

*****Email submission *****

From: Fernando Morales <fernando.morales@highviewpower.com>
Sent: Monday, 29 June 2020 6:46 AM
To: Future Energy <FutureEnergy@aemo.com.au>
Subject: RIS Stage 1

Dear Sir/Madam,

I hope this email finds you well. I welcome the opportunity to provide some comments on the RIS Stage 1 report. I work for an award winning company that designs and develops synchronous locatable energy storage suitable for utility scale, long duration applications. I have been following the development of different ancillary services markets for our technology starting in Ireland through the DS3 programme and then ERCOT in 2015 when they proposed Synchronous Inertial Response. Most recently I have been Involved in responding to the Stability Pathfinder RFI and tenders run by National Grid ESO and I am also following the development of a grid code modification Related to virtual synchronous machines or grid forming inverters.

<https://www.nationalgrideso.com/industry-information/codes/grid-code-old/modifications/gc0137-minimum-specification-required>

Last year I worked on a paper published by the European Association for the Storage of Energy where I cited some of the materials produced by AEMO on the challenges you were identifying regarding short circuit level and inertia.

I would like to compliment you for the excellent work on the RIS website, I found it very useful and the video with the summary of Stage 1 findings is also a very good way to present the results of this important study.

Having been looking at the challenges posed by the increasing levels of System Non Synchronous Penetration for so many years I realise this is a very complex task that requires a holistic approach. I believe that in order to maximise socioeconomic welfare any integrated system planning cost benefit analysis should look at system stability in broader terms and should cover all scarcities to be faced by the relevant power system when operating with high levels of renewable generation. These can be categorised as follow:

- Frequency stability and control
- Inertia
- Short Circuit Level
- Voltage Control
- Rotor Angle Stability
- System Congestion
- System Restoration

I can see Frequency, Short Circuit level, Voltage and Inertia well covered in the RIS Stage 1 report. However I couldn't find your views on challenges posed by Rotor Angle Stability scarcities. I see with concern that most system operators see Synchronous Condensers as a solution for inertia and other stability issues. The only grid operator that has published analysis on this matter is ERCOT and lately EirGrid is performing more studies. We performed rotor angle stability transient modelling based on requirements presented in Phase 1 of the Stability Pathfinder run by National Grid ESO and verified severe oscillations for Synchronous Condensers (even those fitted with flywheels) under certain conditions. If rotor angle stability system wide scarcity were to emerge then this will likely result in system collapse, as the separation of remaining synchronous generators would inevitably lead to electrical centres forming on some of the lines that connect these groups and it is unlikely that this separation of the system will result in the formation of secure, stable or even adequate islands. ERCOT has also identified oscillations in their Dynamic Stability Assessment when a number of

synchronous condensers are deployed. I would also be interested to know more about your views on tacking issues related to System Congestion and Restoration. In the UK the system operator launched the Constraint management pathfinder and in Germany Tennet has been the first to introduce the concept of Netzbooster. The difference is that Tennet is proposing the concept as a post fault service whereas National Grid is technology agnostic and would adapt the service for synchronous storage technologies. Regarding System Restoration National Grid launched distributed Re-Start and has identified energy storage as an important contributor with synchronous storage playing a major role given the challenges of keeping stable islands during block loading operations.

Finally, I am not familiar with the Integrated System Planning process in Australia. However as a general consideration I note an overlap between gas and electricity infrastructure where electricity storage and energy efficiency could play a role. To maximise socio economic welfare an achieve decarbonisation targets there is a need to take a more holistic view on energy infrastructure planning at the earliest and I believe the electricity system operator would be in the best position to lead this work supported by the regulator and industry. There is a need to make sure that Integrated System Plans are aligned with carbon target policies and I note a clear trend in funding availability towards electrification. For example, the European Investment Bank has agreed to phase out its multibillion-euro financing for fossil fuels, including gas networks, within 2021.

I remain at your disposal for any further clarification and would ask you to add me to any distribution list you may have.

Sincerely,

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