Proposal 1

AEMO to update and publish the technical and operational guidelines relating to FCESS quantification and dispatch processes: ESS Quantities WEM Procedure, DFCM process, RTFS process, and SESSM documentation.

Consultation question

Do stakeholders support the proposal for AEMO to update and publish these technical and operational documentation?

Do stakeholders consider there is additional documentation pertaining to the ESS requirements and processes that is missing or require review?

Comments:

SFW supports the proposal for AEMO to update and publish technical documentation relating to how the FCESS quantities are estimated and dispatched. It is difficult to establish whether the ESS quantities currently being procured are optimal without first understanding the underlying models in detail. In particular, the interaction between the procurement of Contingency Reserves and RCS is unclear. The linkages between the RTFS used to procure RCS and the DFCM used to determine the quantity of Contingency Reserves required needs to be clearly understood by stakeholders. It would also be helpful to understand how the quantity of RCS procured in a trading interval influences the Contingency Reserves with some concrete examples provided. These examples can also be linked to the RTFS and DFCM models and their formulations.

Proposal 2

AEMO to review the inputs, parameters and assumptions for the DFCM and test whether they should be updated to reflect current system conditions, and drive relevant and correct outputs.

Consultation question

Do stakeholders support the proposal for AEMO to review the inputs, parameters and assumptions for the DFCM?

Comments:

Ideally, the differences between the “offline” DFCM and the “online” RTFS should be reduced as much as possible to minimize dispatch interventions by AEMO. This is especially important considering that the DFCM generated lookup table serves as an input to the WEMDE. In this context, the DFCM needs to be kept updated at a well-defined frequency. SFW supports the proposal for AEMO to review the inputs, parameters and assumptions used in the DFCM. Furthermore, SFW suggests that AEMO undertake a review of the inputs, parameters and assumptions at frequent, well-defined intervals. Additionally, SFW suggests that AEMO publish more details about the inputs used by the DFCM, the exact model of the DFCM and how the lookup table is generated for use in the WEMDE. This will allow stakeholders to appreciate the complexities involved in regulating the frequency in a transitioning SWIS.

Proposal 3

Increase the RoCoF Safe Limit from 0.25 Hz per 0.5 seconds to 0.75 Hz per second to reduce the need for AEMO interventions.

Consultation questions

Do stakeholders support the proposal to increase the RoCoF Safe Limit from 0.25 Hz per 0.5 seconds to 0.75 Hz per second to reduce the need for AEMO interventions?

Do stakeholders have supporting documentation to demonstrate that the proposed increase to the RoCoF Safe Limit may endanger existing Facilities?

Comments:

SFW generally considers an increase in the RoCoF safe limit from the current levels to be reasonable. The reasoning provided for selecting 0.75Hz/s appears to be arbitrary. It is not clear if the proposed value is 0.75Hz/s over 500ms. SFW suggests that further detailed technical studies be conducted before the proposed value is finalized. The proposed values are unlikely to be an issue for major OEMs.

Proposal 4

AEMO to implement a monitoring program over a twelve-month period to track the amount of headroom and footoom available from unaccredited Facilities or non-dispatched FCESS Facilities to better quantify MPFR availability to assess the level of Contingency Reserve Raise and Lower that could be provided from the inclusion of MPFR.

Consultation question

Do stakeholders support the proposal to establish a twelve-month monitoring program for AEMO to track the amount of headroom and footroom available from unaccredited Facilities or non-dispatched FCESS Facilities?

Comments:

SFW generally welcomes the consideration of MPFR while estimating the levels of required Contingency Reserves. It is worth pointing out that MPFR is remunerated in markets such as the UK (called the Mandatory Frequency Response). Is the plan to monitor the MPFR availability a precursor to the introduction of an MPFR product in WA? It would be interesting to calculate the savings under the assumption that MPFR is a paid service. Furthermore, the calculations behind the numbers presented in Table 8 is unclear. How did the Regulation Lower expenses increase on 12/02/25 at 3pm? It would be worthwhile for EPWA to provide some clarity on the thought process behind this exercise and the future unbundling of frequency response services in general. Finally, the rationale behind excluding CCGTs from the provision of MPFR appears rather flimsy. CCGTs are not excluded from providing MPFR or similar services in other markets. In any case, SFW supports an extended period of study to estimate the MPFR while taking into account some of the considerations mentioned above.

Proposal 5

Assess of suitability of synthetic inertia (RCS) from BESS in complementing synchronous inertia from rotating machines, and consider potential barriers and suitable incentivisation for grid-forming BESS to provide such services.

Consultation questions

Do stakeholders support further analysis and assessment by AEMO to assess the suitability of synthetic Inertia from BESS in the WEM?

Do stakeholders support further investigation to better understand the incentives required to support this?

Comments:

With the development of multiple large projects in WA, it is important to estimate the potential contribution of BESSs to inertia in the SWIS. However, grid forming inverters are unlikely to be the ‘silver bullets’ of the energy transition in the SWIS. In this context, it is important that EPWA develops holistic policies which are technology neutral and are focused on solving the actual problem in the grid. As such, SFW strongly recommends against solely focusing on developing incentive structures for grid forming inverters. It is suggested that EPWA focus its efforts on formulating clear policies for service providers (irrespective of technology) to monetize the provision of inertia. Furthermore, the technical feasibility of synthetic inertia has been assessed by numerous grid operators globally. The financial implications to BESS operators of providing synthetic inertia needs to be carefully examined in the WEM context. The maintenance of adequate headroom and footroom for inertia provision is likely to significantly impact the charge/discharge profiles of BESS projects. As has been pointed out in the consultation document, this could result in lower revenues being earned via the RCM which may need to be compensated through other mechanisms. The maintenance of headroom/footroom BESS projects is also likely to significantly impact the overall dispatch profile of the WEM considering the outsized contribution of the big batteries in WA’s power system.

The NESO which was mentioned as an example in the consultation document has already successfully experimented with both real and synthetic inertia as products.

The Pathfinder program was used by the UK NESO to contract stability services including inertia and short circuit level (SCL). The first Stability Pathfinder in 2020 contracted 12 synchronous condensers to provide system inertia. The first Pathfinder was essentially restricted to technologies capable of providing “physical inertia”. while not delivering active power. Stability Pathfinder 2 was aimed at contracting SCL. In Stability Pathfinder 2, 5 BESS and 5 synchronous condensers were contracted. These projects are expected to provide about 6.7GVAs of inertia as well to the system. Stability Pathfinder 3 was also open only to providers of physical inertia and all the 29 contracts were awarded to synchronous condensers. The focus of Stability Pathfinder 3 was to procure inertia and SCL. NESO has moved beyond the Stability Pathfinder program to commercial market structures for contracting stability services. The D-1, Y-1 and Y-4 markets were designed to contract stability services at the day-ahead, one year ahead and four-year ahead levels respectively. The UK NESO has also designed the Dynamic Containment, Dynamic Regulation and Dynamic Moderation services to control system frequency. The details of these services are omitted here for the sake of brevity. The combined effect of these services is expected to reduce the minimum inertia level required in the system.

a. The average daily cost of inertia in GB between April 2024 and January 2025 for all the days when an action was taken due to low grid inertia, was 3460£/GWs, considering 30 min settlement periods. This cost does not discriminate which technology was used for inertia provision, or how the inertia shortfall was alleviated. While all of this cost cannot be directly attributed to BESS with grid-forming inverters (GFMs), it is still indicative of how inertia is valued by the system. To incentivize BESS projects to include GFMs in their design or new synchronous condenser installations, the ERA price cap for RCS needs to be revisited. Measures such as the uplift payments are unsustainable from a long-term perspective.

b. Inspired by the UK balancing mechanism, an alternative would be to evaluate the cost of utilizing the existing grid assets to maintain the minimum required inertia levels versus the cost of merit order dispatch and using the difference (weighted per GWs) as the reference for mid- or long-term contracts with new assets that can bridge the inertia gap. In this process, assets that can provide competitive bids are selected. This could potentially help new projects being developed to achieve FID. The contract length could be determined based on the envisaged asset lifetime.

c. Recent performance tests for synthetic inertia in the UK (from Stability Pathfinder 2) have been unsatisfactory. Synchronous inertia from the contracted synchronous condenser assets (from stability pathfinder 1) has been used successfully over the last couple of years at least, and satisfaction with the results has been reflected, for instance with the publication of Pathfinder 3. It is also important to emphasize that inertia is not the only product sought by NESO, as reduced SCLs are also associated with the declining adoption of conventional generation and is likewise included in the stability pathfinders.

The synthetic inertia provided by a BESS-GFM should also be quantified after discounting the response provided through FFR and other frequency control mechanisms according to a technical note published by AEMO in September 2024. FFR and synthetic inertia may overlap during the timeframe in which synthetic inertia is determined. A BESS-GFM without FFR can only slow the RoCoF without arresting the frequency drop. The FFR has a significant impact on inertia quantification when the setpoint of the BESS-GFM prior to a disturbance is away from its current limit. Finally, the ability of a BESS-GFM to provide synthetic inertia is also dependent on its SoC.

Focusing on synthetic inertia is focusing on one solution over others. A better approach is to define the performance goals while keeping the solution technology agnostic. Furthermore, grid stability needs a holistic perspective. System strength, voltage regulation and SCLs also need attention and solutions which can effectively address multiple issues need to be promoted alongside BESS-GFM. Synchronous condensers or mechanical energy storage solutions provide multiple benefits for grid operations including additional reactive power support, short circuit current contributions for correct relay operations and system strength. Mechanical energy storage technologies such as liquid air energy storage also provide black-start capabilities.

According to a white paper published by NERC, BESS-GFM does not address the issues associated with fault currents from IBRs which are needed for protecting the power system. The inverter current and voltage limits determine the ability of a BESS-GFM to withstand voltages outside nominal ranges. The ability of a BESS-GFM to supply energy during contingencies might be limited by the energy stored. In addition, BESS-GFMs need to be over dimensioned for contributing fault currents. Synchronous technologies such as synchronous condensers are capable of providing short-circuit currents several times their rated currents.

In summary, a narrow-minded approach focused on promoting synthetic inertia in the WEM can have unintended consequences. EPWA can take the lead in combining the system stability requirements and identifying solutions or combinations of solutions suitable for specific locations. A combination of BESS-GFM and mechanical storage systems or synchronous condensers might be the best solution to address all the stability issues in a decarbonized SWIS. As the AEMO technical note rightly notes in its executive summary, a lot of work needs to be done in order to understand the relationship and interchangeability between synthetic inertia and synchronous inertia. The same note also points out that the split between synthetic and synchronous inertia required to operate the grid in a secure operating state can only be understood with extensive studies.