



Efficient reactive current access standards for inverter-based resources

Consultation starts on a proposal to change the reactive current access standards that apply to inverter-based resources to better reflect the needs of the system

The AEMC has published a consultation paper seeking stakeholder feedback on two rule change requests, one from a consortium of wind turbine original equipment manufacturers (OEMs) and the other from Renewable Energy Revolution Pty Ltd (RER). The rule change requests are being considered together as they both propose changes to the standards with which connecting generators must comply, with the aim of ensuring the needs of the power system are met without connecting generators being subject to undue requirements.

Access standards require connecting plant to meet certain performance benchmarks to ensure the system can remain stable and secure

Generators, loads and bi-directional units must prove that they can comply with a suite of 'performance standards' when they connect to the NEM. This is to ensure that connecting plant behaves in a predictable manner that benefits the security and stability of the power system, both under normal operating conditions and following disturbances. The rules specify minimum access standards, below which plant will not be granted permission to connect, and automatic access standards, above which plant cannot be denied permission to connect on technical grounds. Connecting applicants negotiate with the relevant network service provider (NSP) to connect at a level that is usually somewhere between the minimum and automatic standards.

The Commission is initiating and consolidating two rule change requests relating to reactive current access standards

The Commission is currently considering two rule change requests relating to the access standards that inverter-based resources must comply with to connect to the NEM. One was submitted by Renewable Energy Revolution Pty Ltd (RER) on 2 April 2019 and the other by a consortium of wind turbine original equipment manufacturers (OEM) on 11 March 2021. The Commission has decided to consolidate its assessment of these two rule change requests, as both proposals relate to the reactive current fault-response that should be required of connecting plant.

Power system equipment and loads are designed around certain operating voltage ranges. Hence, voltage needs to be regulated to ensure proper operation of the power system and the connected loads. In contrast to frequency regulation, which is a system-wide need, the need for voltage regulation is localised. The voltage profile itself should be within acceptable harmonic levels and be held sufficiently far from the point of voltage collapse to minimise the risk of cascading failures. Where active power is the tool used to manage frequency, reactive power via reactive current is used to manage voltage levels.

The wind turbine OEMs have identified several issues with the existing reactive current fault-response minimum access standard that stipulates the amount of reactive current capability that inverter-based generators must provide following a fault. They consider that:

- the standards are set at an inappropriate level
- compliance is not defined in a way that is mutually understood by AEMO, TNSPs and connecting proponents
- inconsistencies exist between these and some related standards that make it difficult to

comply with all of them

Similarly, RER considers that the existing reactive current injection standard is inappropriate for network regions with certain impedance characteristics described by low reactance to resistance ratios (X/R). They have proposed that it should be changed to a standard that varies with connection-point X/R, to better reflect the feasibility of tuning the reactive current response to meet the current connection point standards.

We are seeking your views on the proponents' solutions to address the problems identified and whether there are alternatives that the Commission should consider

RER has proposed a move away from the current static maximum reactive current fault-response requirement of 100% of the unit's maximum continuous current. Instead, they have recommended a maximum reactive current response that is less than 100% and varies based on the X/R ratio of the connection point. They suggest this is because, at low X/R ratios, active power can help support voltage, like reactive power, with this effect decreasing as the X/R increases. Mandating a maximum reactive current response of less than the maximum continuous current would allow a greater amount of active current response, further supporting voltage.

The wind turbine OEMs have proposed several changes to the reactive current fault-response minimum access standard that they consider will:

- resolve the risks to the commercial viability of new generation and investment duplication by lowering the minimum level of reactive current capability that generators have to install at the connection point to zero
- resolve challenges with coordinating a generator's reactive current response by both shifting the point of compliance assessment from the connection point to the generator unit terminals and by making the standards describing the characteristics of that response (i.e. when a response should commence, and how quickly it should stabilise) less onerous
- resolve other issues that are creating uncertainties for the grid approvals process by clarifying potential conflicts between obligations to provide a reactive power response that helps maintain stable voltage levels and an active power response that helps maintain stable frequencies.

Next Steps

The consultation paper sets out a range of questions for the purpose of seeking stakeholder feedback, including questions on:

- the proposed framework to assess whether the rule requests, or any alternatives, meet the National electricity objective (NEO)
- whether the problems proposed by the proponents are material and whether the Commission has characterised them correctly
- whether the changes proposed by both proponents will address the issues they each raise
- what benefits and costs stakeholders expect to see from the proposed rule changes.

Submissions to the consultation paper are open until **23 June 2022**. The draft determination is due by 3 November 2022.

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