European Distribution System Operators for Smart Grids

Response to Commission Questionnaire on Energy Storage

September 2018

Q1: Why does the energy system need energy storage?

Europe's energy system is fundamentally changing due to various interconnected developments, including the electrification of the energy system, digitisation, more decentralised generation and multi-directional power flows. While the whole energy system moves towards more electrification, the deployment of intermittent renewable energy sources is drastically increasing. About 90% of renewables are connected to the distribution grid and their volatility poses on the one hand a challenge to network operators and on the other hand provides opportunity for them to use renewables, together with DSR and storage, as flexibility sources. As the energy system takes up higher shares of variable renewables, storage technologies will be an essential source of flexibility in the power system – next to demand response – in ensuring security of supply and cost-efficient system operation. We appreciate the fact that DSOs should be allowed to own and operate storage devices under certain circumstances. Regarding the main barriers for the further deployment of energy storage, we believe that administrative and operations procedures are designed for generation units and do not take into account the technical particularities of batteries.

At the same time, the demand side is changing as well with the uptake of electric vehicles, heat pumps and other smart appliances. Electrification of transport and energy efficiency measures are both opportunities and challenges for the operation of the energy system. Next to demand response, mature and emerging storage technologies are set to provide the flexibility needed to achieve our decarbonisation goals.

In order to deal with these major trends, DSOs need to actively manage their networks and use new tools. Flexibility is crucial in this regard, serving different purposes such as congestion management, load balancing, contingency grid support, investment deferral or shifting investment to another place in the grid, voltage control, among others. The different flexibility options are as diverse as the purposes they serve. Storage should be considered as a new type of a fully integrated network element. While storage is an important flexibility asset, it is only one of several tools at the disposal of DSOs. Different flexibility solutions include market-based options where flexibility is procured by the DSO from aggregators and other flexibility service providers (FSPs). Moreover, there are technical solutions (e.g. grid reconfiguration by the DSO), solutions based on dynamic distribution tariffs (time of use in energy and capacity terms, for example) or on connection agreements and rules-based solutions. Therefore, we believe DSOs should be allowed to use any sort of technology (including storage devices) to fulfil their tasks. Regulation should be technology-neutral and the aim should be considered (instead of the mean – i.e. technology – of realisation)

While storage is primarily seen as a market activity whose services can be procured by network operators, DSOs should be allowed to own and operate storage devices as part of their network operation task. This precludes engaging in commercial activities, participating in competitive power markets or undermining their price formation. Nonetheless, certain storage devices should be acknowledged as an integrated network component for technical purposes and to ensure the efficient, reliable and secure operation of the distribution system. Technical purposes include for example voltage control, loss reduction and outage prevention. With about 90% of all variable renewable energy sources connected at distribution level, operating the distribution grid is becoming more challenging. Storage services are a key part of the new active DSOs' 'toolkit' to assist DSOs to operate and better plan their networks. The amendments put forward by the Council and the European Parliament on Art. 36 of the Proposal for a Directive on common rules for the internal market in

electricity (recast) is therefore seen as a valuable addition to the Commission's initial proposal; nevertheless, the proposed amendments are still restrictive considering actual needs. The final proposal should serve to trigger an efficient and effective use of storage by all parties (even in nascent scenarios with immature markets).

Q2: What are the barriers (regulatory, fiscal, economic, technical) in the deployment of energy storage?

The cost of storage is still high; nevertheless, the storage market is quickly growing, and costs are continuously decreasing. For example, prices of household batteries have decreased by ~50% since 2013. Nevertheless, for DSOs, the main barriers to using storage as a tool to manage their networks are of a regulatory nature.

The current low electricity market prices constitute a challenge for storage technologies. Constant low prices pose a high risk to the profitability. Certainty over the long-term remuneration received by storage projects is essential to carry out the necessary investments. This will be of particular importance in a market context where generation technologies would have very low marginal operating costs, and thus day-ahead markets might progressively lose their prominence in favor of long-term price signals.

Another challenge for storage development is to find the optimal location. To solve the possible local problems of the power network, storage devices should be located in a distributed way throughout the distribution network. This configuration makes the investments of agents other than the DSOs more difficult; DSOs are the natural experts as well as the main responsible party of the most appropriate configuration, technical implementation and system operation of power grids. This favours their key role in the development of storage devices for the management of the grid.

Also, from a technical point of view, most of the administrative and operation procedures are designed for generation units, and don't consider the technical particularities of batteries. Basically, to make the participation of batteries more attractive in the provision of services, they should have the following key characteristics:

- The minimum services duration should be 0,5-1 hour.
- To include a mechanism for battery SoC (State of Charge) adjustment (this is a fundamental aspect as batteries have a limited capacity).
- To provide bonus for fast and accurate response (e.g.: fast dynamic response of less than 1 second).

The finalisation of the EC position (Clean Energy Package) on electricity storage is essential to boost storage projects and market uptake. According to the latest version, DSOs' use of own storage facilities is limited to situations where the market cannot provide solutions (Art. 36 Electricity Directive). This considerably restricts DSOs' involvement in storage activities. In their role as neutral market facilitators, DSOs support the market uptake of storage because this will greatly benefit the energy system. The procurement of storage services is therefore crucial to system operators. However, as

European energy regulators highlight[1] it is important to "*keep in mind current technical limitations of* ***non-frequency related ancillary services*** *and their geographical limitations (e.g. the ability to supply and or absorb reactive power from distant sources). […] Rather than predefining a prescriptive requirement for market-based procurement for all non-frequency related ancillary services in European-wide legislation, a more suitable approach would be to allow for more local discretion on a case-by-case basis, taking into account different technical and local circumstances."* Only TSOs and DSOs have the whole knowledge about their respective grid and can identify best where local use of storage is beneficial from the technical point of view to ensure reliability and security of supply.

DSOs should therefore also be able to own and efficiently operate storage for the technical management of their grids, ensuring a reliable and stable grid operation, without interfering in the market. The Council's amendments to Art. 36 are a step forward in this regard. DSOs' storage as an integral part of the distribution system should be fully recognised. In addition, there is a need for extending the definition of integrated network components, as proposed by the Council, to technical balancing of networks and preventing local network congestion, crucial to ensure reliability and security of supply. EDSO suggests to change the Council's Definition in Article 2, point 39a like this: *'fully integrated network components' means static network components that are integrated in the transmission or distribution system, including storage facility, and are used for all tasks of transmission and distribution system operators in order to ensure a secure, reliable and efficient operation of their respective transmission or distribution system* ~~*but not for balancing nor congestion management*~~***.***

Q3: Is the regulatory framework sufficient to ensure that markets can deploy storage capacity?

The deployment of storage capacity does not only depend on the regulatory framework but also on the right market conditions. As stated above, storage is not the only flexibility tool. The uptake of storage will depend on its specific use, the availability of other solutions and cost-effectiveness of the different options available.

Cost-effectiveness can depend on regulation as well. For instance, abolishing net metering, shifting from kWh-based to kW-based network tariffs and introducing feed-in network tariffs can improve the business case for home batteries considerably.

Under any circumstances, it must be avoided that regulatory hurdles prevent the use of storage, a technology still developing. This includes the use by system operators that work in a regulated environment. Storage within the fully integrated network components is one area. Another case is if market parties are unwilling or unable to provide cost-effective services, the ownership and operation of storage by regulated actors such as DSOs should be allowed. In any case, investments made earlier by DSOs into energy storage facilities have to be recovered.

As a general rule, the property and operation of any device by DSOs should be considered on their whole lifetime and should take into account positive or negative externalities (e.g. is the device reusable at a different location? Is it environmentally friendly? Does it allow a higher security of

[1] CEER "*Efficient System Operation*" White Paper series (paper # IV) on the European Commission's Clean Energy Proposals 16 June 2017 link

supply? Can a larger investment be deferred? Can it eliminate a potential for sunk costs? Is it faster, cheaper or better for the consumer? etc.). In the short-term, the market value of storage devices (market arbitrage or frequency regulation services) is rather low compared to the service provided to a DSO in which security of supply or investment deferral is involved. The expected level of storage devices that would be needed by a DSO to improve quality of supply as well as increase security of supply is significantly lower than what would be needed to distort wholesale market prices.

The energy transition will require very significant investments from the power sector and consumers in networks but also in clean generation, storage and home appliances. Currently, price signals both for closure of existing plants and investments in new generation are inadequate. Whilst some of the provisions in the Clean Energy Package are likely to increase investor confidence in renewables technologies, the issue of longer-term price signals for investments is not tackled in a holistic way. Key questions remain: Which investment signals and frameworks are needed into clean generation and clean solutions?

Q4: Should the EU do further efforts? What type of actions/policy options should be considered?

The market will be the main driver to develop cost-effective storage solutions. However, DSOs as operators performing key duties for the whole society cannot rely solely on the market to provide the services that are required to ensure the efficient, reliable and secure operation of the electricity network at specific locations within the grid. While DSOs support the market uptake of storage in their role as neutral market facilitators, they must also ensure the highest possible quality and reliability of supply. Consequently, European legislation and national regulation must take this dual role of DSOs into account. For the above-mentioned reasons, the Electricity Directive should enable DSOs to deploy their own grid-scale storage for the technical management of the grid. Besides that, DSOs must be able to choose the most adequate and cost-effective solution to actively manage their grid, including the different options outlined in Q1. This should also include network reinforcements if necessary.

In line with CEER's views[2], the regulatory environment should remove barriers to the pursuit of innovative approaches by DSOs which have the potential to bring savings or benefits to consumers, without foreclosing competition in new activities. Member States and NRAs should provide incentives to DSOs for the operation, development and integration of innovative solutions in the distribution systems. They shall recognise as eligible and include all relevant costs in distribution tariffs and introduce performance targets to incentivise DSOs to implement innovative solutions such as storage.

To this extent, a wide technology-neutral approach on storage is needed. All types of storage will have a role to play and the importance they play will likely increase. As Member States face diverse challenges in their efforts to reach EU targets and to decarbonise their energy systems, it must be ensured that all technology options are open.

[2] CEER - Conclusions Paper on Incentives Schemes for Regulating Distribution System Operators (DSOs), including for innovation 19/02/2018 (link)