High level questions to the Electricity Coordination Group on storage

A Eurelectric response paper

October 2018

Eurelectric represents the interests of the electricity industry in Europe. Our work covers all major issues affecting our sector. Our members represent the electricity industry in over 30 European countries.

We cover the entire industry from electricity generation and markets to distribution networks and customer issues. We also have affiliates active on several other continents and business associates from a wide variety of sectors with a direct interest in the electricity industry.

We stand for

The vision of the European power sector is to enable and sustain:

- A vibrant competitive European economy, reliably powered by clean, carbon-neutral energy
- A smart, energy efficient and truly sustainable society for all citizens of Europe

We are committed to lead a cost-effective energy transition by:

investing in clean power generation and transition-enabling solutions, to reduce emissions and actively pursue efforts to become carbon-neutral well before mid-century, taking into account different starting points and commercial availability of key transition technologies;

transforming the energy system to make it more responsive, resilient and efficient. This includes increased use of renewable energy, digitalisation, demand side response and reinforcement of grids so they can function as platforms and enablers for customers, cities and communities;

accelerating the energy transition in other economic sectors by offering competitive electricity as a transformation tool for transport, heating and industry;

embedding sustainability in all parts of our value chain and take measures to support the transformation of existing assets towards a zero carbon society;

innovating to discover the cutting-edge business models and develop the breakthrough technologies that are indispensable to allow our industry to lead this transition.

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Markets & Investments Committee
Distribution & Market Facilitation Committee
Electrification & Sustainability Committee
WG RES & Storage
WG Hydro
WG Wholesale Market Design & Investment Frameworks
WG Market Integration & Network Codes

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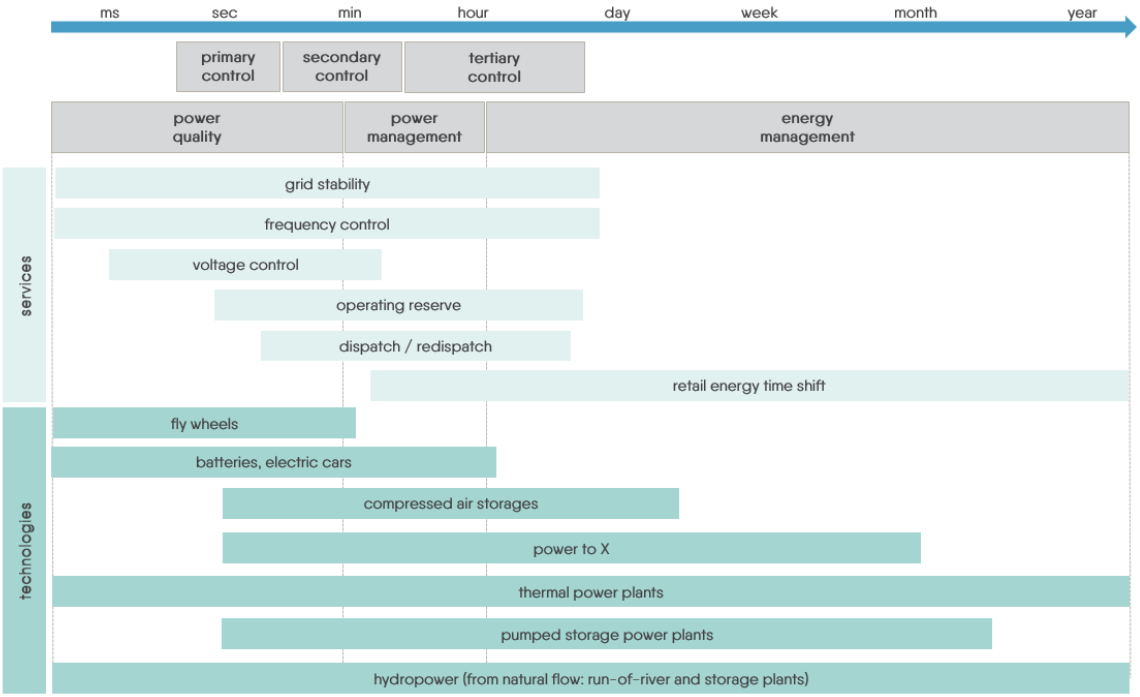
We would like to thank the European Commission for the opportunity to provide our input to this informal feedback round. The present document was established with the kind support and expertise of our members, who were consulted extensively in the course of this work-stream.

1. Why does the energy system need energy storage?

Storage is of paramount importance for the energy system as it can contribute to:

- **Enable a cost-efficient energy transition toward a system with high renewables penetration.** As the power system takes on higher shares of variable RES generation, storage – alongside demand response, generation and interconnection capacities – will be an essential source of flexibility and will contribute to operate the system in a cost-efficient way and to ensure security of supply. **Energy storage may consequently help reducing extreme prices.** A diverse mix of complementary energy storage technologies will help ensure a reliable power grid.

  Different energy storage technologies can take different roles in the power system. A mix of complementary (storage) technologies will be necessary to meet flexibility needs at all timescales (see depiction below).



Source: Eurelectric and VGB 2018

- **Address the challenges of changing demand patterns and increase the system's flexibility.** Electrification of transport, heating & cooling and energy efficiency measures are both opportunities and challenges for the operation of the energy system. Next to demand response, conventional plants and interconnection capacity, mature and emerging storage technologies are set to provide the flexibility needed to achieve our decarbonisation goals.

- **Ensure security of energy supply.** As flexibility provider, storage is a relevant response to address adequacy issues (i.e. insurance value). Moreover, energy storage can respond to changes in supply and demand, while having a cost effective role to play in managing periods of very high electricity demand.

- **Allow the development of new business models and consumer participation.** Storage technologies could transform the way business is done, and the services that market actors

can provide to consumers. With both existing and upcoming storage technologies such as electric vehicles and home batteries, consumers as well as prosumers will be able to play a more active role in providing flexibility to the system.

- Reduce the need for additional interconnection (i.e. system value) and decrease import dependency linked to conventional fuels for power generation. **Storage solutions are of particular importance in the context of the energy transition both for interconnected and for isolated energy systems,** where variable RES penetration can reach very high levels and where demand patterns shift dramatically.

- **Support network operators in fulfilling their tasks more efficiently.** With over 80% of all variable RES connected at distribution level, operating the distribution grid is becoming increasingly challenging. Services provided by decentralized storage are a key part of the new active DSO's 'toolkit' to assist DSOs to operate and better plan their networks and by providing flexibility services to balance the grid.

  When storage is connected to the distribution network the efficiency of storage is maximized because it can solve local constraints as well as provide services to transmission system operators in the form of frequency ancillary services.

2. What are the barriers (regulatory, fiscal, economic, and technical) in the deployment of energy storage?

We identify four types of barriers in the deployment of energy storage.

- First, there are **regulatory barriers** which are mainly due to (see also answer in next section):

  - Lack of precise definitions, very often mixing up electricity and energy storage which could, for certain storage technologies lead to unjustified fees and levies, see also 4th point on fiscal barriers below. For instance, the definitions currently used tend to exclude some technologies, such as hydropower storage plants without the ability to pump as well as flexibility enablers (e.g. demand-response).

  - Various policy barriers with regards to the construction, renovation, upgrade and operation of storage technologies including granting procedures.

- Second, there are **economic barriers**:
  - The low electricity market prices as well as low spreads between peak and off peak prices constitute a challenge for storage technologies
    - Uncertain, low and less volatile electricity prices as well as low price spreads constitute a risk for storage technologies especially because they are used to alleviate the extreme price volatility levels due to their energy usage time shifting, fast-ramping and price arbitrage capabilities. At low electricity prices, during off-peak periods, storage facilities can draw electricity from the grid and store it. During peak periods, the energy accumulated is discharged to provide electricity at higher prices. In the case of time shifting, the electricity is purchased and sold in the day-ahead market while in load following or ramping application the electricity is sold in intra-day or balancing markets. Missing or

low price spreads make the operation of storage facilities unprofitable. For instance, they constitute a high risk to run hydropower pumped storage[1], even though pumped-hydro systems are among the largest available and economically viable large-scale storage technologies to date[2].

    - Even though costs for EV battery packs have fallen by around 80% from 2010-2017, batteries still have a significant cost overall compared to other storage technologies which makes investment decisions more difficult in the current market situation.

  - In the future, adding storage to the system will tend to flatten the electricity price fluctuations. This would have an impact on the storage investments and ability of market players to develop profitable business cases.

- Third, and even if remarkable progress has been made with innovation and research, **technical barriers** still exist. Over time these barriers are gradually being removed as the storage industry is experiencing increasing customer interest, rapidly declining costs and a growing number of companies investing and researching in storage solutions.

- Fourthly, the following **fiscal barriers** can be identified:
  - In many EU countries, double energy taxes on storage must be addressed; indeed electricity is taxed at consumption level. Thus the electricity that is used for the charge of storage is exposed to tax as well as when electricity is extracted from the storage device to the grid.
  - Charging regimes penalising only certain technologies as well as subsidies to specific technologies can lead to market distortions. For instance, double grid fees only apply to operators of pumped storage power plants in some Member States: they have to pay when consuming electricity (Load-charge) as well as when generating electricity (Generator-charge). Double charges do not reflect the complementary benefits of storage to the networks for balancing the wider electricity system. In general, double fees constitute one of the major barriers to investment in new or other energy storage technologies.

A level playing field for all technologies is needed to overcome all types of barriers, as storage and other flexibility assets will become increasingly important. This should also include Power-to-X technologies (such as Power-to-Gas), which can be a way to store renewable energy and to contribute to the flexibility needs and security of supply of energy systems. Those technologies can notably play a key role to deliver flexibility by storing excess of variable renewable power generation, before turning back to electricity for final use. Moreover, further market integration with larger interconnected electricity markets instead of separated electricity markets is necessary to create new potentials for any kind of flexibility products and a level-playing-field for storage facilities in those markets.

[1] This is particularly true when there are only low market spreads, i.e. no difference between peak- and base- or off-peak-prices.

[2] 96% of the storage services world-wide is delivered by pumped-hydro systems (2017).

3. Is the regulatory framework sufficient to ensure that markets can deploy storage capacity?

The current regulatory framework does not seem entirely appropriate to ensure the deployment of storage capacity - where it is needed. There are two specific issues we would like to point out:

- **Roles and responsibilities with regard to storage operation and ownership**
  Energy storage facilities shall be owned, developed, managed or operated by market participants. However, Eurelectric favours a tendering procedure to assess whether in some specific circumstances, DSOs may be allowed to own, develop, manage or operate energy storage facilities. Yet, as a mandatory tendering procedure could be both costly, time consuming and not appropriate for every situation, we propose that DSOs may be allowed to own, develop, manage or operate energy storage facilities only if:

  1) following an assessment of the market against transparent criteria the NRA concludes that no tendering procedure is needed and gives its approval, or

  2) following a tender/market test performed in an open and transparent manner under NRAs' supervision, no parties have expressed interest to own, develop, manage or operate the storage facilities or cannot deliver those services at a reasonable cost. This is a simple adjustment to the normal regulatory process between the DSOs and the NRA and it does not require derogation from EU law.

  In the context of the above, the use of storage facilities by a DSO should not lead to market disturbances (e.g. buy and sell electricity at the DA, ID and balancing market which would have a direct market impact), and whenever more efficient, a market-based solution is preferable. While such flexibility services which can be procured by DSOs should remain a market activity, DSOs may also be allowed to own and operate grid-scale storage facilities in order to secure the technical operation of the grid within the approved regulated activities and within the tendering boundaries as outlined above.

- **Long term investment signals for generation, storage and demand response**
  The energy transition will require very significant investments from the power sector and consumers in networks but also in clean generation, storage, demand response and home appliances. Currently price signals both for closure of existing plants and investments in new generation are inadequate, with insurance values of firm generation capacities and flexible assets not always captured by markets. Whilst some of the provisions in the Clean Energy Package are likely to increase investor's 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 for clean generation and clean solutions? How to ensure that customers/prosumers get the right investment signals for distributed generation and storage? How to ensure a credible investment environment allowing long-term investment decisions for market players in generation, storage and flexibility assets?

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

Without a proper regulatory framework, much of the value of storage will not be utilised. The Clean Energy Package - if well-implemented - will provide a first milestone in the emergence of more flexible generation, storage and demand-response. However, there are further needs for adequate policies and strategies to facilitate a coordinated storage market integration and system operation. The EU should do efforts in order to ensure storage can support the entire value chain with flexibility:

1. **A holistic approach to regulation of all grid connected assets, including storage, must be applied**, reflecting their impact and value at all levels of the energy system. Storage will foster the development and penetration of RES, optimize the quality of supply at distribution level, benefit from digitalisation and work together with other flexibility sources such as conventional flexible plants and demand side response.

2. **A technology neutral approach is needed.** The barriers to a level playing field should be removed. All types of storage can have a role to play and their importance will increase. Member states face diverse challenges in their efforts to reach EU targets and to decarbonise. It must be ensured that all technology options compete on a level playing field. A holistic approach for energy storage also means that sector coupling is a key dimension to achieve this goal, as different storage technologies play complementary roles in terms of time response and flexibility services they can deliver to the energy system.

3. **Storage must be able to compete on a level playing field with generation and demand response** in areas such as market-based congestion management as well as other ancillary services. As future support schemes for generators become more market-based, congestion management should also become market based to reduce potential distortion. Storage assets must be able to participate in all markets on a level playing field, including in capacity markets where they exist.

4. **Storage must be a focus of EU funding for research and innovation.** Technologies are progressively developing and consequently leading to direct improvements in the use of storage. This trend deserves attention from policy makers when designating innovation funds. A breakthrough in storage can even become the decisive game changer for the energy transition.

Eurelectric pursues in all its activities the application of the following sustainable development values:

Economic Development

- Growth, added-value, efficiency

Environmental Leadership

- Commitment, innovation, pro-activeness

Social Responsibility

- Transparency, ethics, accountability

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