Forecasting gas usage for gas-powered generation

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As the proposed east coast gas system (ECGS) projected assessment of system adequacy (PASA) rule proposes that AEMO determine the processes and methodologies to be used by AEMO to prepare demand forecasts, the Australian Energy Market Commission's (AEMC) has requested AEMO to provide this document to accompany the AEMC draft determination on the ECGS PASA rule change. It is intended to prompt consideration of how gas demand for gas-powered generation (GPG) should be incorporated into the PASA framework.

While the Australian Energy Market Operator (AEMO) has taken all reasonable care in the preparation of this document, the information should not be construed as advice.

Background

AEMO recognises the importance of early industry feedback on the development of a modelled approach to forecasting gas usage for GPG ("GPG demand") within the ECGS PASA framework. GPG demand will be a significant input into the PASA, and GPG usage in the NEM is difficult to forecast. In particular, AEMO is interested in exploring how different sensitivities – such as electricity market conditions, renewable generation variability, fuel availability and operational constraints - could be incorporated into the forecasting approach.

AEMO has undertaken preliminary analysis of GPG demand forecasting in its recent PASA report[1], which provides a foundation for further development. While the detailed methodology is proposed to be developed and implemented through AEMO procedures, its scope and direction may be shaped by the final rule as determined by the AEMC.

This document is therefore intended to support early thinking and discussion, ahead of any formal methodology development process.

[1] AEMO, *Developing a projected assessment of system adequacy (PASA) for the east coast gas system*, October 2024, at AEMO ECGS PASA Report.pdf.

AEMO's ECGS PASA report

AEMO's ECGS PASA Report highlights significant challenges in accurately forecasting gas usage for GPG. Analysis of existing data sources – including NEM data and Bulletin Board (BB) nominations and forecasts – found that GPG demand forecasts were inaccurate and highly variable. This makes them unsuitable as a standalone deterministic forecast for GPG demand. Given the variability in GPG demand driven by electricity market conditions, renewable generation output, and other operational factors, AEMO considers a centrally modelled approach to forecasting GPG demand could enable the use of multiple gas demand scenarios to better reflect uncertainty and support a more robust assessment of system adequacy.

The proposed approach involves AEMO developing its own GPG demand forecasts using available NEM data and BB data as key inputs. For non-NEM connected GPG, BB pipeline nominations and forecasts may be sufficient, subject to improvements in data quality. To this end, AEMO has recommended a mandatory obligation for BB shippers to provide rolling seven-day nominations to pipeline operators.

Despite the inherent difficulty in forecasting GPG demand, it is important that a transparent and consistent approach be adopted to be used for a short term (ST) and medium term (MT) PASA. The ST PASA is proposed to provide a rolling seven-day forecast of the supply-demand balance across the ECGS while the MT PASA is proposed to be a rolling 12-month outlook.

Indicative methodology and considerations

To support stakeholder feedback, this section outlines an indicative approach for forecasting GPG demand for the ECGS gas PASA. This is not a final proposal but is intended to prompt stakeholder views on appropriate forecasting methods, demand sensitivities and priority areas for development. Feedback on the scope, structure and limitations of the proposed methodology will help inform the development of AEMO's procedures and implementation activities if the proposed ECGS PASA rule is made.

Forecasting gas usage for GPG could involve a combination of:

- A modelled GPG forecast, constructed from electricity market data (demand, generator availability and renewable forecasts); and
- A scenario-based framework, which applies demand sensitivities to reflect uncertainty in GPG usage across different market/system conditions.

While both the modelled forecast and scenario-based framework could be used in each timeframe, their structure and emphasis may differ depending on the forecasting context:

Component	ST PASA (7-day)	MT PASA (12-month)
Modelled GPG forecast	Residual method	Probabilistic modelling using broader input assumptions
Scenario-based framework	Reflects near-term variability	Reflects uncertainty across seasonal demand, outages, fuel constraints etc.

AEMO already undertakes medium-term GPG forecasting through existing processes such as the Gas Statement of Opportunities (GSOO), which incorporates electricity sector modelling to forecast GPG gas demand under different planning scenarios. Hence, the focus on this document is on how to forecast meaningful GPG gas usage in the short-term

outlook. The following section outlines a proposed approach for short-term GPG forecasting.

Short-term GPG forecasting (ST PASA)

For the 7-day outlook, one approach to forecast GPG gas demand could be by using the outputs of NEM processes (forecast electricity demand, generation supply capacities) to determine the residual NEM demand that is required to be supplied by GPG. While some of these inputs are readily available, AEMO would need to develop a methodology on the specific approach to undertake this calculation.

This residual method reflects the role of GPG as a firming resource that provides dispatchable capacity to meet electricity demand not supplied by variable renewable generation or coal-fired power stations.

Given the high variability in GPG dispatch, AEMO could apply a scenario-based framework that reflects near-term operational uncertainty, to show sensitivities of the forecast GPG demand. A key proposed output from the gas ST PASA are forecasts of GPG gas demand that will be used to inform the broader adequacy assessment. The methodology must therefore produce credible, timely forecasts that are usable within operational timeframes given the 7-day outlook of the ST PASA.

Key considerations for implementation:

- Limits of inputs and forecast – It is not expected that an AEMO-modelled GPG demand forecast will be able to accurately forecast actual GPG gas demand. However, it would ensure transparency in approach and allow for sensitivities to test different scenarios, for example, the impact of a 10% increase in NEM demand or a low renewable generation day. The inputs such as NEM demand, renewable generation forecasts and generator capacities all have some level of inaccuracy that will propagate through to the GPG demand forecast.
- Firming role of GPG – operators of GPG are responsible for their own self-dispatch commitments and GPG is highly responsive to near-term NEM dispatch conditions, market prices, and outages, which makes short-term GPG demand difficult to predict with precision.
- Clarity, credibility and refinement – forecasts must be fit-for-purpose and support informed decisions under the gas PASA. AEMO expects the methodology will evolve over time, incorporating implementation experience and stakeholder input.

Consultation questions

The following questions are intended to guide stakeholder feedback on the indicative approach to forecasting GPG demand under the ECGS PASA. AEMO is particularly interested in views on appropriate forecasting methods, key demand sensitivities, and priority areas for development. Feedback on the scope, structure and limitations of the proposed methodology will help inform formal design work.

1. Do you agree with the use of a modelled, scenario-based approach to forecast GPG demand for the ST PASA? If not, what alternative methods should be considered?
2. Are there any specific inputs or assumptions (e.g. generator availability, variable renewable energy forecasts, fuel constraints) that you believe are particularly important to capture in the GPG demand forecasts? If so, how should these specific inputs or assumptions be captured?
3. For the short-term forecasts for the ST PASA,
    3.1. are the proposed inputs (e.g. NEM demand, generator assumptions) appropriate for forecasting GPG gas demand via a residual method?
    3.2. do you see value in using multiple short-term GPG demand scenarios? If so, what scenario types would be most useful?
4. Are there additional limitations or risks that should be considered during the design and implementation of the GPG forecasting approach?