

Economic Regulation Authority secretariat briefing note: Review of the method to set capacity values of intermittent generators

In July 2016, the obligation to periodically review key market methods transferred from IMO to the ERA. The transitional arrangements provide some flexibility on when the ERA can conduct the reviews. The exception is the review of the method for setting the relevant level of certified capacity for intermittent generators (also called the relevant level method), which has to be completed by 1 April 2019. The approximate timeline for the review is below.

EXPLORE 3 months (Apr-Jun)	SELECT 2 months (Jul-Aug)	DESIGN 4 months (Sep-Dec)	IMPLEMENT 3 months (Jan-Mar)
Framework and approach Identify and research issues Other jurisdictions Changes since last review	Formalise review scope Finalise project plan	Main research and analysis Propose method Draft report Publish draft report Formal consultation	Consider stakeholder feedback Final report and recommendations Rule change proposal(s)

This briefing note is to support an informal discussion with the Governing Body, planned for 8 May. The discussion will explore issues pertinent to certifying capacity for Intermittent Generators (IG), such as how we define, measure and forecast the contribution of IGs to meeting system reliability requirements. The discussion will cover background and commentary on the current method of estimation of the capacity value of IGs, and consider market changes since the last review, as set out below. It will also provide a summary of preliminary findings on approaches taken in other jurisdictions as part of a power point presentation.

In this 'Explore' phase of the project, the Secretariat is seeking input and advice from the Governing Body on relevant issues for inclusion in the project scope.

Each year, AEMO certifies generators' capacity to recognise their contribution to the reliability of electricity supply in the SWIS. Intermittent Generators by their nature have variable availability and output, with limited control to generate when needed. Initially in the WEM, IMO calculated the capacity contribution of IGs based on their average output over the course of a year (approximately 40 per cent of nameplate capacity for wind farms and 25 per cent for solar). The IMO considered this method did not align the capacity contribution of IGs to the reliability of supply and in 2010 commissioned Sapere Research Group to provide independent advice. Sapere's recommendations provided the foundation for the method currently employed for setting the relevant level of capacity for intermittent generators.

Key considerations

The contribution of a resource, regardless of the technology, to meeting the reliability target of the system underpins its capacity value. The method for the calculation of the capacity value of IGs in the SWIS should be consistent with the definition of the reliability target under the market rules¹, which specify that there should be sufficient available capacity in each capacity year to:

- a) meet the forecast peak demand that would not be expected to be exceeded in more than one year out of ten years, plus a fixed reserve margin; and

¹ The reliability target in the SWIS, called the planning criterion, is defined in clause 4.5.9 of the market rules.

b) limit expected energy shortfalls to 0.002 per cent of annual energy consumption.

To date, the first reliability criterion (part (a) above) has set the target amount of available capacity required in the system, and this has been sufficient to also meet part (b). Output from IGs is variable and therefore could increase the potential for energy shortfalls during both peak and non-peak demand periods. As the penetration of IGs in the SWIS increases, it is possible that the capacity that is sufficient to meet the first reliability criterion will no longer be sufficient to also meet the second criterion. Consequently, a capacity value determined only by IGs' contribution to peak demand periods may not ensure that the second criterion is met.

A commonly used approach for determining the capacity value of intermittent resources is the Effective Load Carrying Capability (ELCC) method.² ELCC is the additional (fixed) load that a resource can support, without a change in the system reliability. For a resource in the SWIS, ELCC is the additional load the resource can support while both reliability criteria (part (a) and part (b) above) are maintained.

Electricity markets worldwide use two broad approaches for the determination of ELCC. The first is a fundamental analysis, which employs coincident historic time series for demand, intermittent generation output and other random inputs (such as weather data and forced generator outages) to model the electricity system and simulate energy shortfalls. The second is an administered method that approximates the results of a fundamental analysis, based on simplifying assumptions. Approximation methods commonly use adjustments to the mean output of individual resources over the periods when the risk of energy shortfall is the highest.

An approximation method is currently used in the SWIS. The method bases its estimation of capacity value on the contribution of intermittent resources when the likelihood of energy shortfall is the highest. This is the average output of IGs over 60 trading intervals (from 12 separate days) in the preceding five years, when system net load (load for scheduled generation (LSG)) is the highest.³ To determine the capacity value of IGs, the method adjusts this average output by two factors K, which recognises the volatility of IG output, and U, which recognises that IG output deteriorates at maximum temperatures. The K-factor has been set to zero since 2015 and the U-factor has remained at 0.635 since 2014, when the IMO conducted the last method review.

On 1 March 2018, Collgar submitted a rule change proposal [RC 2018 03](#) to replace the use of LSG with IG output taken from actual system peak trading intervals. Collgar argued that the current approach discriminates against IGs because it “does not provide a link between the requirement for capacity to meet system peak periods and the ability of IGs to make capacity available during those peak periods.”

Given the extent of the overlap, the rule change panel has delayed its assessment of Collgar's rule change until after the ERA has completed its review. The rule change panel received seven submissions in the first consultation period, as summarised in the table below.

² Another common metric is effective firm capacity, which is a measure of the size of the equivalent firm capacity that is always available that would provide the same level of reliability in the system.

³ The LSG for a trading interval represents the system demand in the trading interval that would need to be met by scheduled generators. For a trading interval, LSG is measured by the total metered generation plus any voluntary or involuntary load reduction, minus the total generation by IGs.

Submission	Summary
AEMO	<ul style="list-style-type: none"> • Collgar's proposal would reduce the ability of the reserve capacity mechanism to support the reliability of the SWIS when compared to the current method. • The increasing level of IGs is shifting the greatest risk of involuntary load shedding from the highest demand periods to those of high (but not necessarily highest) demand and reduced capacity availability.
Community Electricity	<ul style="list-style-type: none"> • Decline the rule change proposal as the ERA will review the current method more comprehensively.
Noel Schubert	<ul style="list-style-type: none"> • Supported Collgar's argument that the current method does not suitably address the contribution of IGs during peak periods.
Perth Energy	<ul style="list-style-type: none"> • It is not prudent to pursue Collgar's proposal as the ERA has commenced the review of the current method. • The current reform package currently being undertaken by the PUO is likely to review the current method and other issues about the reserve capacity mechanism.
PUO	<ul style="list-style-type: none"> • Supported the proposal and stated that it will provide for improved alignment of capacity certification for IGs with their likely generation output during peak demand periods. • Reliability of the South West Interconnected System is placed under most stress during peak demand periods as capacity becomes scarce.
Shane Cremin	<ul style="list-style-type: none"> • Supported the proposal subject to cost-effectiveness • Noticed that it is to be balanced against the ERA's timeframe for the review of the current method.
Synergy	<ul style="list-style-type: none"> • Did not support Collgar's proposal. • Capacity certification for non-reliable resources should not be based solely on that facility's ability to meet peak demand without also considering the other unique ways that the capacity for IGs is treated (e.g. testing and refunds) in the RCM. • The use of the peak LSG intervals supports the main objective of the capacity mechanism, which is to ensure that sufficient capacity is available during periods of peak demand to meet reliability targets, so the calculation should remain as is. • Given that the current method efficiently assigns capacity credits to IGs where the "value" of those capacity credits is highest, Collgar's proposed change would promote economically inefficient capacity assignment to IGs.

Next steps

The Secretariat's next steps are to:

- Identify and conduct any initial research and analysis to include/exclude issues from the potential review scope;
- Establish a stakeholder working group and schedule the first meeting to discuss issues as raised and seek wider feedback through MAC and AEMO stakeholder forums; and
- Following feedback, provide a short paper to the Governing Body that includes a summary of issues and findings, recommendations on what to include in the review scope, and indicative timing and resourcing. If agreed by the Governing Body this will form the basis of the project scope and project plan for the method review.