



INDEPENDENT
MARKET
OPERATOR



Gas Statement of Opportunities

Executive summary and key findings

December 2014



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¹ Gas referred to throughout this report refers to natural gas.

Executive summary

This Gas Statement of Opportunities (GSOO) has been prepared in accordance with the Gas Services Information Rules to provide an independent insight into the Western Australian (WA) domestic gas market and assess the adequacy of medium to long-term supply to meet forecast gas demand. The GSOO provides forecasts of supply and demand in the market for the period from 2015 to 2024 (the forecast period), to identify any potential shortfalls, constraints and opportunities for existing and potential market participants.

The Independent Market Operator (IMO) has again retained the services of the National Institute of Economic and Industry Research (NIEIR) to perform the modelling of gas demand and prices. The modelling of potential gas supply was performed by the IMO, with key data inputs provided by NIEIR and Wood Mackenzie.

Key finding

Forecasting is particularly challenging in the current environment, for a number of reasons. Commodities prices have fallen rapidly, including iron ore, gold and oil – with oil prices falling by more than United States (US) \$40 per barrel between 1 September 2014 and the publication of this report.

Despite this uncertainty, the IMO has considered the range of factors that have been identified as having the potential to affect the domestic gas market, and this GSOO makes the following key finding for the supply-demand balance in the WA domestic gas market for the forecast period:

The supply of gas to the domestic market is expected to be adequate to meet demand over the forecast period.

The uncertainty relating to the continuation of supply from the NWS JVs, highlighted in the January 2014 GSOO, has reduced considerably following the recent announcement by the WA Government about the agreement reached with the NWS JVs. This agreement supports continued supply from the NWS JVs to the domestic gas market well into the future. In addition, the announcement by the Hess Corporation (Hess) stating its intention to develop and toll its WA reserves through the NWS JVs' processing facilities may indicate additional supply of gas to the domestic market towards the end of the forecast period. However, with several investment decisions yet to be made by both the NWS JV and Hess regarding gas fields to be used, and by the NWS JVs regarding the refurbishment of its aging LNG and domestic gas facilities, the extent of any future supply from the NWS JVs is not yet known with certainty.

Supply-demand balance

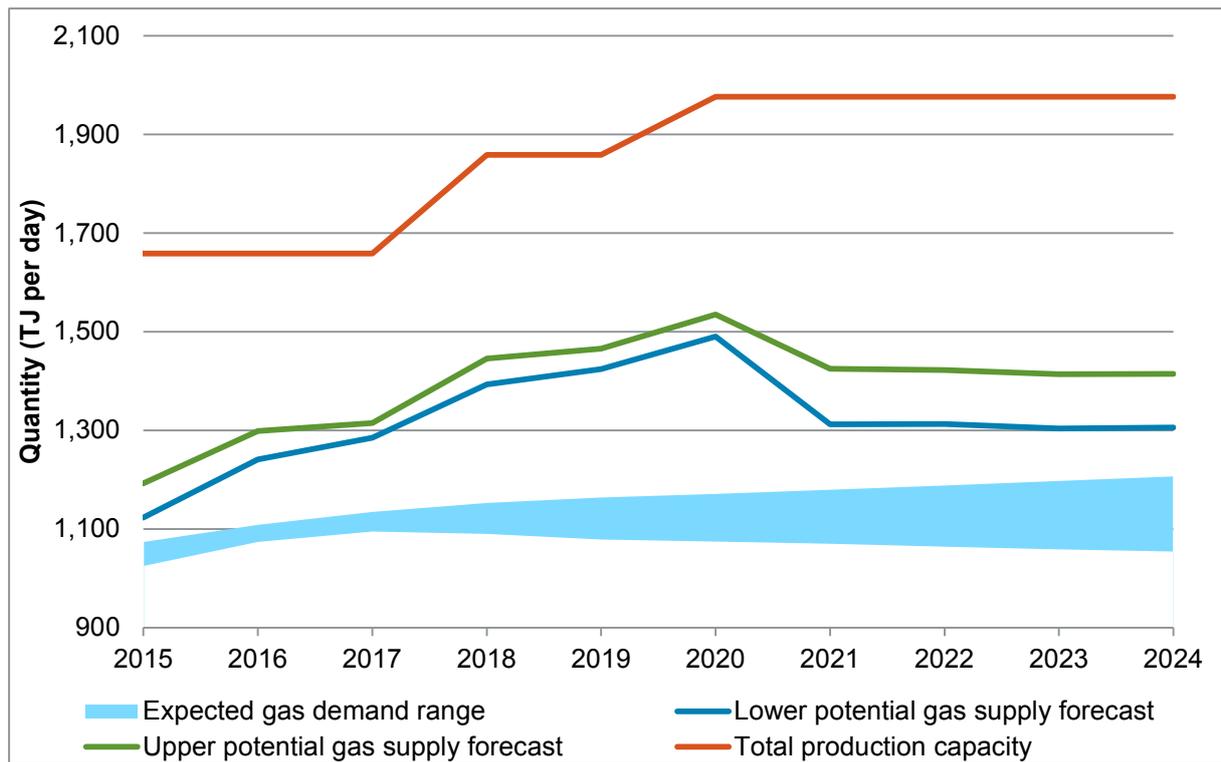
In recognition of the continued uncertainty about the extent of supply from the NWS JVs beyond 2020, two supply scenarios were developed for this GSOO:

- the Lower potential supply forecast, which assumes the NWS JVs will only make sufficient gas available to the domestic market after 2020 to fulfil their domestic gas obligation recently agreed with the WA Government, around 100 TJ per day, and assumes the Base forecast gas prices; and

- the Upper potential supply forecast, which assumes the NWS JVs will be willing to make additional gas available to the domestic market after 2020 above the minimum required to fulfil their recently agreed domestic gas obligation, and assumes the High forecast gas prices.

Figure ES.1 shows the supply-demand balance for the WA domestic gas market for the forecast period, comparing the two potential supply scenarios with gas production capacity and the range of expected demand outcomes.

Figure ES.1: Supply-demand balance, 2015 to 2024



Source: NIEIR and IMO forecasts 2015 to 2024.

This GSOO finds that, in all of the forecast scenarios, supply will exceed demand – by at least 50 TJ per day in 2015 and 320 TJ per day in 2020.

Domestic production capacity is projected to be almost double the forecast level of domestic gas demand by the end of 2024, as shown in Figure ES.1 above. WA’s domestic gas production capacity is not expected to be fully utilised during the forecast period.

Gas demand

The IMO has developed two gas demand scenarios, Base and High, and considers it likely that actual demand will be somewhere within the range bounded by these scenarios – the expected gas demand range shown in Figure ES.1 above.

The quantity of gas forecast to be consumed by the domestic gas market is shown in Table ES.1 below.

Table ES.1: Domestic gas demand forecasts (TJ per day), 2015 to 2024

Scenario	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Base	1,026	1,074	1,095	1,090	1,079	1,075	1,071	1,065	1,059	1,055
High	1,074	1,109	1,135	1,153	1,164	1,171	1,180	1,188	1,198	1,207

Source: NIEIR forecasts, 2015 to 2024.

Over the forecast period, gas demand is expected to grow at an average annual rate of between 0.3 per cent in the Base demand scenario and 1.3 per cent in the High demand scenario.

The majority of projected gas demand growth in the early years of the forecast period, shown in Figure ES.1 and Table ES.1 above, is driven by large gas-consuming projects that have reached final investment decision (FID) since the writing of the January 2014 GSOO. These projects include:

- Sub161's compressed natural gas (CNG) supply facility;
- the Fortescue River Gas Pipeline (FRGP);
- the Eastern Goldfields Gas Pipeline (EGGP);
- The restarting of Alinta Energy's Newman Power Station which will supply electricity to Hancock Prospecting's Roy Hill iron ore mine; and
- operation of TransAlta's South Hedland Power Station.

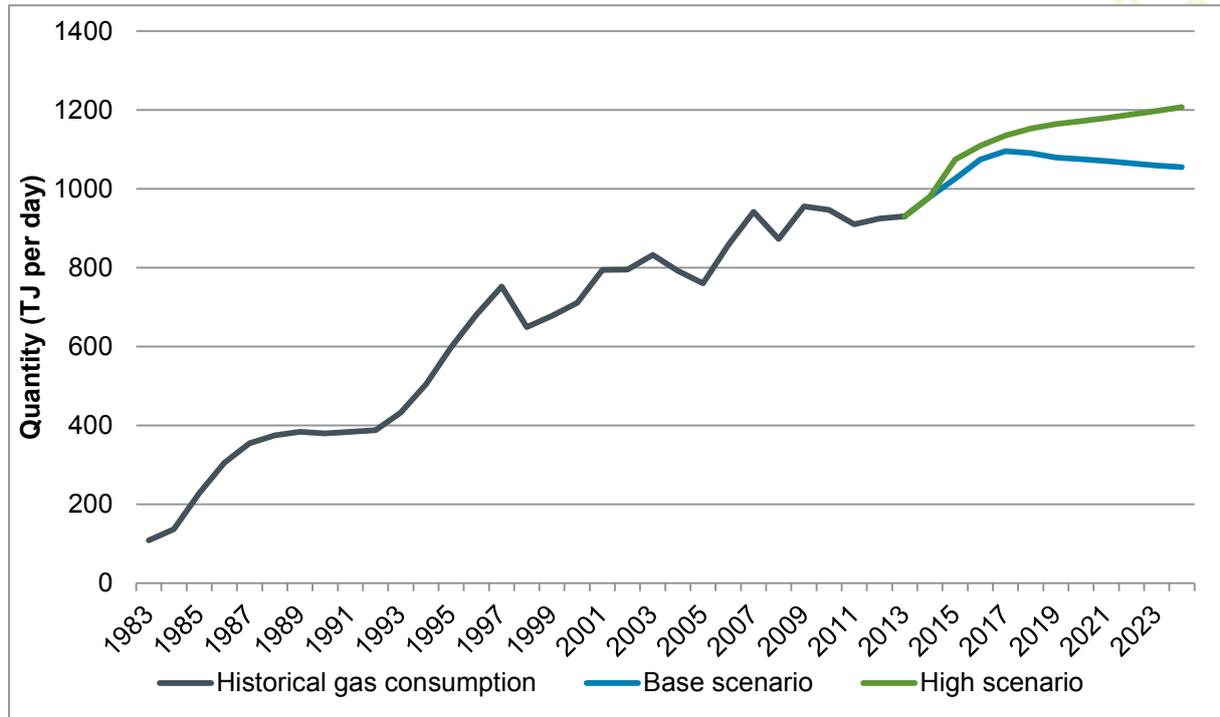
In addition, previously announced projects such as the Pilbara Temporary Power Station and CITIC Pacific's Sino Iron magnetite mine are also expected to drive growth in gas demand in this forecast.

These projects are expected to contribute almost three quarters of the forecast gas demand growth over the forecast period, with most of this growth occurring in the period between 2015 and 2017.

An estimate of gas demand from a number of prospective projects, which have not yet reached FID, is also included in the High demand scenario.

NIEIR's Base and High demand forecasts are shown in the context of historical gas demand in WA in Figure ES.2 below.

Figure ES.2: Domestic gas demand forecasts in relation to historical gas demand, 1983 to 2024



Source: Department of Mines and Petroleum (DMP) and NIEIR forecasts 2015 to 2024.

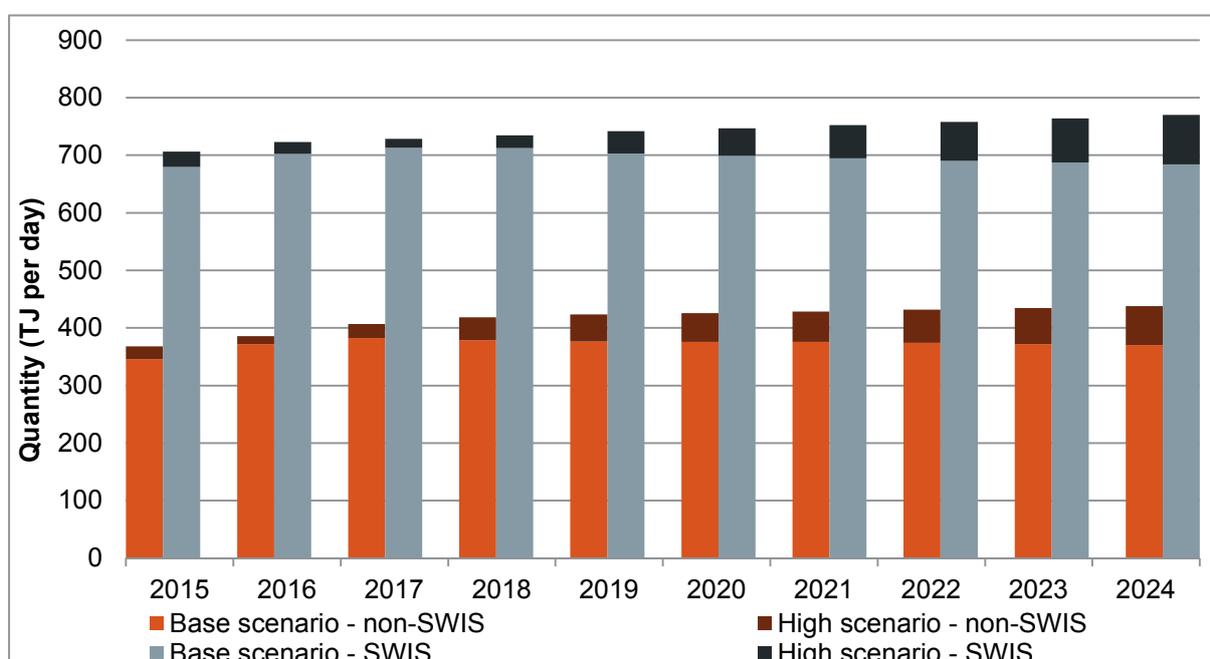
Gas demand in WA tends to have a cyclical growth pattern, with periods of high growth followed by periods of slower growth. This is due to the scale of many gas-consuming projects in WA, with a relatively small number of individual gas consumers accounting for a significant proportion of overall gas demand.

Gas demand by area

New gas-consuming projects, noted above, located in the Pilbara and Goldfields regions of WA are expected to lead to higher gas demand growth in areas located outside the South West Interconnected System (SWIS) than within, as shown in Figure ES.3 and Table ES.2.

For the Base gas demand scenarios for both areas, Figure ES.3 shows a slow decline in gas consumption after growth in the initial years. This is due to the limited expected growth in demand for gas as a fuel for electricity generation within the SWIS, and the increased focus on energy efficiency as WA businesses seek to reduce costs in the current economic environment. By contrast, the High gas demand scenario for both the SWIS and the non-SWIS areas show continued growth, due to the lesser impact of energy efficiency measures and, in the non-SWIS area, the development of additional projects yet to reach FID.

Figure ES.3: Gas demand forecast by area, 2015 to 2024



Source: NIEIR forecasts 2015 to 2024.

The quantity of gas forecast to be consumed in the SWIS and non-SWIS regions of WA is shown for each year of the forecast period in Table ES.2 below.

Table ES.2: Domestic gas forecasts, SWIS and non-SWIS (TJ per day), 2015 to 2024

Scenario		2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Non-SWIS	Base	346	372	382	378	376	376	376	374	372	370
	High	368	386	407	418	423	426	429	432	435	438
SWIS	Base	680	702	713	712	703	699	695	690	687	684
	High	706	723	728	735	742	747	752	758	764	770

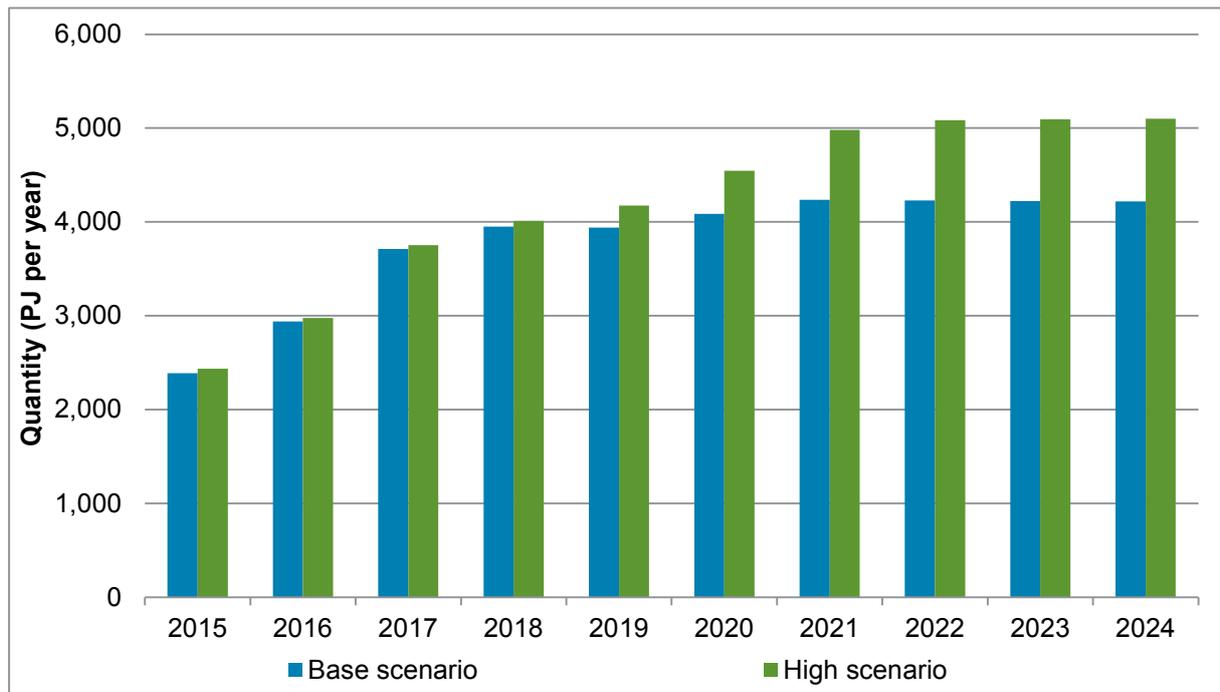
Source: NIEIR forecasts 2015 to 2024.

Note: Numbers may not add to those in Table ES.1 due to rounding.

Total gas demand

Total gas demand includes domestic gas demand plus natural gas for liquefied natural gas (LNG) exports, including feedstock and gas consumed in LNG production. Over the forecast period, total gas demand is forecast to grow strongly at approximately 6.5 per cent per year to 2024, as shown in Figure ES.4.

Figure ES.4: Total gas demand, 2015 to 2024



Source: NIEIR and IMO forecasts 2015 to 2024.

International LNG demand is expected to grow rapidly in the forecast period. As a result, more than half of forecast growth in total gas demand is driven by the gas feedstock and processing requirements relating to the Gorgon and Wheatstone LNG and Prelude floating LNG (FLNG) facilities. These are anticipated to start producing LNG within the forecast period, more than doubling WA's LNG export capacity from approximately 21 million tonnes per year (mtpa) to approximately 49 mtpa.

The additional growth in the High total gas demand scenario reflects both additional demand from prospective domestic gas-consuming projects and additional new or expanded LNG export facilities that have not yet reached FID.

Gas Supply

The potential supply of gas to the domestic market is expected to increase over the forecast period, with the completion of the Gorgon and Wheatstone domestic gas facilities (in 2015 and 2018 respectively) and expansion of the Gorgon facility in 2020. This growth will be offset to some extent by a possible reduction in supply from the NWS JVs after 2020 (when current supply contracts expire).

The total quantity of gas expected to be made available to the domestic market is shown in Figure ES.1 above, and in Table ES.3 below.

Table ES.3: Domestic gas supply forecasts (TJ per day), 2015 to 2024

Scenario	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Lower	1,124	1,241	1,286	1,394	1,424	1,491	1,313	1,313	1,304	1,306
Upper	1,193	1,299	1,315	1,446	1,466	1,535	1,425	1,422	1,414	1,415

Source: IMO forecasts 2015 to 2024.

Overall, average annual growth in supply over the forecast period is expected to be between 1.7 per cent per year in the Lower supply scenario, and 1.9 per cent per year in the Upper supply scenario.

Resources and reserves

In terms of gas resources, WA remains the most gas-endowed state in Australia. BREE (now the Office of the Chief Economist) and Geoscience Australia estimate WA onshore and offshore basins hold a total of 158,373 PJ of economic and sub-economic conventional gas resources.

Based on resource estimates and forecasts of total gas demand (domestic market and the LNG industry) for 2024, conventional gas resources are likely to last between 12 and 38 years beyond 2024, depending on whether all sub-economic resources are able to be developed. This number has decreased significantly since the January 2014 GSOO, primarily due to an update to the calculation method used by the IMO to assess the resources available from the end of the forecast period. The addition of unconventional gas would mean that resources in WA have the potential to last for another 105 years beyond 2024.

At the time of this report, the majority of WA's domestic gas supply comes from a single basin, the Carnarvon Basin. The IMO estimates the Carnarvon Basin is capable of meeting forecast domestic consumption and LNG requirements for approximately another 8 years from 2024 – to 2032. Considering the length of time required to develop and extract gas resources commercially, encouragement of exploration and development of other gas basins may be warranted to promote diversity and reduce WA's supply risk.

Increased availability of pipeline capacity

In September 2014, the APA Group completed an expansion of the Goldfields Gas Pipeline (GGP). The expansion increased the nameplate capacity of the

pipeline by approximately 47.5 TJ to 202.5 TJ per day, making the GGP the second largest gas transmission pipeline in WA by capacity.

In 2014, two new pipeline developments were also announced. The first, the FRGP, is expected to be completed in Q1 2015 – allowing gas to be shipped to the middle of the Pilbara region. The other pipeline, the EGGP, was announced in July 2014. This pipeline, scheduled for completion in Q1 2016, extends the Murrin Murrin lateral of the GGP, allowing gas to be shipped to the eastern Goldfields region.

This GSOO also reports an increase in the availability of shipping capacity on the Dampier to Bunbury Natural Gas Pipeline (DBNGP), easing concerns about the ability to obtain gas supply and shipping capacity on this pipeline which was previously fully contracted. At the time of this report, the DBNGP has approximately 89 TJ per day of available firm full-haul capacity.

It is likely that the projects considered in the Base gas demand scenario that have already attained FID can be met by existing pipeline capacity, new pipelines that are under construction (such as the FRGP) or upcoming pipelines (such as the EGGP). However, as the High gas demand scenario incorporates potential demand growth of prospective projects that have not yet attained FID, there may be opportunities for pipeline companies to assist these projects through provision of gas transmission capacity.

Key risks to the GSOO forecasts

In the development of this GSOO, careful consideration has been given to a range of issues that could affect the development of the WA gas market. The number and complexity of the issues and risks that currently face the market make forecasting extremely challenging.

While some of the uncertainty surrounding future supply from the NWS JVs has been removed with the recently announced agreement with the WA Government, the IMO has identified a number of key risks to the findings of this report, and will continue to monitor their development for future GSOOs.

The most significant risks identified are:

- significant changes in the prices of key WA commodities (e.g. iron ore, nickel, alumina or gold), for example a further fall in international oil prices – discussed in more detail in chapter 2;
- further significant changes in the Australian dollar to United States (US) dollar exchange rate;
- a fall in Asia Pacific gas prices, pressuring the relatively high cost LNG producers in Australia, due to one or more of the following factors:
 - a significant increase in North American LNG export capacity, increasing competition among international LNG suppliers;
 - a reduction in LNG demand in the Asia Pacific region due to the suggested, but not yet scheduled, restart of nuclear powered electricity generators in Japan and South Korea;

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- increased competition driven by the development of a short-term LNG trading hub in Singapore; and
 - a change to Asia Pacific purchasing behaviour for gas and LNG (such as joint purchasing or increased short-term contracting).

Key drivers of change from the January 2014 GSOO

Since publication of the January 2014 GSOO, a number of key developments have occurred. The key drivers of the changes to the forecasts are:

- a significant increase in the number of large, gas-consuming projects that have obtained FID and are expected to commence in the forecast period;
- a weakening of the expected Australian dollar to US dollar exchange rate – resulting in an increase in domestic gas prices for most of the forecast period (partly offset by other factors such as lower oil prices) and driving an increased willingness to supply gas to the domestic market; and
- the impact of continued moderation of energy demand in the SWIS, largely due to continued investment in distributed solar generation, energy efficiency and cost reduction measures.

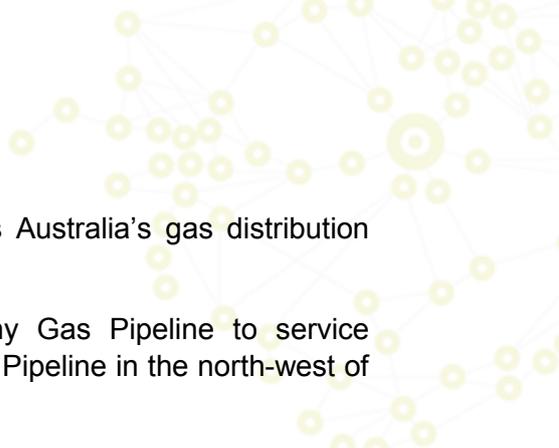
The following changes have also been made to the GSOO forecast approach in response to stakeholder feedback:

- the inclusion of several prospective gas demand projects (those yet to reach FID) in the High gas demand scenario;
- adjustments to the total gas demand estimates to reflect the utilisation of LNG production facilities;
- adjustments to the potential gas supply model to reflect the different commercial drivers of LNG-linked and domestic-only gas production facilities; and
- adjustments to the gas supply model to reflect how gas suppliers with multiple interests in various gas production facilities manage their gas supply contracts.

Future developments for the WA gas market, 2015 to 2024

Further developments in the WA gas market are expected over the forecast period. Known developments include:

- completion of the Gorgon, Wheatstone and Prelude LNG production and export facilities, and the development of the two new domestic gas production facilities associated with the Gorgon and Wheatstone LNG facilities;
- completion of the FRGP and EGGP;
- the Australian Consumer and Competition Commission's (ACCC's) review of any applications for joint marketing of gas from the NWS JVs or Gorgon JV (before the end of 2015);

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- completion of access arrangement reviews for ATCO Gas Australia's gas distribution network (2015), the GGP (2015) and the DBNGP (2016);
 - possible construction of the proposed Bunbury to Albany Gas Pipeline to service customers in the South West region and the Great Northern Pipeline in the north-west of WA;
 - final investment decisions for other domestic gas production facilities including Warro, Pluto and Yulleroo/Valhalla, and the expansion of the Dongara production facility; and
 - final investment decisions relating to other LNG export projects, including Browse, Equus, Gorgon Train 4, and Scarborough.