# EASE Reply to European Commission's Questions on "The Future of Energy Storage in the EU"

## September 2018



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- ✓ **Why does the energy system need energy storage?**

Energy storage technologies are playing a valuable role in the transition to a low-carbon energy system. In the future energy system characterised by very high shares of variable renewables and electrification of heating, cooling, and transport, energy storage will be fundamental to ensure a stable, secure, and efficient operation of the energy system.

The Renewable Energy Directive sets a binding renewable energy target of 32% for the EU for 2030. To achieve this target, new flexibility sources will have to be deployed to integrate these variable energy sources with minimum curtailment and at optimised system cost, and to keep our system stable.

Storage enables decoupling energy generation from consumption, both geographically and over time. Energy storage can also provide valuable flexibility to the system at various time-scales, from seconds and hours to weeks and months. Short-duration storage technologies such as flywheels and batteries can respond to imbalances created by higher shares of RES within milliseconds, while longer-duration technologies like pumped hydro storage (PHS) or hydrogen storage can provide weekly, monthly, or even seasonal storage. Therefore, all storage technologies are needed to ensure a smooth energy transition.

A further important attribute of storage is that it can provide highly reliable, predictable, and accurate flexibility services totally independently from external factors (weather, time or season, consumer behaviour, etc.). It can be deployed rapidly with high public acceptance, and at any scale and level of the electricity system (generation, transmission, distribution, consumption). As such it can provide both local services (i.e. congestion at distribution level) and system services (capacity, frequency regulation, energy cost minimisation) with unlimited aggregation capability. For instance, storage can be used at both transmission and distribution levels to solve local grid congestion, to defer grid investments, to increase network capacity, and to maintain lines without reducing security of supply: it is therefore an important element in transmission and distribution activities within the ongoing energy transition.

Already now on islands and in microgrids, storage is part of the solution to decarbonise the system: storage together with variable RES and smart grids is generally more economical and environmentally friendly than diesel-powered generators. In addition, energy storage improves electricity grid stability, flexibility, reliability, and resilience.

Energy storage also enables sector coupling, linking the electricity sector to the heating and cooling sector, as well as to transport. Roughly 85% of heating demand is currently met by fossil fuels, so the electrification of heating via storage is a very effective way to decarbonise the heating sector. Energy storage also plays a key role in the decarbonisation of the transport sector. The interface between energy storage and mobility is a very promising area: second-life batteries could make EV technology more sustainable by alleviating environmental concerns related to the battery lifecycle and could facilitate the rollout of EVs.

Finally, depending on the tariff and regulatory conditions, energy storage devices can provide a variety of services at all levels of the energy system, including in residential consumers' premises. Small-scale energy storage technologies, including vehicle-to-grid as electrification of mobility goes forward, can be used to optimise self-consumption of solar PV at the residential and community level and enable active consumers to participate fully in electricity markets.

Simply put: without energy storage, the EU cannot achieve its transition to a low-carbon economy.



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- ✓ **What are the <u>barriers</u> (regulatory, fiscal, economic, technical) in the deployment of energy storage?**

EASE has identified a set of barriers to be tackled in order to ensure the rapid development and deployment of energy storage technologies:

1. **Regulatory barriers**

The wide variety of storage technologies with different attributes and applications, as well as the rapid technological development in the sector, renders policymaking in the storage sector rather difficult.

A fair and clear regulatory framework must be established to ensure the development of energy storage technologies. This includes:

- **Introducing an open energy storage definition** at EU level, covering all energy storage technologies
- **Clarifying the legislative framework on the ownership of storage by regulated entities**, in order to support investment in the sector
- Ensuring that **network code provisions do not contain unjustified barriers** to the deployment of storage technologies and their participation in the energy, balancing and ancillary services markets on a level playing field with competing technologies

Additionally, the **value of energy storage facilities' exceptionally fast reaction time or flexibility is not yet recognised** at EU level. While fast-reacting energy storage devices can respond to frequency imbalances in milliseconds (thereby reducing the amount of balancing power), they will be remunerated at the same rate as slower-reacting devices. Where storage facilities can provide a clear added value in terms of added flexibility or faster response times, these attributes should be rewarded by specific market products.

In some Member States, balancing and ancillary services are not all tendered on the market. In others, storage is either explicitly or implicitly barred from providing



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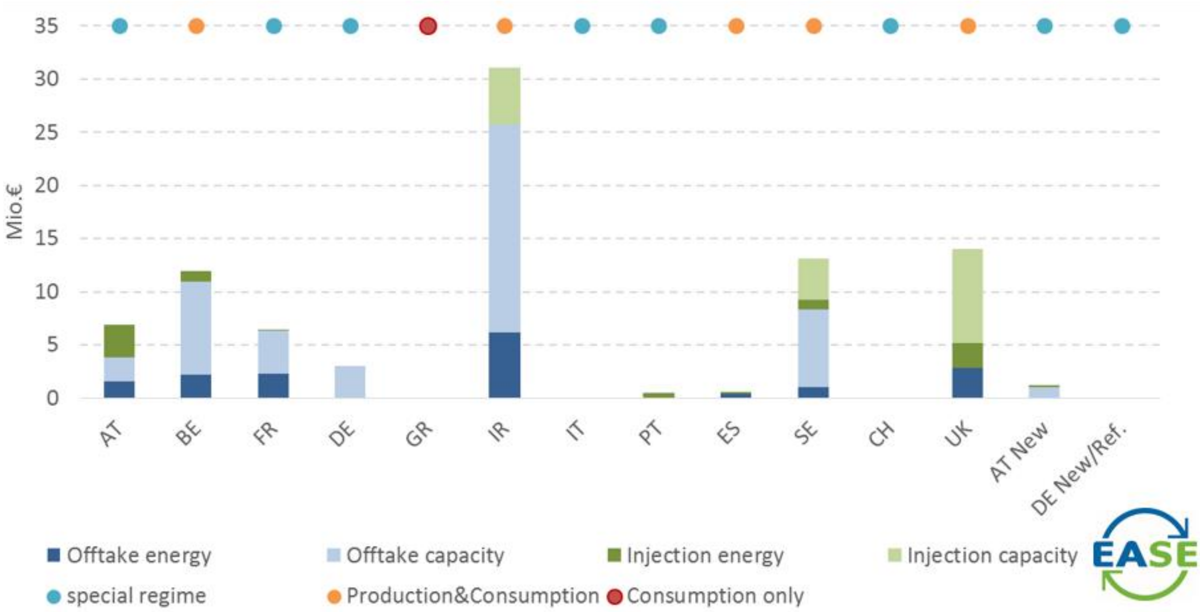
ancillary services. For instance, energy storage cannot provide frequency containment reserve in Sweden, and in central and Eastern Europe[1]. Additionally, there is often a lack of clarity about which services can be combined or 'stacked' on one device. Thus, storage facilities are often prevented from accessing potential revenue streams. For long-duration storage in particular (weekly, monthly or seasonal storage of heat, for example) there is a lack of clarity on how to monetise the services such facilities provide.

## 2. Fiscal barriers

**There is a clear lack of harmonisation of grid charges, taxes, and fees applied to energy storage technologies across the EU**, as illustrated by the below graph. Double charging of storage technologies - once when they draw electricity from the grid and once when they feed energy back into the grid - is particularly damaging to the storage business case and does not reflect the added value of storage for the system.

### Indicative grid charges for a fictive large-scale Pumped Hydro Storage (PHS) plant




*Source:* [*EASE Position on Energy Storage Deployment Hampered by Grid Charges, 2017*]

[1] ENTSO-E survey on ancillary services procurement, balancing market design 2017, May 2018 ; https://docstore.entsoe.eu/Documents/Publications/Market%20Committee%20publications/ENTSO-E_AS_survey_2017.pdf



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Significant variance between countries in the amount of taxes/fees/charges applied to storage creates distortions in cross-border energy trade: investments in storage therefore are not only based on where it is most needed, but also on where grid costs are lower. This illustrates the impact of the currently fragmented regulatory framework on energy storage competitiveness in general and how it is hampering the creation of an internal energy market in particular.

EASE therefore calls for a coordinated approach to defining grid tariffs for storage that recognises its alleviative effects on grid constraints and grid extension costs, while contributing to reduced curtailment of $CO_2$ free electricity generation.

## 3. Economic and financial barriers

While wholesale prices fluctuate over the day to reflect energy flows on the grid, retail prices are less variable, notably because of a **high share of fixed charges taxes/levies** in final electricity bills. This reduces the economic incentive for flexibility services. In order to incentivise consumers to invest in storage and provide flexibility services, consumers should receive a fair price when the sell their energy in excess to the grid.

Additionally, **long-term contracts should be allowed for services offered by storage facilities** – provided there is a level playing field with other technologies – in order to increase investment certainty and speed up the deployment of storage technologies.

More generally speaking, energy storage solutions often compete with incumbent technologies and investment schemes. Despite proven technical feasibility and a favourable environmental footprint, projects are not realised as they are suffering from one or several of the following drawbacks:

- Environmental benefits are not remunerated. A well-functioning EU Emissions Trading System would favour the emergence of innovative technologies like energy storage.
- Regulatory provisions or policy support schemes which prevent proper economic signals for investment in storage devices (e.g. exemptions from balancing responsibilities, net metering for self-consumption, grid extension). For instance, net metering schemes for renewable distributed generation allow prosumers who generate their own electricity to, first, feed electricity they do

not use back into the grid and second, to receive a credit when they need to use electricity from the grid. This can be seen as providing prosumers with free "virtual batteries", disincentivising the installation of actual storage devices (and more energy efficient behaviours).

- Lack of operational experience – inherent to innovations – but also absence or instability of the regulatory framework and taxation incur uncertainties for the remuneration model and represent a risk many investors are not ready to accept.

## 4. Technical barriers

Since storage is a relatively new player in the energy system, **the technical requirements and assessments used in the past are often not suitable to be applied to storage technologies.** For example, the existing framework is centred on the three traditional segments in the energy system – generation, transmission/distribution, and consumption of energy. Storage acts as both generation and consumption, depending on the moment considered, which is why technical requirements developed to suit these three segments can be problematic for storage.

Therefore, there is a need to review the network codes and their implementation to ensure that they do not contain provisions that are blocking storage deployment. For instance, the grid connection requirements (which currently do not cover storage technologies except pumped hydro storage) should be extended to cover the other electricity storage technologies, to ensure that appropriate requirements can be agreed and applied to ensure harmonisation at EU level.

There are other barriers to storage deployment due to implementation of the system operation guideline. For example, discussions on the minimum activation time for limited energy reservoirs, e.g. batteries, providing frequency containment reserve (FCR) during alert state might impact the deployment of storage technologies[2]. A 30-minute activation time would hinder FCR provision by most current storage technologies

[2] Article 156 (11) of the Commission Regulation (EU) 2017/1485 of 2 August 2017 establishing a guideline on electricity on transmission system operation



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during alert state, even though they could limit the effects of a contingency. Indeed, the fast dynamic response of energy storage devices is expected to help cope with the system inertia decrease and the RES intermittency, thereby contributing to grid stability. This added value is not reflected in current discussions.

Furthermore, energy storage technologies should not be penalised by a lack of clarity of existing technical, safety and environmental standards or a lack of specific standards for energy storage technologies. Standards covering dismantling/disposal, emissions and environmental aspects, performance testing could for instance be created to accelerate the roll-out of electrochemical storage technologies while making sure they do not create undue barriers to trade.

Finally, many of the energy system models used today – such as the PRIMES model – do not take into account intra-hour effects. Since energy storage facilities provide mostly short-duration services (e.g. ancillary services such as primary frequency control with a duration of 15-30 minutes), the value of energy storage is systematically under-represented in the PRIMES model. An example of this is the modelling used in the cost-benefit analysis for storage projects in the Ten-Year Network Development Plan and Projects of Common Interest (CBA 2.0), which tends to underestimate the benefits of storage technologies.

- ✓ **Is the regulatory framework sufficient to ensure that markets can deploy storage capacity?**

Getting the regulatory framework right is of course incredibly important for the storage sector to develop. However, some aspects – such as taxes and fees levied on storage devices – cannot be determined by legislation at EU level.

Aside from developing the regulatory framework for storage, it is vital to support research, development, and demonstration projects across all storage technologies. EASE identified in the EASE-EERA Energy Storage Technology Development Roadmap specific needs to be addressed within the next 2-10 years to ensure a rapid and cost-effective development of energy storage technologies:



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- Develop a strategic energy storage plan for Europe, detailing how to conduct strategic planning of storage potential. A first step would be to create an EU Energy Storage Observatory that would set-up a database of all storage facilities across Europe to gain a clearer understanding of the current deployed capacity and planned developments. The only available database for EU energy storage projects has been established by the US Department of Energy but does not provide up-to-date information.
- Fund new large-scale demonstration projects focused on the grid integration of relatively mature storage technologies, including projects with hybrid storage systems (combination of two or more different storage technologies) and long-duration storage technologies (e.g. power-to-gas, power-to-heat). Funding could take the form of guarantees – rather than Capex and R&D funding – and therefore at least cover a part of investment risk inherent to innovation.
- Study system integration, focusing on how gas, electricity, heat, and other infrastructure (e.g. refuelling infrastructure) can be combined and complemented with storage of gas, electricity, heat, and/or fuels.
- Support materials and equipment research to improve performance of crucial components.
- Research the monetisation of storage services and the development of flexibility markets, particularly at the distribution grid level.
- Pursue a coordinated RD&D policy effort for energy storage at EU level and provide more funding for storage technologies through available EU funds (Horizon 2020/ Horizon Europe, Connecting Europe Facility, ETS Innovation Fund,…).

The earlier these efforts are undertaken, the better: if we want to have more efficient and cost-effective storage technologies available in the near future, we must focus on their RD&D funding today. RD&D policy should be technology agnostic as far as possible, to avoid picking winners and losers, and should include both early-stage research and deployment of relatively mature technologies.



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- ✓ **Should the EU do <u>further efforts</u>? What type of <u>actions/policy options</u> should be considered?**

EASE welcomes the efforts of the EU institutions to support the deployment of energy storage. Some key actions should be carried out by the EU institutions to further boost storage deployments:

- Working on the implementation of the Clean Energy Package:
  - Making sure that energy storage is covered by the network codes and that technical specificities of storage technologies are recognised
  - Assessing how the provisions regarding ownership of storage by regulated entities could be applied in the most cost-effective way. Could regulated entities and market players make contractual arrangements that would reconcile, on the one hand, compliance with competition rules and, on the other hand, shared ownership and/or the operation of an energy storage facility?
- Promoting the development of appropriate market products, reflecting new needs arising from higher shares of intermittent renewables. Markets should be designed in such a way that they will enable energy storage to participate without any unjustified barrier. To support the market-based development of the energy storage sector, the EU regulatory framework should enable revenue stacking: enabling a storage facility to provide various services to various stakeholders (generators, consumers, network operators) and 'stack' multiple revenues, therefore improving the business case for storage (see below):



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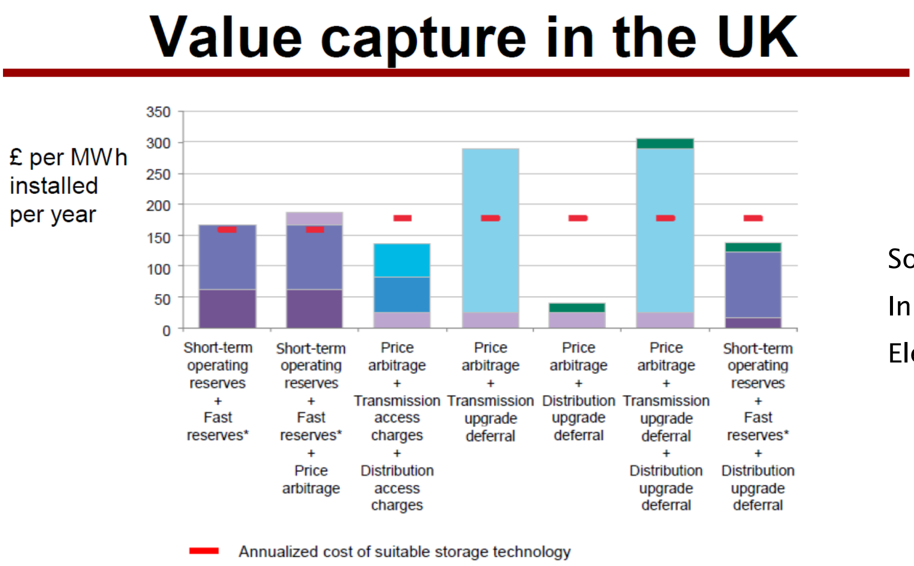


Source: SBC Energy Institute, 2013. Electricity Storage.

- Encouraging and facilitating by all means innovative and experimental implementation of energy storage solutions, provided those support future flexibility and stability needs of the electricity system. It is crucial to give the largest possible freedom to storage owners/operators as well as to offtakers of storage services (including regulated entities) in order to experiment innovative operation and remuneration schemes.
- Further promoting sectoral integration:
    - Following-up on High-Level Roundtable on Sectorial Integration
    - Recognising the importance of storage in decarbonising the transport, heating and cooling sectors, e.g. in the Strategy for long-term EU greenhouse gas emissions reductions in accordance with the Paris Agreement
- Supporting energy storage RD&D funding:
    - Horizon Europe
    - Connecting Europe Facility
    - ETS Innovation Fund
- Encouraging a dedicated debate on grid charges/fees/tariffs applied to storage facilities. Coordination at EU level is sorely needed, and it merits discussion whether and to what extent storage should contribute to grid costs, given that storage usually alleviates grid constraints.



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*About EASE*

*The European Association for Storage of Energy (EASE) is the voice of the energy storage community, actively promoting the use of energy storage in Europe and worldwide. It supports the deployment of energy storage as an indispensable instrument within the framework of the European energy and climate policy to deliver services to, and improve the flexibility of, the European energy system. EASE seeks to build a European platform for sharing and disseminating energy storage-related information and supports the transition towards a sustainable, flexible and stable energy system in Europe.*

*For more information please visit [www.ease-storage.eu](http://www.ease-storage.eu)*

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*Disclaimer*

*This response was elaborated by EASE and reflects a consolidated view of its members from an energy storage point of view. Individual EASE members may adopt different positions on certain topics from their corporate standpoint.*

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