Summary of Key Feedback about AEMO Draft Gas Forecasting Methodology

The Australian Energy Market Operator (AEMO) is bringing gas forecasting in-house to increase the transparency and to better service industry. Following review of the gas forecasting methodology options paper in March and April 2014, AEMO presented the draft gas consumption forecasting methodology to stakeholders in mid-May 2014. At the same time, it sought feedback from attendees, phone discussions and written submissions.

This document summarises the key feedback AEMO received in May and June 2014 from stakeholders. These stakeholders include Federal and State government departments, regulators, industry participants and industry bodies.

Stakeholder Comment	Stakeholder	AEMO Comment
General		
General feedback on process: • Big move, but in the right direction. • Generally comfortable with the methodology proposed. • Provides strong forecasting approach which is as objective and repeatable as possible. • Acknowledges that the intent of this project is to develop a gas forecasting approach that satisfies AEMO's requirements under the National Gas Law (NGL) to complete gas forecasts for the Gas Statement of Opportunities (GSOO). • Good to see frequent references to data reconciliation at appropriate points of the methodology. • Appreciates AEMO's effort to engage and communicate with stakeholders which will result in better forecasting methodology as well as better publish understanding of the process and final forecasts.	DEWS, Energy Australia, Envestra	**ACTION:** Noted and appreciated.

General feedback on the draft methodology: • Fuel substitution effect should be examined more closely in future. • Ensure consistency year-on-year for population projections and leaning towards Australian Bureau of Statistics (ABS) projections where they are available. • Avoid a strict definition of a 'large' customer. AEMO to identify those customers whose consumption is large relative to their forecast areas. • Definition of consumption should include at least compressor gas and unaccounted for gas (UAFG) as elements.	DEWS	**ACTION:** Noted. • Fuel substitution effect will be examined more closely in the 2015 National Electricity Forecasting Report (NEFR) and NGFR. • In 2014, AEMO engaged an independent expert to develop an economic outlook (including population) which is used consistently across gas and electricity. This will be the approach in 2015. AEMO will ensure that where applicable, this outlook refers to or compares to the ABS projections. • In order to maintain consistency across regions, in 2014 AEMO will define a large user. More specifically, large users will be defined as using a minimum of 0.5 PJ per year and users connected directly to the transmission pipelines. The success and appropriateness of this approach will be assessed in 2015. • AEMO intends to include compressor gas and UAFG in its forecasts, but our ability to do so will be dictated by the historic data we have access to. The data collection process is currently underway. AEMO will ensure that the treatment of UAFG and compressor gas is clearly defined in the NGFR.
Final Report		
Include a summary of ACIL recommendations as part of Executive Summary in the final document. Insert headers at top of each page for presentation purposes.	DEWS	**ACTION:** ACIL has summarised recommendations in the Executive Summary in the published document. **ACTION:** To maintain the integrity of the report, styling is consistent with ACIL's corporate branding. AEMO will consider the request relating to headers for future publications.
Improve presentation of Bulk Supply Point schematics.		**ACTION:** ACIL has amended the presentation of Bulk Supply Point schematics in the published document.

Are Liquefied Natural Gas (LNG) and Gas Powered Generation (GPG) methodologies and the economic outlook still open to consultation or are they final and set in stone?		AEMO is always looking to improve methodologies to ensure that our forecasting process is best practice. As such AEMO will accept feedback on publications at any point. If due to time constraints, AEMO is unable to address your feedback in the 2014 NGFR, it would be considered as part of the 2015 process. Please address feedback on GPG methodology, LNG Methodology and Economic Outlook to energy.forecasting@aemo.com.au
Data		
A significant level of data and cost will be required of industry to support AEMO's gas forecasting process. It is unclear how AEMO will accommodate the heterogonous data across the different networks. Does the benefit of augmenting the AEMO forecasts exceed the cost?	Envestra	AEMO is mindful of the burden of data collection and is working with industry to establish a balance between confidentiality, practicality and needs for the 2014 GSOO and NGFR. **ACTION:** AEMO will continue to investigate options for data gathering including collaborating with other organisations to streamline the process for 2015, having consideration for confidentiality concerns.
It would be useful to publish logical schematics of the gas network in NGFR in order to aid transparency but also noting that large gas users might not be willing to be identified. How did the Western Australian (WA) GBB manage to get large users onside?	DEWS	**ACTION:** AEMO will investigate the level of information/data detail it can publish while still protecting confidentiality. Under the WA legislation, large users are required to provide data to the WA GBB. It is uncertain at this point in time if there will be similar legislation for the GBB.

Stakeholders are interested to know what data information will be made available to them. • What delivery points are included in the forecast area? • What is the responsiveness of industry to change in gas prices with the large players? • What information should and shouldn't be publicly disclosed? • AEMO should ensure that the data session reflects current Gas Bulletin Board (GBB) review and Enhanced Pipeline Capacity Information consultations. It was noted that historical data provided in the past does not match GBB data.	General feedback	During the Options Paper workshop, AEMO indicated that it will hold a data session with stakeholders involved in the data collection. Due to confidentiality concerns, AEMO adopted a one-on-one approach with stakeholders involved in the data collection process. **ACTIONS:** • AEMO is currently working with stakeholders to obtain the data required to produce gas demand forecasts which are a key input into the GSOO. • AEMO's goal is to be as transparent as possible whilst maintaining confidentiality. The NGFR will reflect this, however as we are still collecting data, at this stage we are unable to definitively state what will be published. • AEMO will reconcile historical data with GBB data in the NGFR and publish as a supplementary document. • AEMO will summarise what it already has access to, current GBB review data and what data is confidential as a supplementary document to the NGFR.
Forecast component		
LNG forecasts should be consistent with domestic gas forecasts.	EUAA	**ACTION:** AEMO has engaged consultancy Jacobs to develop consistent forecasts of LNG export and associated gas and electricity consumption. On 20 June 2014, AEMO hosted a LNG forecast methodology workshop with stakeholders.
Request that AEMO clarify the role prices play in determining forecasts and whether they account for the iterative impact of prices on consumptions and vice versa.	Energy Australia	**ACTION:** On 20 June 2014 AEMO facilitated a workshop during which the methodology for forecasting gas price was presented. In 2014 gas price forecasts were based on forecast gas consumption as per the 2013 GSOO. AEMO will consider incorporating feedback loops as part of the 2015 NGFR.
1-3 year outlook is fine for real world objective (electricity) but gas forecasts should be for 1-5 years outlook. Due to LNG project and gas demand changing, short-term forecast is important to provide granularity.	Energy Australia, EUAA	**ACTION:** Similar to the NEFR, and consistent with the GSOO, the 2014 NGFR will contain a long-term (20-year) gas forecast, with an emphasis on getting the short-term (1-5 year) outlook right. AEMO will engage an independent advisor to assist with this process.

Not convinced that producing individual forecasts of residential, commercial and industrial customers using a data intensive econometric approach is the best way for AEMO to meet its obligation under the NGL, or is indeed required for gas investment planning purposes. A simpler model based on aggregate distribution network gas consumption may be more appropriate and enable AEMO to meet its tight deadline of December 2014. AEMO should consider customer segmentation only for annual forecasts.	Envestra	Consultation to date indicates that segmentation to a residential, commercial and industrial level would be beneficial to stakeholders and may allow for increased forecast accuracy. **ACTION:** AEMO is currently in the process of sourcing data and understands the potential limitations of this data. AEMO will decide on the appropriate method and/or level of segmentation once this process is complete.
Seasonal demand profiles are desirable. Disaggregation of Tariff V data to finer time periods than years is not likely to be reliable due to billing lag issues. How will AEMO then approach the billing lag issue? Methodologies provided to address billing lag will provide an underestimate of peak usage as they blur the time over which usage peaks, and this will need to be accounted for if any of these methodologies are used.	DEWS, ENA, Energy Australia	**ACTION:** AEMO to investigate whether seasonal demand profiles and disaggregation of Tariff V data is possible based on data available at the time. **ACTION:** Further comments on billing lag have been noted and will be considered as part of AEMO's modelling process.
Definition of UAFG needs to be clear. Potentially use a different term to distinguish between metering error and transmission and end use.	APA Networks	**ACTION:** Noted. AEMO will clearly define what is included in UAFG and will consider using different terms depending on data availability and any confidentiality concerns.
It is important to incorporate sector breakdown of forecasts. For example, small businesses in Tariff D might be insignificant on their own but would be significant when aggregated up to a sector. On aggregate, an industry sector (which may be composed of many small businesses) may behave as a group in response to a particular driver. May require grouping of industry type to properly forecast the impact of economic/policy drivers on industrial/commercial load. While the survey approach captures changes in the individual surveyed customers, the methodology must account for groups of smaller customers behaving on aggregate. Suggest using the Australian and New Zealand Standard Industrial Classification (ANZSIC) codes breakdown.	Energy Australia	**ACTION:** AEMO will consider using ANZSIC codes in the 2014 NGFR, noting that the success of this approach will depend on the level of data we are able to access (process currently underway) as well as time constrains. Additionally AEMO must be mindful of confidentiality concerns and protecting the identity of individual loads. Should this breakdown not be able to be implemented in 2014, it will be listed as an action item for the 2015 NGFR.

Demand drivers and assumptions		
Comments on use of cohort: • Might not know which forecast area that cohort belongs in. Might be better to apply a decay factor variable that fits your model. • Price elasticity, cohort, fuel substitution will be tied together and it will be inherent within historical data. • Presence of cohorts might blur the impact of say price elasticity. Possible solution is to include indices instead of cohorts. • Replace cohort variable with a "non-price energy efficiency" term to avoid confounding price-driven behaviour between cohort and price terms.	General feedback	**ACTION:** AEMO will consider these comments as part of the model development and will engage an independent expert to provide further advice as to the most appropriate approach.
Scenario assumptions should be made in a transparent manner so as to allow all readers to modify the adjustments to their own view if desired.	Energy Australia	**ACTION:** AEMO to ensure that terms and assumptions are clearly defined in the NGFR.

Comments on price elasticity:
• Consider incorporating these ideas in the sensitivities:
  ○ Prices should be lagged as it takes household years to change to an energy efficient appliance despite a change in prices today.
  ○ People may pre-empt price rise and make choices with a forward view of where they think price will go.
  ○ The average customer thinks in terms of their overall energy bill rather than their marginal cost. Change in the marginal cost as a proxy for retail price may not reflect customer views of increasing gas price as well as the overall bill.
  ○ The impact of prices will be implicitly included in the different components (e.g. energy efficiency), therefore potentially overstating the impact of prices when it is included in the model as its own variable.
• The differential in future gas prices might likely be too large for an elasticity coefficient calculated on historical outcomes to remain valid.
	General feedback	**ACTIONS:** Noted and these points will be considered as part of AEMO's modelling process.
		• Modelling will include lag and lead times as appropriate and care will be taken to avoid double counting.
		• ACIL's recommendation relating to measuring the rate of change in standing contract prices of energy in each forecast area is to:
		  ○ use either the calculated bill for a nominal customer with constant consumption; or
		  ○ the percentage change in volumetric charge of the block that is marginal for most customers.
		• AEMO will develop low, medium and high scenarios in line with the published planning scenarios. These will take gas price and other uncertainties (e.g. commodity prices and Australian dollar) into account, consistent with NEFR.
		• AEMO acknowledges the hypothesis that potential step changes in future gas prices may result in a different price sensitivity to that seen historically. AEMO intends to investigate international analogues to determine the potential impact and also to consult with independent advisors on an appropriate approach.

Commercial gas consumption is proposed as a sum of terms including a gas price term. However commercial gas customers are often on multiple year contracts and thus exposure to step price rises (rises independent of the Consumer Price Index (CPI) and upstream contract repricing moments) may be delayed.	Energy Australia	**ACTION:** Noted and this point will be considered as part of AEMO's modelling process. In 2014 gas price forecasts for commercial customers were developed by Frontier Economics. Frontier Economics' approach does not consider contracts directly (see the Frontier Economics report for further information: http://www.aemo.com.au/Electricity/Planning/Forecasting/National-Electricity-Forecasting-Report/NEFR-Supplementary-Information) ACIL's recommendation is that AEMO reflect the impact of contracting term in the way it lags the price variable in a specific forecast area or perhaps to model these customers separately, though this relies on the availability of consumption data for such customers.

Comments on driver variables and co-efficient: • Keep the model simple and only identify and include top 4-5 variables. • Variables may be collinear and may incorporate the effects of other variables not defined or identified. ○ For example, one of the variables for Tariff D model is Gross State Product (GSP), therefore will be able to see growth irrespective of price. Need to quantify how it is attributed to price change. • Does not seem consistent that stakeholders can pick and choose because of the grouping of all the variables. • In Section 6, the document assumes the main input variable e.g. GSP, population before analysis has been undertaken. AEMO should enter the process with an open mind and allow the analysis to drive the outcome. • Each forecast area has the potential for different driver variables and that gas consumption in one forecast area may respond to the same driver variable in a different way when compared against another forecast area. • Co-efficient may capture too many different variables/effect and may impede ability to test different sensitivities. How will AEMO be able to gauge the impact? • Regional effects as co-efficient are different for different forecast area.	ENA, Energy Australia, APA Networks	**ACTIONS:** Noted and these points will be considered as part of AEMO's modelling development. • AEMO will conduct diagnostic testing of driver variables for statistical significance and suitability for inclusion. • AEMO develops component forecasts so stakeholders can pick and choose which component they rely on or are most interested in. • Elasticities for each of the variables modelled within the mass market forecast will also be provided. • AEMO will ensure that terms and assumptions are clearly defined in the NGFR. • Co-efficients will be determined at a regional/state level.
Suggest to investigate the following for weather standards: • Using seasonal factor for 'Like' Effective Degree Day (EDD) for forecasts. • Experiment with Heating Degree Day (HDD) and Cooling Degree Day (CDD) as it uses different base temps and different weights as opposed to climate. • Weather data used as part of Electricity Statement of Opportunities (ESOO) process should be used in NGFR in order to be consistent. • Provide a "hot", "average" and "cold" forecast for each scenario (e.g. provide forecasts for 3 EDD/HDDs per scenario) with respect to future forecast to allow readers to assess impact of weather on forecasts for any given scenario.	Lumo, Energy Australia, DEWS	**ACTION:** As part of the NGFR process AEMO is looking at reviewing the weather standards for Victoria. AEMO will state which weather standards or weather variables it uses in the forecasts for other states. **ACTION:** AEMO will investigate whether the weather data used in ESOO can be applied to the NGFR. **ACTION:** The 2014 NGFR will only consider an average forecast for each scenario, however the request to provide a hot, average and cold scenario has been noted and will be considered for the 2015 NGFR.

Comments on large users: • There are too few large users and they are too heterogeneous to use econometric methods. • Methodology should consider not only the impact of large users, but also the flow on effects from any changes in operation of these users. As example could be the closure of a single large automotive manufacturer having a flow on effect to all the small parts providers. • Do we need separate drivers for certain large industries because of their materiality to demand e.g. alumina and fertiliser – commodity prices, exchange rates, wholesale gas price etc.? • Forecast needs to account for the fact that the relationship between gas demand and GSP varies by industry type. • Energy Efficiency Opportunities scheme implementation and demand reductions arising form may be worth looking into for large users.	General feedback	**ACTION:** • As outlined in the methodology, AEMO's first preference is to use customer surveys for large users. The economic forecast approach may be used to account for any information gap. • ACIL's recommendation to AEMO regarding the flow on effect is that AEMO can apply direct post-model adjustments in the commercial customer category or to modifications to the economic outlook for certain forecast areas. • Low, medium and high scenarios will be developed in line with the published planning scenarios. These will take gas price and other uncertainties (e.g. commodity prices and Australian dollar) into account, consistent with the NEFR. • AEMO will be researching publicly available information including the Energy Efficiency Opportunities scheme as a source of potential data relating to historical changes in consumption.
Address major market shifts by a more in depth panel/appliance approach as major market shifts likely to occur over the next few years. In the absence of panel/appliance approach, we believe that post model adjustments are unavoidable (and will necessarily be somewhat subjective).	Energy Australia	**ACTION:** As per the published methodology, in 2014 AEMO will rely upon an econometric model approach and make post model adjustments as necessary. **ACTION:** AEMO will work with stakeholders in 2014/15 to identify potential trends which may be better quantified using an alternative approach in parallel with the econometric model. Depending on the outcomes of this consultation, AEMO may develop panel/appliance models which are used in conjunction with the econometric model in the 2015 NGFR.
How will impact of policy changes be quantified?	ENA	**ACTION:** AEMO to ensure that terms and assumptions regarding policy changes are clearly defined in the NGFR.

Comments on post-model adjustments: • Consider using energy efficiency or fuel substitution as a variable instead of post model adjustment. • Post model adjustment is more appropriate than using cohort variable to forecast fuel substitution. • Post model adjustment may be required if a significant industry sector undergoes changes impacting the relationship between state-wide GSP and gas demand. • Post model adjustment is need if future market conditions are expected to be radically different to current market conditions.	APA Networks, Energy Australia	**ACTION:** Noted, AEMO will determine which information is suitable during model development.
Peak demand is often related to multiple days rather than a single day of extreme weather. Linear regression should be based on multiple days rather than single day to support higher peak demand forecasting.	Energy Australia, DEWS	**ACTION:** AEMO is considering a similar approach to electricity maximum demand forecast. The approach considers a range of variables including multiple day temperature. **ACTION:** The approach to forecast maximum flow will be published and assumptions will be verified and tested.
Tracking indicator		
Indicator tracking can deal with forecasts when they are out of range. For example, GSP. Going into recession would result in incorrect forecast. However, the model is not wrong but the input is. Look at appropriate solution range associated to indicator tracking.	General feedback	**ACTION:** Noted and agree. AEMO engages independent experts to provide economic inputs into our models. When tracking forecast performance, AEMO will separate variances into input variance and model variance.
AEMO should provide updates to industry as material changes are identified. • What form will the update be in? • How frequent will the update be? • Suggest sending emails on a daily basis to industry as material items in the news are identified.	General feedback	**ACTION:** AEMO will continue to monitor the market to determine if forecast updates are required outside of the annual process. Once the NGFR process is established (i.e. in 2015+) AEMO will consider increasing the frequency if stakeholders consider this to be beneficial.

Imperative that the forecasts be able to be compared with historical actuals.	Energy Australia	**ACTION:** Agree. • AEMO to include historic and forecast data in the NGFR. • AEMO to clearly state how GBB data fits with the NGFR forecasts and how this data can be used to track forecast performance. • ACIL's recommendation is that AEMO may also want to produce 'back cast' series to illustrate year by year performance.
Will AEMO be doing retail gas price tracking in each state noting that retail gas price in each state will be difficult to obtain?	BREE	**ACTION:** Ideally AEMO would track all indicators and assumptions on an ongoing basis However, as noted by BREE, this is not always possible due to a lack of actual data. Nevertheless, in 2014/15, AEMO intends to test a tracking process internally and workshop results as appropriate in 2015.
Supply-demand calculator: • There is a supply-demand balance calculator published with the Electricity Statement of Opportunities (ESOO). Will there be a similar calculator for gas? • Will there be a similar calculator for the demand forecasts that would allow modification to the forecasts?	General feedback	AEMO has moved to a more sophisticated approach for the ESOO modelling, and as of 2012 the electricity supply-demand calculator was discontinued. For both the ESOO and GSOO, AEMO publishes the underlying model, assumptions, and datasets to allow stakeholders to substitute their own data, or explore alternative sensitivities. AEMO intends to implement a similar approach from the 2014 NGFR. **ACTION:** The need for a "calculator" will be determined from stakeholder feedback on the 2014 NGFR.
Independent Experts		
There may be benefit for AEMO to be supported during the process by independent experts, especially during the exploration stage of the forecast.	Energy Australia	Agree, AEMO intends to have an independent advisor and independent peer reviewer as part of the 2014 NGFR process.