EASE Position Paper on Guiding Principles to Develop an EU Methodology to Assess Flexibility Needs

Brussels, July 2024

Table of Content

Introduction

The projected deployment of renewable energy sources (RES) in the European Union (EU) creates a viable path to achieving ambitious decarbonisation objectives. However, their integration into grids will require incorporating sufficient, diverse, and cost-efficient flexibility sources to adjust to their variability and maintain a reliable energy system.

New legal provisions in the energy market design (EMD) regulation reform (Regulation (EU) 2024/1747, Article 19e and 19f) have been introduced requiring Member States (MSs) to carry out an Assessment of Flexibility Needs (AFN) with a 5 to 10-year look-ahead. Therein, MSs will analyse the contribution of various flexibility sources in meeting the defined needs. Once the regulation is published in the Official Journal of the European Union, the timeline detailed below in Figure 1 begins. ENTSO-E and the EU DSO entity are responsible for developing the AFN methodology within 9 months which will be subsequently amended and approved by ACER within 3 months. Next, either the regulatory authority or another designated authority will apply the AFN methodology to produce an AFN report within 1 year. Finally, MSs will formulate indicative targets for non-fossil flexibility, energy storage, and demand response within 6 months.

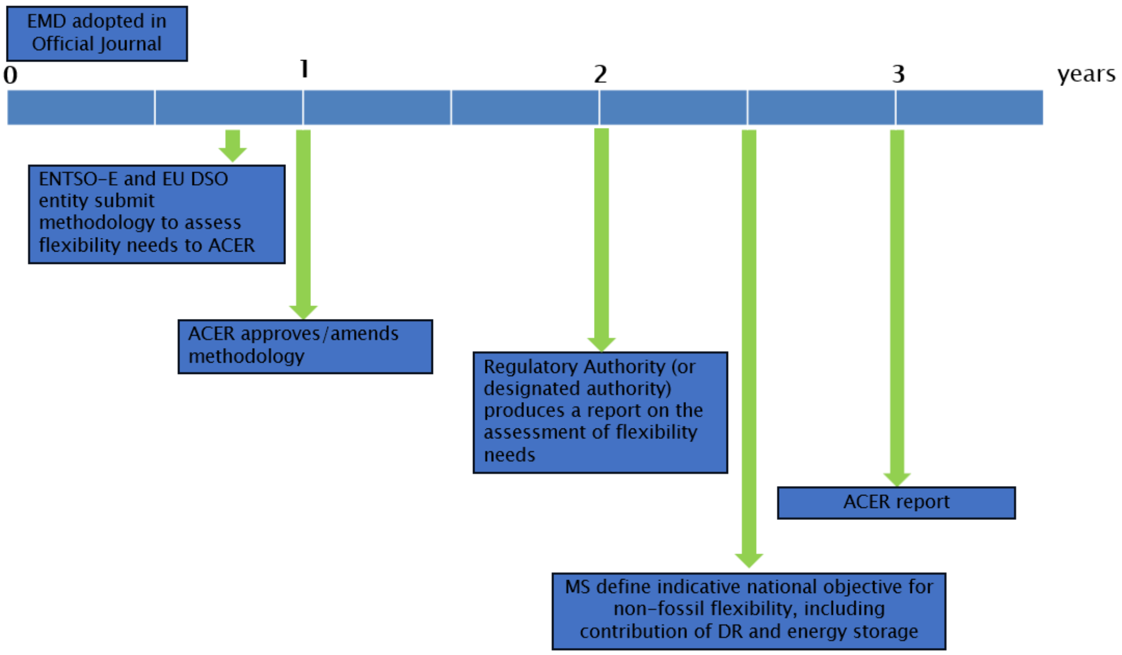

Figure 1: Timeline to implement the Assessment of Flexibility Needs

Despite the legislation not requiring a formal consultation of stakeholders, this institutional process presents an opportunity for EASE to express some guiding principles that the

EASE - European Association for Storage of Energy

Avenue Adolphe Lacomblé 59/8 - B-1030 Brussels - tel: 02.743.29.82 - fax: 02.743.29.90 - info@ease-storage.eu - www.ease-storage.eu

methodology should follow and highlight open questions that need to be addressed. It is critical that, going forward, stakeholders are consulted on the pertinence of different methodological approaches.

The guiding principles presented below are mainly concerned with three fundamental issues:	1. Defining a flexibility need
	2. Ensuring technology neutrality
	3. Designing robust scenarios

Principle 1: Defining a Flexibility Need

1.1 Overview

Defining the scope of the AFN methodology, specifically what counts as a 'flexibility need' in the assessment, should not result in a disadvantage for a flexibility source because of consequently disregarded revenue streams that impact either the flexibility source's economic viability or assessed value to the system.

The business case of energy storage can depend on the stacking of several revenue streams (i.e. arbitrage, balancing services, peak capacity, congestion management, RES curtailment reduction, etc.). If an energy storage application (Monetising Energy Storage, p. 97) is not classified as satisfying a 'flexibility need', will the application still be included quantitatively or qualitatively?

The EMD provisions and existing work by relevant stakeholders invite the scope of the AFN to be open to interpretation.

- The EMD introduces a definition for flexibility as, "*the ability of an electricity system to adjust to the variability of generation and consumption patterns and grid availability, across relevant market timeframes*" (Regulation (EU) 2024/1747, Article 2 (79)). The report that applies the AFN methodology should, "*evaluate the different types of needs for flexibility, at least on a seasonal, daily and hourly basis*" (Regulation (EU) 2024/1747, Article 19e 2a). Addressing the energy supply-demand balance across time-scales is

EASE – European Association for Storage of Energy

Avenue Adolphe Lacomblé 59/8 – B-1030 Brussels – tel: 02.743.29.82 – fax: 02.743.29.90 – info@ease-storage.eu – www.ease-storage.eu

inherently implied, but should the ‘flexibility needs’ part of the methodology also consider a broader portfolio of flexibility needs, including the procurement of reserves, such as balancing and ramping services? What about congestion management and grid capacity expansion?

- ENTSO-E’s position paper on future flexibility needs refers to two types (Assessment of Future Flexibility Needs, p. 3). First those related to the system (i.e. adequacy, stable frequency, and reliability) and second those related to the grid (i.e. congestion management and voltage stability).
- The Belgian TSO Elia published a power system planning study that combines longer term flexibility needs (yearly, seasonal, daily) with short-term flexibility needs (the capabilities which are required to cover the unexpected, intra-day and real-time variations in load and generation, as well as forced outages of generation and transmission assets)(Adequacy and Flexibility Study for Belgium, p. 50-52). In other words, a typical hourly economic dispatch simulation capturing energy-only market revenues is extended to account for short-term flexibility requirements providing additional revenues from participating in ancillary services in this study.

1. 2 Open Questions

1. Does the ‘flexibility needs’ part of the methodology:
    a. Only address the supply-demand balance across time-scales (possibly including balancing services)?
    b. Also address congestion management in transmission and distribution grids?
2. What are the consequences of only considering the minimum set of time-scales (hourly, daily, and seasonal) outlined by the legislation and disregarding other time-scales, i.e. weekly, inter-seasonal or inter-annual, which have been illustrated prominently in scenarios from the study published by the French TSO RTE (Futurs énergétiques 2050, p. 298)?
3. What are the similarities and differences between national resource adequacy assessments and the AFN?

EASE - European Association for Storage of Energy

Avenue Adolphe Lacomblé 59/8 - B-1030 Brussels - tel: 02.743.29.82 - fax: 02.743.29.90 - info@ease-storage.eu - www.ease-storage.eu

Principle 2: Ensuring Technology Neutrality

2.1 Overview

Analysing the contribution of different flexibility sources in meeting the identified flexibility needs must be technology-neutral to ensure a level-playing field for all technologies and market participants.

The EMD provision specifies that the methodology should take into account, "*all available sources in a cost-efficient manner in the different timeframes, including in other Member States*" and shall "*contain guiding criteria on how to assess the capability of the different sources of flexibility to cover the flexibility needs*" (Regulation (EU) 2024/1747, Article 19b 4e). **The following points should be implemented to this end.**

- **Establish a clear process for emerging flexibility sources to be included or excluded from the modelling exercise.** This should take into consideration the maturity levels of the assessed technologies (as well as projected maturity in the future). In the 2024 European Ten-Year Network Development Plan (TYNDP) scenarios methodology report, the limited technology options that are modelled imply that there is no role for thermal or long duration energy storage (LDES) technologies. The participation of new flexibility sources should not be foreclosed nor over or underestimated in the AFN.
- **Ensure that flexibility sources are competing to satisfy flexibility needs in a cost-efficient manner**, whereby investments in flexibility sources are an output of the model, or at the very least a diverse set of scenarios and are investigated when this principle is not upheld. In the JRC study on flexibility (Flexibility requirements and the role of storage in future European power systems, p. 31), installed capacities are input assumptions reflecting a single hydrogen-centric reference scenario for 2030 and 2050. Given electrolysers still face several technical and economic challenges, it is unclear whether investments are profitable for hydrogen producers and cost-efficient for the power system. How should reflecting policy ambitions be balanced with enabling competition between flexibility sources?
- **Transparently define and communicate plausible techno-economic and behavioural assumptions.** Some types of assumptions critically affect the deployment of competing

EASE – European Association for Storage of Energy

Avenue Adolphe Lacomblé 59/8 – B-1030 Brussels – tel: 02.743.29.82 – fax: 02.743.29.90 – info@ease-storage.eu – www.ease-storage.eu

flexibility solutions, particularly if they belong to the reference scenario. In the 2023 European Resource Adequacy Assessment (ERAA methodology report, p. 15), some implicit demand side response assumptions are concealed and unknown, i.e. the share of price sensitive EVs, HPs, and out-of-market batteries. It is important and expected that such assumptions are transparently shared. Additionally, hydrogen networks and storage are not modelled. The total production of hydrogen via electrolysis is unknown because it is based on an activation price not a final demand profile (ERAA methodology report, p. 32). It is unclear whether this modelling approach captures the price-setting behaviour of electrolysers in electricity markets which impact their economic viability (Roach and Meeus 2020; Ruhnau 2022; Härtel and Korpås 2021). In the 2023 Flexibility study by Artelys and Trinomics , the results show that no stationary batteries are installed in 2030, 2040 and 2050 due to rapid uptake of EVs with smart charging and vehicle-to-grid (V2G) capabilities (Power System Flexibility in the Penta Region, p. 34). The authors state that stationary batteries could satisfy other flexibility needs, such as congestion management, voltage support or balancing reserves which are not covered in the modelling exercise but could help improve their cost-competitiveness vis-à-vis other flexibility solutions. Conversely, the 2024 study on redispatch by the JRC looks out to 2030 and 2040 and assumes no flows from EV batteries back to the grid because V2G has not been demonstrated yet on a large scale (Redispatch and Congestion Management, p.12). These wide differences in V2G assumptions between studies do not necessarily pose a problem due to different underlying research questions; however, it is important to think about the plausibility of assumptions and how the modelling results will eventually be interpreted to set targets.

- **Mitigate biased modelling choices that can distort the evaluation of flexibility needs and resources.** While some simplifications are necessary in a modeling exercise of this scope, it is important to clearly assess whether they act as a biased limitation and, if so, mitigate their impact where possible. For example, ample evidence shows that, especially for longer timeframes (e.g., seasonal storage needs), choices such as the chronology employed by a model can significantly impact the optimal deployment of resources and their operations (Mantegna et al. 2024; Sioshansi et al. 2022; Kotzur et al. 2018). These modelling choices are particularly relevant for long-duration energy storage (LDES), for instance, when creating the representative periods and period-linking constraints of a model. Overlooking how these simplifications are carried out, and if left unmitigated, the AFN risks failing to capture all flexibility needs completely and undervaluing LDES or possibly prioritising sub-optimal flexibility sources in meeting these needs.

EASE - European Association for Storage of Energy
Avenue Adolphe Lacomblé 59/8 - B-1030 Brussels - tel: 02.743.29.82 - fax: 02.743.29.90 - info@ease-storage.eu - www.ease-storage.eu

2.2 Open Questions

The implementation of the AFN methodology should lead to a report that, per the EMD legal provision, "*shall be consistent with the European Resource Adequacy Assessment and national adequacy assessments*" (Regulation (EU) 2024/1747, Article 19e 1a).

1. What does "consistent" mean in this context?
2. How to ensure consistency requirements do not limit the AFN analysis?
    - For example, ERAA ignores revenues from ancillary services, excludes various energy storage technologies, and makes several simplifying assumptions that are important for assessing flexibility sources.

Principle 3: Designing Robust Scenarios

3.1 Overview

Flexibility needs for any territory cannot be defined once and for all based on the analysis of a single scenario. Different plausible scenarios of the electricity system, as well as sensitivities, need to be designed to determine flexibility needs in a robust way.

First, power mix scenarios should be subjected to a sufficiently large panel of individual (not averaged) climatic variations to analyse how the power system responds to different series of weather conditions. Flexibility needs span time-scales from ramping to dunkelflaute type events, for example, and will need to be captured.

The Belgian TSO Elia in its study on Adequacy and Flexibility is exemplary of best practices. Several sensitivities are carried out considering different rates of electrification, deployment of renewables, share of EVs and HPs participating in the market, among others (Adequacy and Flexibility Study for Belgium, p. 216). Carrying out several sensitivities in the AFN is necessary to quantify the magnitude of key assumptions. At the same time, it is important to ensure that the results are still able to clearly inform policymakers when they set indicative targets.

EASE – European Association for Storage of Energy

Avenue Adolphe Lacomblé 59/8 – B-1030 Brussels – tel: 02.743.29.82 – fax: 02.743.29.90 – info@ease-storage.eu – www.ease-storage.eu

3.2 Open Questions

1. Is the design of scenarios part of the methodology?
2. Should the methodology help inform how to interpret the AFN results to reach a non-fossil flexibility target, as well as targets for energy storage and demand response?
3. How do you determine whether investments in non-flexibility sources will materialise, thereby requiring, or not, non-fossil flexibility support schemes?

EASE – European Association for Storage of Energy

Avenue Adolphe Lacomblé 59/8 – B-1030 Brussels – tel: 02.743.29.82 – fax: 02.743.29.90 – info@ease-storage.eu – www.ease-storage.eu

Conclusion

The implementation of the AFN methodology by MSs is expected to play a significant role in directing investments towards non-fossil flexibility solutions, including energy storage and demand response. In applying the guiding principles above and investigating the open questions further, the AFN methodology can provide a solid foundation for MSs to integrate greater shares of variable renewables. This paper's guiding principles seek to address several risks in the development of such a methodology. Defining the scope of flexibility needs could indirectly disadvantage some flexibility solutions over others by ignoring revenue stacking opportunities of energy storage. Applying simplifying assumptions or restrictive modelling approaches may not provide a level playing field for flexibility solutions to compete. Finally, analysing a limited set of scenarios may be insufficient to inform policymakers of different possible futures when they are setting non-fossil flexibility targets. Given the new legislative provisions impose a clear and strict timeline for the development of the methodology, it is critical to pragmatically address these challenges and possible shortcomings without delay. It is key that stakeholders are consulted going forward on the pertinence of different methodological approaches. Finally, EASE welcomes further discussion on what could be the logical steps to implement the methodology from scenario design to investment planning.

EASE – European Association for Storage of Energy

Avenue Adolphe Lacomblé 59/8 – B-1030 Brussels – tel: 02.743.29.82 – fax: 02.743.29.90 – info@ease-storage.eu – www.ease-storage.eu

***

About EASE:

The European Association for Storage of Energy (EASE) is the leading member - supported association representing organisations active across the entire energy storage value chain. EASE supports the deployment of energy storage to further the cost-effective transition to a resilient, carbon-neutral, and secure energy system. Together, EASE members have significant expertise across all major storage technologies and applications. This allows us to generate new ideas and policy recommendations that are essential to build a regulatory framework that is supportive of storage.

For more information please visit www.ease-storage.eu

***

Disclaimer:

This content 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.

***

Contact: Martin Roach | Senior Energy Analyst | m.roach@ease-storage.eu

European Association for Storage of Energy

Avenue Adolphe Lacomblé 59/8
1030 Brussels | Belgium
Tel: +32 2 743 29 82
@EASE_ES

www.ease-storage.eu
info@ease-storage.eu