11/09/2023

Future Cleantech Architects' response to the consultation on Terna's assessment "*STUDIO SULLE TECNOLOGIE DI RIFERIMENTO PER LO STOCCAGGIO DI ENERGIA ELETTRICA*"

Future Cleantech Architects gGmbH (FCA) would like to provide its feedback on Terna's assessment "STUDIO SULLE TECNOLOGIE DI RIFERIMENTO PER LO STOCCAGGIO DI ENERGIA ELETTRICA," in line with Resolution 247/2023/R/EEL and open for consultation until 4 September 2023.

Future Cleantech Architects is an independent, science-based think tank working exclusively on hard-to-abate sectors. We exist to close the remaining innovation gaps to reach net-zero emissions by 2050. To reach this objective, we accelerate innovation in critical industries, and our primary mission is to promote sustainable solutions that accelerate the transition to a low-carbon energy system. With this mission in mind, we wish to stress the following points in our response:

1. **The importance of covering all energy storage solutions while opting for solutions with a high Technology Readiness Level** (TRL). It is crucial not to close the door to a variety of energy storage solutions that could help foster the deployment of renewable energy solutions in the future, but also to ensure that these solutions have proven successful industrial applications.

2. Accordingly, FCA suggests that **innovative technologies be admitted** to the tenders for the purchase of energy storage capacity when, as a mandatory requirement, **they demonstrate high technological reliability of systems** and which use well-known proven equipment that market operators consider reliable enough to guarantee their operation and performance.

3. In response to the question on page 12 of the study, we also strongly recommend the **inclusion of Thermal Energy Storage** (TES) for power-to-heat-to-power facilities in the list of technologies. This omission is notable, as TES represents a well-established and promising solution for energy storage.

4. In particular, within thermal energy storage, molten salts coupled with steam generators (high-temperature TES for heat-to-power facilities) already exceed 20 GWh worldwide [1]. While many of these installations are associated with Concentrated Solar Power plants, these systems can also be implemented independently, using electrical input. **This commercial maturity underscores their readiness for inclusion in energy storage auctions**. Furthermore, apart from molten salts, various other high-temperature thermal storage materials, such as sand, gravel, and bricks, exhibit high TRL and are suitable for heat-to-power installations.

5. We also urge a reconsideration of the 10 GWh threshold for minimum global installed capacity. While this criterion may be well-intentioned, it is **overly restrictive and may exclude technologies that possess a high TRL but are still in the early stages of commercialization**. This exclusion perpetuates a cycle where promising technologies struggle to gain traction and develop further.

6. **Flow batteries, Compressed Air Energy Storage (CAES), and Liquid Air Energy Storage (LAES)** are notable examples of technologies with high technological maturity that currently **fall below the study's threshold for commercial deployment. Nevertheless, they have already been commercially deployed at plant scale globally**. Flow batteries, for instance, have over 1 GWh of installed capacity globally [2,3], while CAES plants have achieved several GWh of installed capacity (including diabatic) [4,5]. It is essential to acknowledge these accomplishments and consider their potential for future energy storage auctions.

7. Terna's approach to update this study every two years to reflect newly established technologies is very welcome. However, the urgency of the climate challenge calls for faster adoption of new technologies. Therefore, we suggest **reserving a significant portion of the auction specifically for innovative technologies**. This approach would accelerate the commercial maturity of new solutions, potentially driving down costs, reducing long term risks associated with their deployment and making them more attractive.

Sources:

[1] IEA - Renewables 2021: https://iea.blob.core.windows.net/assets/5ae32253-7409-4f9a-a91d-1493ffb9777a/Renewables2021-Analysisandforecastto2026.pdf

[2] Sankaralingam et al. 2021 https://doi.org/10.1016/j.est.2021.102857

[3] Energy Storage News 2022 https://www.energy-storage.news/rising-flow-battery-demand-will-drive-global-vanadium-production-to-double-by-2031/

[4] Huntorf 2001 http://www.fze.uni-saarland.de/AKE_Archiv/AKE2003H/AKE2003H_Vortraege/AKE2003H03c_Crotogino_ea_HuntorfCAES_CompressedAirEnergyStorage.pdf

[5] http://www.eseslab.com/ESsensePages/CAES-page