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**COMMISSION RECOMMENDATION**

**of 14.3.2023**

**on Energy Storage – Underpinning a decarbonised and secure EU energy system**

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## on Energy Storage – Underpinning a decarbonised and secure EU energy system

THE EUROPEAN COMMISSION,

Having regard to the Treaty on the Functioning of the European Union, and in particular Article 292 thereof,

Whereas:

- (1) The Commission has put forward the European Green Deal, the strategy aiming at achieving climate neutrality by 2050, among others<sup>1</sup>. In this context, the Fit for 55 package<sup>2</sup> aims at reducing net greenhouse gas emissions by at least 55% by 2030. Moreover, and against the background of Russia's unprovoked invasion of Ukraine and weaponisation of its energy supply, the REPowerEU Communication<sup>3</sup> and plan<sup>4</sup> propose measures to rapidly end the dependence on Russian fossil fuels and tackle the energy crisis by accelerating the clean energy transition and joining forces to achieve a more resilient energy system.
- (2) Given that the production and use of energy account for more than 75% of the Union's greenhouse gas emissions, decarbonising the energy system is crucial to reaching those targets. To achieve the Union's climate and energy targets, the energy system is undergoing a profound transformation characterised by improved energy efficiency, the massive and rapid deployment of variable renewable energy generation, more players, more decentralised, digitalised and interconnected systems and increased electrification of the economy. Such a system transformation requires more flexibility, understood as the energy system's ability to adapt to changing needs of the grid and manage variability and uncertainty of demand and supply across all relevant timescales. Models<sup>5</sup> show a direct relationship, sometimes exponential, between the need for flexibility (daily, weekly and monthly) and renewable generation deployment. As a result, the need for flexibility will be particularly relevant in the coming years as the share of renewable energy in the electricity system is expected to reach 69% by 2030.
- (3) New operational challenges also call for additional services in the future electricity system (e.g. for balancing and non-frequency ancillary services<sup>6</sup>) to ensure stability and reliability and ultimately security of electricity supply.
- (4) Different technologies can provide the energy system with the necessary flexibility, such as energy storage, demand response, supply-side flexibility and interconnections.

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<sup>1</sup> COM(2019) 640 final. The European Green Deal also includes objectives beyond climate neutrality, such as halting biodiversity loss, reducing and eliminating pollution, and decoupling economic growth from resource use through circular economy approaches.

<sup>2</sup> COM(2021) 550 final

<sup>3</sup> COM(2022) 108 final.

<sup>4</sup> COM(2022) 230 final.

<sup>5</sup> See section 2.2 of the SWD(2023) 57

<sup>6</sup> As defined in Article 2(45) and 2(49) of Directive (EU) 2019/944, OJ L 158, 14.6.2019, p 125-199

In particular, different energy storage technologies (e.g. mechanical, thermal, electrical, electro-chemical and chemical) can provide diverse services on different scales and at different timeframes. For example, thermal storage, in particular large thermal storage in district heating systems, can provide flexibility and balancing services to the electricity grid and therefore provides a cost-saving system integration solution by absorbing variable renewable electricity production (e.g. wind and solar energy). In addition, energy storage technologies can be a technical solution to provide stability and reliability.

- (5) Energy storage in the electricity system is defined in Article 2(59) of Directive (EU) 2019/944<sup>7</sup> covering different technologies. Directive (EU) 2019/944 addresses the participation of energy storage in the electricity market, including the provision of flexibility services on a level playing field with other energy resources.
- (6) Beyond the electricity system, the storage of energy, such as thermal storage, can contribute to the energy system in multiple ways. For example, energy storage that complements renewable heating and cooling generators as part of individual and district heating systems allows a higher proportion of heating demand to be covered by variable and low-temperature renewable sources, such as shallow geothermal, solar thermal and ambient energy. Promoting these renewable heating systems is essential to shift away from fossil fuel-based heating systems, in particular in buildings.
- (7) Energy storage can play a crucial role in decarbonising the energy system, contributing to energy system integration and security of supply. A decarbonised energy system will require significant investment in storage capacity of all forms. Energy storage technologies can facilitate the electrification of different economic sectors, notably buildings and transport. For example, through the uptake of electric vehicles and their participation in the balancing of the electricity grid via demand response (e.g. by absorbing excess electricity in times of high renewable generation and low demand). The energy stored in electric vehicle batteries can also be effectively used to power homes and help stabilise the grid.
- (8) Energy storage, in particular ‘behind the meter’, can help consumers, both households and industries, to maximise self-consumption of self-produced renewable energy, making it possible for these consumers to reduce their energy bills.
- (9) For energy systems that are less or not interconnected, such as islands, remote areas or the EU’s outermost regions flexibility resources, notably energy storage, can significantly help to move away from imported fossil fuels and manage high levels of short-term and seasonal variability in renewable energy supply.
- (10) Energy storage faces a number of challenges that can affect its deployment to the levels necessary to significantly support the energy transition. Some of these challenges are related to a need for long-term visibility and predictability of revenues to facilitate access to finance.
- (11) The Union electricity market is designed to already allow energy storage to participate in all electricity markets. This provides a basis to combine different revenue streams (revenue stacking) in order to support the viability of the storage business model and allow the maximum added value of energy storage for the energy system.

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<sup>7</sup> OJ L158, 14.6.2019, p.125-199

- (12) The Guidelines on State aid for climate, environmental protection and energy<sup>8</sup> encourage Member States to introduce additional criteria or features in their security of supply measures to promote the participation of greener technologies (or reduce the participation of polluting technologies) necessary to support the delivery of the EU's environmental protection objectives. Such criteria or features are expected to increase the proportion of storage benefitting from security of supply measures.
- (13) Transmission system operators are required to take into account the potential for the use of energy storage facilities in their 10-year network development plan<sup>9</sup>. However, the typical operation pattern of energy storage – injecting electricity into the grid when generation levels are low and consuming electricity when they are high – can be further exploited when planning networks. Consumption from the grid during peak hours can be reduced through well-designed network charges and tariff schemes that strengthen the use of flexibility tools such as energy storage.
- (14) The sharing of stored electricity has the potential to deliver wider benefits to the system through demand response, when final customers are exposed to appropriate price signals or are allowed to participate in flexibility schemes. As provided in Directive (EU) 2019/944, jointly acting final customers should not be exposed to double charges when providing flexibility services to system operators using front-of-the-meter storage facilities.
- (15) The update of the national energy and climate plans for 2021-2030 as provided for in Article 14 of Regulation (EU) 2018/1999 on the governance of the Energy Union and Climate Action<sup>10</sup> should include greater ambition to speed up the green transition and increase energy security in line with the European Green Deal Package<sup>11</sup> and REPowerEU. The update of the national energy and climate plans should also include national objectives to increase system flexibility pursuant to Article 4(d)(3) of that Regulation.. Those updated national plans should also table relevant policies and measures to support investment needs identified under the REPowerEU as well as the key priority of protecting EU competitiveness and attractiveness with regard to global partners, while taking into account environmental impacts, particularly on habitats and ecosystems<sup>12</sup>. The national energy and climate plans are the opportunity to explore synergies across the five dimensions of the Energy Union<sup>13</sup>, in particular as regards benefits of electricity storage,

RECOMMENDS: (1) Member States take into account the double role (generator-consumer) of energy storage when defining the applicable regulatory framework and procedures, in particular when implementing the Union legislation concerning the electricity market, in order to remove existing barriers. This includes preventing

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<sup>8</sup> Communication from the Commission – Guidelines on State aid for climate, environmental protection and energy 2022, C/2022/481 (OJ C 80, 18.2.2022, p. 1).

<sup>9</sup> Regulation (EU) No 347/2013 on guidelines for trans-European energy infrastructure, OJ L 115, 25.4.2013, p. 39–75

<sup>10</sup> OJ L 328, 21.12.2018, pp. 1–77.

<sup>11</sup> [https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/european-green-deal/delivering-european-green-deal\\_en#documents](https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/european-green-deal/delivering-european-green-deal_en#documents)

<sup>12</sup> In order to achieve the European Green Deal's goals and respect the 'do no harm' principle, it is also necessary to take into account broader environmental trade-offs of energy storage and provide solutions to their mitigation or neutralisation.

<sup>13</sup> COM(2015) 080

double taxation and facilitating permit-granting procedures<sup>14</sup>. National regulatory authorities should also consider such a role when setting network charges and tariff schemes, in compliance with Union legislation.

- (2) Member States identify the flexibility needs of their energy systems in the short, medium and long term, and in their updates of the national energy and climate plans strengthen the objectives and related policies and measures that aim to cost effectively promote the deployment of energy storage, both utility-scale and behind-the-meter storage, demand response and flexibility. Member States should also assess manufacturing capacity needs for the relevant energy storage technologies.
- (3) Member States, in particular their national regulatory authorities, ensure that energy system operators further assess the flexibility needs of their energy systems when planning transmission and distribution networks, including the potential of energy storage (short- and long-term duration) and whether energy storage can be a more cost effective alternative to grid investments. They should also consider the full potential of flexibility sources, in particular energy storage, when assessing their connection capacity (e.g. considering flexible connection contracts) and operating the system.
- (4) Member States identify potential financing gaps for short-, medium- and long-term energy storage, including behind-the-meter (thermal and using electricity) and other flexibility instruments, and if a need for additional flexible resources to achieve security of supply and environmental objectives is identified, consider the potential need for financing instruments that provide visibility and predictability of revenues.
- (5) Member States explore whether energy storage services - in particular the use of flexibility in distribution networks and the provision of non-frequency ancillary services - are sufficiently remunerated, and whether operators can add up the remuneration of several services.
- (6) Member States to consider competitive bidding processes if necessary to reach a sufficient level of deployment of flexibility sources to achieve transparent security of supply and environmental objectives, in line with State Aid rules. Potential improvements should be explored in the design of capacity mechanisms to facilitate the participation of flexibility sources including energy storage, e.g. by ensuring de-rating factors are appropriate in light of the security of supply objective pursued, reducing minimum eligible capacity and minimum bid size, facilitating aggregation, lowering the CO<sub>2</sub> emission limits, or prioritising greener technologies, in line with the Guidelines on State aid for climate, environmental protection and energy.
- (7) Member States identify any specific actions, regulatory and non-regulatory, necessary to remove barriers to the deployment of demand response and behind-the-meter storage, e.g. linked to the uptake of electrification of end use sectors based on renewable energy sources, the deployment of individual or collective self-consumption and to bidirectional charging through the use of electric vehicle batteries.

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<sup>14</sup> See also Commission Recommendation (EU) 2022/822 of 18 May 2022 on speeding up permit-granting procedures for renewable energy projects and facilitating Power Purchase Agreements, C/2022/3219, OJ L 146, 25.5.2022, p. 132, and Council Regulation (EU) 2022/2577 of 22 December 2022 laying down a framework to accelerate the deployment of renewable energy, OJ L 335, 29.12.2022, p. 36.

- (8) Member States accelerate the deployment of storage facilities and other flexibility tools in islands, remote areas and the EU's outermost regions areas with insufficient grid capacity and unstable or long-distance connections to the main grid, for example through support schemes for low carbon flexible resources, including storage, and revise the network connection criteria to promote hybrid energy projects (i.e. renewable generation and storage).
- (9) Member States and national regulatory authorities publish detailed data on network congestion, renewable energy curtailment, market prices, renewable energy and greenhouse gas emission content in real time, as well as installed energy storage facilities, to facilitate investment decisions on new energy storage facilities.
- (10) Member States continue to support research and innovation in energy storage, in particular long-term energy storage and storage solutions coupling electricity with other energy carriers, and to optimise existing solutions (e.g. efficiency, capacity, duration, minimal climate and environmental footprint). Consideration should be given to de-risking instruments, such as technology accelerator programmes and dedicated support schemes that guide innovative energy storage technologies through to the commercialisation stage.

Done at Brussels, 14.3.2023

*For the Commission*

*Member of the Commission*