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wind energy solutions

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First stage submission for consultation of the power system model guidelines

Dear Sir or Madam,

Senvion welcomes the opportunity to make a submission to AEMO's Power System Model Guidelines.

Senvion is a leading global manufacturer of onshore and offshore wind turbines. The company develops, produces and markets wind turbines for almost any location – with rated outputs of 2 MW to 6.33 MW and rotor diameters of 82 metres to 152 metres.

We have the following comments:

EMT - model release to third parties
The EMT models are IP restricted and not to be shared with third parties without consent of IP holders. The current power system model guidelines stipulates the release of those information without regards of confidentiality. E.g. original source code request.
A separate NDA with between the third party and Senvion must be signed. The release of the EMT model must be done by the manufacturer. Market participants who are our competitors or competitors of sub supplier must be excluded from model provision.

Up-to-date EMT models for existing projects
EMT model developments are cost and labor intensive especially in case of an EMT model being required for wind turbines currently operating. Model requirements from the past and current model requirements under discussion are very different. Processes are in place to meet the current requirements for current wind turbines.

EMT models are required for different type of studies
We agree that different type of studies require different type of models. We propose that AEMO specifies clearer the study requirements and validation methods. We have years of experience to be able to propose a model to meet AEMO's requirements for specific studies. EMT specific models can only be example guidance models and not prescriptive requirements to secure high quality of results from studies under consideration of wind turbines designs.

EMT models for transient stability

The models for transient stability studies are to our understanding the models which are intended to be shared with market participants under consideration of the comments above. As it has to operate correctly over a wide range of time steps (10 – 50μs), simplification are necessary e.g. converter and converter switching representation. Implicitly it would mean to have available a wider variance of model types for different applications (PSS/E models, simplified EMT models, detailed EMT models, …).

Torsional stress, fatigue and thermal design limits

"Torsional stress and fatigue on shaft" and "thermal design limits of the integral assembly of the plant" is not required to study full performance during system impact studies. Further different simulation models types would be required to answer those topics properly – this is typically out of scope for grid simulation models.

Source Code submission

In chapter 5.4.9 of the power system model guidelines it is written that "AEMO accepts RMS model source code natively developed in FORTRAN 90 or higher."

Senvion provides models including source code and compilation routines without only using FORTRAN code. Apart from that the models are in line with the guideline.

We would propose to accept C – Code (or similar) additionally, as C is a common programming language, widely used and taught at universities and can be handled by the majority of engineers. Conversion of any source code into FORTRAN code not only creates additional costs and does not have a direct benefit but may even create additional risks for translation errors.
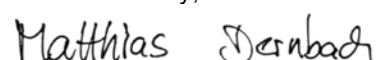
The Senvion approach also includes the flexibility to use the same simulation model in different simulation software and is therefore more future-proof. We would be pleased to present AEMO our source code proposal.

Model validation

It is proposed to base model validation requirements on international standards, such as "IEC 61400-27-1: Wind turbines – Part 27-1: Electrical simulation models – Wind turbines". This standard proposes in chapter 6 detailed methods for demonstrating the quality of model validation by following international standards (such as data sampling methods from IEC 61400-21) and at the same time opens up the possibility to define accuracy limits through the system operator. This standard also includes to judge model validation errors based on per unit data rather than on the specific change of quantity. The proposed method in the Power System Model Guidelines is concerning when evaluating very small changes (getting into numerical issues) - while the effect on system stability is very low.

Please feel free to contact us in case you require further information.

Yours sincerely,

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