



19 April 2017

John Pierce
Chairman
Australian Energy Market Commission
PO Box A2449
Sydney South NSW 1235

Submitted online: www.aemc.gov.au

REF: ERC0219

Dear Mr Pierce

NATIONAL ELECTRICITY AMENDMENT (Generating System Model Guidelines) RULE 2017

Origin Energy Limited (Origin) welcomes the opportunity to comment on the proposed rule change that seeks increased information gathering powers for AEMO when undertaking system modelling exercises.

Origin Energy has contributed to many aspects of the current generator modelling requirements and believes any discussions around modelling must include an examination of the entire process which encompasses modelling, evaluation and validation testing. Any changes to one of these requirements will impact the other; as such the overall impact must be assessed.

Over the past 10 years, Origin has worked with AEMO on the development of new projects, modifications to existing plant and undertaken modelling for SRAS and FCAS ancillary services across different NEM regions. We have also worked with the relevant Network Service Providers (NSPs) and a variety of consultants and contractors to provide accurate and timely data.

Origin supports the use of models to assist AEMO in power system management, but notes there are a number of deficiencies with the current process in that it lacks consistency and transparency. We are concerned that the proposed rule will exacerbate these issues and increase participants costs, for limited benefit to the NEM overall.

In summary our key points are:

- While useful, there are limitations to modelling as it does not always provide an accurate representation of true operational conditions. It is therefore important that the intended uses and expected output of any modelling takes into account its inherent shortcomings. More data and additional modelling is only warranted where it will provide a net benefit.
- Requesting data based on "AEMO's Reasonable Opinion" could result in significant costs to participants with no clear means of evaluating the need for the requested data. Rather than allowing "AEMO's reasonable opinion" to be the basis of when information is required and when studies are to be carried out, the rules should specify under what circumstances certain data elements and models are required.
- The current modelling processes can be improved by designing an information request process between AEMO, NSPs and industry. This would clearly define the data requirements, responsible parties, information sharing protocols, expected outcomes and timeframes.

Should you have any questions or wish to discuss this information further, please contact me on Derek.Freeman@originenergy.com.au or (07) 3512 4026.

Yours sincerely,

Derek Freeman
Lead Electrical Engineer, Origin Energy

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Limitations of Generator and Network Modelling

Generators, loads and networks are made up of many elements working together to maintain system security. Due to the number of interconnected systems, modelling is a useful tool to help analyse and predict network behaviours of these complex interactions within the NEM.

However Origin's experience suggests that there is an overreliance on theoretical modelling at the expense of industry knowledge and good engineering practice. Modelling has helped with the integration and establishment of settings for generation plant, but it has also become an obstacle where:

- Models identify operations to be unachievable where it has been demonstrated that certain operations are possible and repeatable.
- Models fail to identify issues that have been raised as concerns through other methods.
- Conflicting results emerging from the use of different modelling software.
- Poor communication of performance requirements have resulted in additional investment that was not required.
- Additional modelling and performance requirements being pushed onto a participant to fix issues unrelated to the plant.

Modelling errors can include:

- Non-linear behaviours of equipment due to operating conditions and age.
- The inability of a model to account for every aspect of an equipments design and operational capability.
- A variety of incorrect assumptions about current and future network operations.
- Inability for modelling software to accept common operating practices used on some plant.
- Differences in model accuracy, type and detail for different participants and network users.
- The inability to communicate how modelled outcomes have been influenced by the physical attributes of the power plant.

Some of these errors can be addressed through increasing the details of the models, increasing the validation testing and tuning and increasing the variety of scenarios the models are applied to. All of this comes at the expense of time and cost, sometimes with limited benefit

Origin is aware that as reaction times to system events get smaller and there is an increased need for inertia and frequency response, modelling will become very important to ensure systems interact with each other in a co-ordinated manner. However, modelling will have inherent errors and decisions must allow for an acceptable level of error. Additionally modelling should not displace other methods widely accepted by industry including good operating practice and industry experience.

The current data gathering process has a number of inefficiencies

The current process requires the Generator, Network Service Provider (NSP) and AEMO to perform various system modelling studies. Often there is significant overlap in this process including duplication of previous evaluations because some data is not available to all participants. Additionally decisions are not transparent between these groups due to privacy concerns. This process is far from efficient.

It is also very difficult to communicate or provide clarity around projects and operational planning due to the level of uncertainty associated with some projects. In working with various NSPs, our observation has been that the process is inconsistent as there are different expectations and opinions within each of these NSPs regarding the obligations and responsibilities for each participant. AEMO and the NSPs are able to claim from the generator, costs associated with the modelling works. The cost of these inefficiencies is borne by the generator and ultimately passed onto consumers for cost recovery.

The modelling, evaluation and testing that is required as part of the generator registration process, i.e. meeting generator performance standards, can cost a participant between \$500,000 and \$1,000,000 for a new generation unit or any significant modification to existing plant. This cost alone could be factored into a project, but with a lack of clarity, accountability, and control surrounding the process; the final cost can significantly differ from original estimates. This adds significant contract risk to a project and increasing the quantity of data required by AEMO will only increase both costs and risks.

Where upgrades to obsolete equipment are required, modelling costs can, and have resulted in, projects becoming cost prohibitive to a company. Origin questions the benefit of such detailed studies where other evaluation methods and continuous monitoring systems can provide real data relating to a machine's performance. The majority of the data required for the requested models is of minimal benefit to the generator and is only obtained and provided at the request of the NSP and/or AEMO.

Plant operators will often look for opportunities to optimise processes and systems to improve efficiency or provide increased performance. These benefits are minor when compared with the overall plant and are normally only done where there is a positive cost/benefit ratio. If there is a requirement by AEMO to undertake more detailed modelling of all systems in a generation plant, this will likely prevent some of these minor improvements being realised, as the costs will outweigh the benefits.

Origin has also had experiences where AEMO has requested additional data to such a level of detail that the Original Equipment Manufacturer (OEM) or plant designer has not been able to produce suitable data. As such, Origin is often challenged by these companies on the need for such data which comes at both a financial and relationship cost.

Data provision under 'AEMO's Reasonable Opinion'

AEMO's ability to request data based on its "AEMO's Reasonable Opinion" is likely to place an undue burden on participants where they do not have the ability to determine or challenge the reasonableness of this information request.

Origin's experience with additional data requests and assessments to date has indicated there is often limited consideration of the difficulty in obtaining some of this data. Additionally there has been no transparency or justification for the data request or assessments it was provided for.

Rather than allowing "AEMO's reasonable opinion" to be the basis of when information is required and when studies are to be carried out, the rules should specify under what circumstances certain data elements and models are required. This would help clarify the process and inform participants as to the purpose of the data. For example this process could identify which parties (AEMO, NSPs or generators) were responsible for particular data sets and clearly define a stated end goal and/or projected outcome. This would be beneficial in clarifying a participant's data obligation.

Origin would like to propose the option for generators to install standardised high speed and trend recorders where they see the benefits outweighing the costs. This would aim to negate the need for a large portion of the ongoing modelling requests, as historical data can be directly inputted into the models. Allowing industry, in close consultation with AEMO and NSPs, to develop a specification that can be read directly into the models will save both time and financial costs to NEM participants.

The current process sees AEMO or NSPs asking generators for historical data, which may be in a non-standard format and require data validation. This process is inefficient because multiple parties have to provide data sets, ensure it is the correct format and potentially undertake additional external modelling to validate the data. By allowing a standardised recorder to be located at a participant's connection point, it will save process duplication and external consultant costs which will be beneficial to participants overall.

Finally Origin believes that there could be greater representation by industry on the NTNDP technical working group which examines how modelling outcomes for AEMO and NSPs are utilised. This will

allow industry experience to become part of the current modelling practices and result in better models based on real world conditions.

Summary of the issues

1	<p>Better defined modelling requirements</p> <p>The requirements and purpose of registration, modelling and assessment are vague and make it hard to accurately contract, control and defend decisions made regarding the modelling requirements. The intended purpose of modelling is too broad and does not always provide accurate representation of operational conditions, as such there is a need to better define the needs and boundaries of modelling as well as a system to ensure the process can be carried out efficiently and fairly.</p>
2	<p>Information gathering</p> <p>The cost associated with having 'AEMO's Reasonable Opinion' would be high as it will not only apply to the data, but the requirements for generators to model the new data/scenarios and then validate any new parameters provided. There are significant external modelling costs placed on generators when providing additional data and Origin is cautious about increased data requests without any justification and the uncertainty of compliance costs.</p> <p>Origin suggests a solution may be to use high speed recorders and systems to monitor and record unit performance. This would provide AEMO with 'real' data, not modelled and validated with artificial events. It would also provide them updated inputs as plant performance changes over time and in different conditions.</p>
3	<p>Cost of compliance</p> <p>The current modelling and validation requirements can make a project prohibitively expensive. For example, an AVR or governor upgrade to an existing unit requires extensive modelling and validation to be undertaken to meet generator performance standards. In our experience modelling proved to be the highest proportion of the project costs for a contemplated upgrade which was subsequently withdrawn due to overall costs, exceeding the expected benefits. We are concerned the proposed rule would add to the cost of modelling, adversely impacting the economics of generation projects.</p> <p>Uncertainty surrounding AEMO data requests, changes, or additional performance tests makes contracting for this work difficult and expensive. Budgets for consultants must take into account the risks associated with changes to scopes, models, and requirements. Origin's experience with some of the additional data requirements have found requests for data on equipment that the OEM and plant designer did not have. As such there is an additional cost to study or test plant to find this data.</p> <p>Origin is wary if the data requirement is expanded to include secondary and/or non-primary plant, the data will be impossible to obtain to the accuracy requested by AEMO. It would require either some form of testing or assumptions to put together a model which would again be at an added cost to generators.</p>
4	<p>Data Disclosure</p>

	<p>It is highly unlikely that all data will be willingly shared with third parties due to copyright concerns from OEMs. Often data is not available to the generator due to intellectual property concerns and as such, any information requests from AEMO requesting this data will be highly guarded or only provided in generic terms, which would be of limited value.</p> <p>The existing processes have demonstrated inefficiencies by requiring the same works to be carried out by multiple parties (AEMO, NSPs and generators) which are not shared. Duplication of work is inefficient and wastes time and financial resources.</p>
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