As the market can only work when it is trusted by

[1] For a detailed explanation of data types, please refer to the Annex.

its users, therefore security and privacy of data is of utmost importance. Trust can best be obtained via a neutral, non-commercial party like the DSO. For this reason, many DSOs have taken the initiative to take an active part in the data privacy debate and develop rules for secure communications.[2] The rules for data communication are notwithstanding the fact that the ownership of the data lies with the consumer. Therefore any data can only be provided to third parties with an explicit agreement of the consumer.

Enabling a market design for flexibility

As the energy system is transitioning towards more sustainable supply sources, the shares of renewable sources are rising. Often, these sources are distributed, meaning they are producing in smaller quantities, close to consumption centres, such as micro-CHP, PV and wind energy. Their production is often variable, due to changing weather condition. In consequence flexible resources that can adjust generation and demand to variable renewable energies are necessary. Therefore incentives for investments in flexible generation capacity and **the development of flexibility options for demand will be essential.** Moreover, digitalisation will also play an important role here, given that it providing the foundation for efficiently controlling, automating and optimizing energy production, distribution and consumption.

Supply and Demand on an equal foot

Not only energy supply is becoming more variable but the emergence of new technologies such as smart grids and the digitalization of processes and appliances also make energy demand more flexible. While the flexibility potential on the household level is still by large unknown and more complicated to tap into, many industrial and commercial processes offer some flexibility that can be levered. In order to react to sudden changes in supply from i.e. generation from wind and sun, these flexible loads can be used. **To incentivise a flexible behaviour, also demand sources must have access to markets (forward, day-ahead, intra-day and balancing markets) to offer their services, provided they fulfil the criteria needed for these sometimes very specific markets.** Next to access to markets, tariffs can also be a right mean to incentivise flexible behaviour, especially at household level.

Clear definition of roles and responsibilities of all market actors

The number of electricity generators has been growing rapidly over the past years especially with the deployment of decentralized renewable energy installations. Simultaneously, new business models have been created around the provision of energy services, especially aggregators that offer demand response services to consumers. In order for all market actors to be able to compete on a level

[2] https://www.encs.eu/

playing field while ensuring a smooth market functioning, the roles and responsibilities of each need to be clearly defined.

The issue of **balancing responsibility** has been an issue for RES generators and has been regulated in the environment and energy state aid guidelines by the European Commission. On the demand-side, the issue is less clear for new market actors, such as aggregators, who currently in several national regulations do not have to be clearly linked to a balancing responsible party. In the recent report of the Taskforce Smart Grids, Expert Group 3,[3] it has been recommended to ensure the balancing responsibility in a connection point in order to avoid gaps and overlaps in the balancing responsibility of different actors with whom contracts exist (for example supplier and aggregator) that might be active on a single connection point (be it a consumer or a generator).

Related to this issue are also the **financial adjustments** that are necessary when several parties are active on the same connection point and source flexibility for selling it on energy markets. Any party experiencing an unfair financial disadvantage caused through the action of another party that intervenes in an existing contractual relationship, needs to be adequately reimbursed for this (for example a BRP through the intervention of an aggregator). This requires the management of the data related to this point by the same entity, the DSO. However, an alternative could be separate meters and thus separate balancing responsibilities on a connection point for activities by different actors (supplier and aggregation service provider).

In this context, it is also important to clarify who is responsible for the volumes which are taken at a later time after the activation of flexibility . In general, after an activation of flexibility, especially industry customers will take more energy than forecasted at a later time to recover the production which could not be produced due to the activation of flexibility. At present in most member states, the balancing responsible party (BRP) has to bear costs and risks of these volumes. Causing this imbalance due to the intervention , an aggregation service provider should also be responsible for any volumes which were taken at a later time due to a previous activation of flexibility.

Flexibility and the interaction of grids and markets

As outlined above the reliable functioning of energy markets especially on short-term, is playing an increasingly important role. However, the reliable functioning of energy networks and therewith energy security remain the top priority for energy consumers and is a pre-requisite for the trust in energy markets. Therefore, it is crucial that standards and processes between the parties (aggregation service providers, suppliers, BRPs, DSOs and TSOs) are installed. [4]

If local imbalances of demand and supply occur that would seriously endanger grid stability and security of supply, the DSOs managing the grid operations must have the right for priority access to

[3] Full report available here: https://ec.europa.eu/energy/sites/ener/files/documents/EG3%20Final%20-%20January%202015.pdf

[4] For more some more detailed work on this see ongoing work of Expert Group 3, Task Force Smart Grids

any kind of flexibility, both from generation and demand, as well as the interruption of market processes in case of severe threats for grid instability. This intervention in the market needs to be **part of their regulated toolbox** as their core task of providing security of energy supply is in general public interest and goes beyond particular commercial interest. A **clear set of rules,** therefore needs to be elaborated, which ensures that markets can operate freely as long as the grid stability is ensured and that allows DSOs to intervene and use flexibility services for grid purposes when necessary.

The **traffic light concept** provides a clear and transparent framework to steer interaction between smart markets and smart grids while enabling also flexible national solutions, depending on specific situations. The traffic light concept defines the grid/market interaction rules corresponding to the green, yellow and red state (eg. "green": market is fully operating, no interaction, "yellow": emerging grid constraints, DSO - market interaction according rules to be defined, "red": imminent grid stability/security of supply issue: DSO intervention overriding market functioning). Introduction of a traffic light concept would not only increase transparency but also support fair competition in future markets. The concept refers to the use of flexibility in general and the corresponding execution. [5]

Prosumers

In some Member States, a considerable amount of citizens have started to produce their own energy on-site, i.e. with solar panels on their roof or micro-CHP in their backyards. These prosumers also consume the energy produced and therefore buy less electricity from their suppliers and might even be in the position to sell excess energy at certain times of the day.

Stable and transparent regulatory frameworks: All consumers must have easy access to self-production and self- consumption without any administrative or operational barriers. **Fair allocation of costs:** In the current market design, prosumers who buy less energy from external suppliers, pay considerably less network charges (as well as taxes and levies), which are mostly volume-based. However, prosumers also use the public grid, as they feed- in their excess energy and are still dependent on the supply infrastructure at certain times as back-up. With mostly volume-based network tariffs, the result is a revenue gap for network companies and a shift of costs to other consumers – through the socialisation principle. In this regard, a shift to a larger capacity component in network tariffs, reflecting the actual cost and provided services of the grid seems to be an appropriate step in order to achieve fairer allocation of costs. However, due to other policy objectives, such as energy efficiency, which may be more incentivised through volume-based tariff systems (depending on the weight of the network tariff component on a consumer's end bill), hybrid tariff structures as well as alternative energy efficiency incentives should be assessed.

[5] In the green phase, the market can perform flexibility services freely. In the yellow phase, flexibility is used as a contractual option, based on a contractual agreed payment. In the red phase flexibilities are also used – but without payments (option would be here to build up a regulatory framework which foresees payments based on the national provisions and rules).

In general, tariff setting and cost-allocation principles such as cost-reflectiveness, need to be identified and steps need to be taken to reach transparency on tariff and cost elements.

Equal responsibilities for all market participants: While the market rules should be adapted to respond to changing generation, especially also of decentralized production units with variable sources, all market participants shall carry equal responsibilities (i.e. balancing responsibility) in the market, according to their means. Smaller household consumers traditionally pass this obligation on to their (service) suppliers.

Incentivize smart grid deployment: Prosumers do not only want to be more independent in their energy consumption but also want to seize the economic benefits of self-production and self-consumption. For this, the deployment of smart grids and in some cases smart meters is a necessity in order to transmit price signals and enable prosumers to react to flexibility signals by adapting their consumption to their own production and selling or buying energy to and from the market.

Coordination between DSOs and TSOs

With increasing generation and flexible loads on the distribution networks and an improved toolbox for DSOs to manage their grids and facilitate the market, **the traditional relationship between DSOs and TSOs is challenged and needs to be re-defined**. In order to respond to this challenge, an active cooperation and coordination between DSOs and TSOs is required. This cooperation needs at least to be focused on following domains: system planning, system operation and data exchange.

System planning was in the past a rather straight forward process, with centralised generation and steadily growing demand, however, variable decentralized generation and demand side response will make this process less obvious. Coordination regarding system planning will need to be increased and can start with the exchange of information concerning developments on the respective networks. Exchange on a regular basis of elementary electrical models of the networks could be a starting point. Exchange of evolution of demand and generation might also be useful.

Furthermore, DSOs and TSOs should exchange on regular basis information on available network capacity at the DSO-TSO connection (facilitating integration of distributed generation and consumer connection).

Regarding system operation, responsibilities of the DSOs and the TSOs have to be clear. Each system operator should be responsible for operational security and the quality of supply of its own network, and interacts with the grid users connected to its networks. Notwithstanding the necessity for coordination, DSOs will collect data from grid users connected to their networks (consumers, generators and other DSOs), and provide them to the TSO, where necessary. Because the TSO's operational security and the demand response capabilities of grid users depend on fast reaction times for ancillary services, fast communication links and fast analysis and control capabilities present an important challenge to the DSO-TSO cooperation.

Data exchange between DSOs and TSOs will have to be improved. In the different stages, namely planning, operation and also in emergency, it concerns information on the respective 'observability' area of the DSO and the TSO. The idea is that all system operators share an overview of the situation of their system in an aggregated way. The information exchange concerns i.e. data for medium-term or long-term purposes (planning and connection requests), technical data for market operation: energy, ancillary services, capacity market, data for coordinated operation and control of the networks, close to real-time. This improved data exchange should avoid the situations in which the TSO increases demand or decreases generation in the DSO network in a DSO congested area.

On a European level, a formal dialogue between TSO and DSO associations with the participation of the European Commission has been started and needs to be continued. TSO and associations representing DSOs, signed a Memorandum of Understanding to enhance cooperation and started a series of workshops to tackle above mentioned topics.

Security of supply and capacity remunerations mechanisms

Due to the current challenges in energy markets and the necessity to guarantee security of supply in the long-term, recently several European Member States have been discussing or have already introduced various form of capacity remuneration mechanisms (CRMs) on their national territories. The European Commission has recently launched a sector inquiry about some of these schemes, investigating their compliance with the European Environmental and Energy State Aid Guidelines (EEAG).

EU-wide security of supply assessment

In its communication on the Energy Union, the European Commission announced to undertake European-wide, fact-based security of supply assessments which take not only national generation capacities but also cross-border flows, variable RES generation, demand response and storage capacities into account.

CEDEC agrees that security of supply assessments on an at least regional scale are more cost-efficient and are therefore preferable to purely national approaches. Moreover, security of supply assessment should have **the evolution of electricity demand in the coming years as a starting point:** Europe´s current energy efficiency policies in place, the electricity demand in the coming years is supposed to slightly decline in the coming years. Demographical changes, regional development, and other developments such as decentralisation of energy supply and demand, will play a role and should be carefully assessed as part of the general exercise.

Regional assessments will point to the need for sufficient interconnection capacity, which is absolutely crucial in the completion of an integrated market for energy. An efficient use of smart infrastructure, both on cross-border transmission level and distribution level, combined with demand-response mechanisms, may decrease the need for additional generation capacity. **It is therefore crucial that in the assessment the contributions of all resources, on the supply and demand side, are considered. Equally important, the assessment of different design options should carefully consider the link between capacity remuneration and the integration of different flexibility options in energy markets, both necessary for future fit energy markets.**

Design of capacity remuneration mechanisms

If Member States decide to introduce capacity remuneration mechanisms of some sort on their national territory, they not only have to guarantee the security of supply, also some general principles, as elaborated in the European State Aid Guidelines, must be guarded. CRMs should be market-based when fully implemented and stimulate innovations. Moreover, CRMs should be **open for capacity from neighbouring countries**, where sufficient interconnection exists.

Moreover, when introduced by Member States, capacity remuneration mechanisms should **not contribute to a lock-in of inflexible and the most polluting generation capacity.** Against the background of the overarching European climate and energy targets, generation adequacy measures should facilitate the market participation of flexible technologies which can fill in at times of low supply (e. g. highly-efficient and flexible CHP plants, power storage, programmable renewable power generation and demand-side management programs).

Capacity Remuneration Mechanisms – if rightly designed and implemented - can incentivise the necessary investments in resource adequacy (both supply and demand side instruments) and innovation to guarantee security of supply in the coming decades.

As one example, decentralized CRMs can not only incentivize necessary investments to guarantee security of supply but also incentivize the use of flexibility options. In an energy market with an increasing share of variable renewable energy, conventional power plants will still be needed for the years to come in order to guarantee security of supply at all times. Nevertheless, it is necessary for the fleet of power plants to become more flexible. Many traditional power plants can be flexibly operated or they can be modified to run more flexibly, which reduces the must-run capacity of conventional power plants and reduces emissions. However, modifying these plants requires a secure and stable framework for substantial investments.

Decentralised CRMs can provide a revenue stream for these measures since the mechanism compensates for providing guaranteed and flexible capacities, also from distributed resources, including renewable energy installations, storage facilities and demand side flexibilities. Comparably, industry customers need a predictable revenue stream for their investments e.g. into load management technologies, which enable them to flexibly reduce their demand and contribute to the security of supply. In a CRM, load management reduces the industry's demand for guaranteed capacity and consequently their costs, while contributing to fewer emissions.

Annex

The data managed by the DSO consist of various data:

a) Metering Point Administration (This database contains technical information about the supply of electricity to each address (capacity, limitations, contractual agreements, etc.))
b) Supplier switching (this database contains contractual information that is exchanged between the new and former supplier, and the DSO, with the latter acting as a neutral interface, checking and validating the switching).
c) Consumer metering data for billing and customer awareness purposes (This is a database to store and provide consumer metering data, stored with due regard to the privacy rights, and commercial information protection).
d) Data on planning, operation and forecasting (Today DSOs use data to support their core business processes: energy losses supervision and control, planning, connection, access and operation. This data is key to allow DSO monitoring their networks.)
e) Data on allocation & reconciliation (As there is, today, no possibility to know in real-time who uses electricity, the electricity consumed by households is estimated on the basis of a "profile". Within a certain amount of time (generally several months with a traditional meter), data from households become available. The difference between the amount estimated during the allocation process and the actual amount measured is known after the reconciliation process.
f) Settlement (this is data on the process of comparing the quantity of energy that an electricity supplier has put on the network with the amount that their customers have consumed.)

Who is CEDEC?

CEDEC represents the interests of more than 1500 local and regional energy companies – mostly having local and regional authorities as their shareholders – serving 85 million electricity and gas customers & connections.

These predominantly small- and medium-sized local and regional energy companies are active as:

- Electricity and heat generators,
- Electricity, gas and heat distribution grid & metering operators
- Energy (services) suppliers.

By employing ca. 350.000 people and investing in local infrastructure, these companies make a significant contribution to local and regional sustainable economic development. Together they have an annual turnover of €120 billion. Local and regional energy companies provide services which are reliable, sustainable and close to the consumer.