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Gas Statement of Opportunities

Executive summary and key findings

January 2014

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[1] Gas referred to throughout this document refers to natural gas. All other forms of gas are specified.

1. Executive Summary and Key Findings

As one of the key information services established under the *Gas Services Information Act 2012*, the Gas Statement of Opportunities (GSOO) provides an independent insight into the Western Australian (WA) domestic gas market, including forecasts of supply and demand in the market, with the aim of highlighting potential shortfalls, constraints and opportunities in the medium to long-term for existing and potential market participants.

Since publication of the July 2013 GSOO, development of the WA gas market has continued with the completed expansion of the Mondarra gas storage facility, commencement of the Macedon domestic gas production facility in August 2013 and the official commissioning of the Red Gully domestic gas production facility in September 2013.

This GSOO provides, for the forecast period from 2014 to 2023:

- a gas supply and demand assessment (Chapter 3);
- an updated overview of WA's gas market infrastructure (Chapter 4);
- an outlook for the WA economy (Chapter 5);
- descriptions of the forecast methodology and input assumptions (Chapter 6);
- forecasts of WA gas demand (Chapter 7);
- an updated view of the international liquefied natural gas (LNG) market (Chapter 8);
- forecasts of potential WA gas supply (Chapter 9);
- estimates of WA gas reserves (Chapter 10);
- a view of transmission infrastructure (Chapter 11); and
- a brief on Commonwealth and WA Government inquiries of relevance to the WA domestic gas market (Chapter 12).

To ensure a comparable, consistent approach is applied for this GSOO, the IMO has retained the services of the National Institute of Economic and Industry Research (NIEIR) to perform the modelling of gas supply and demand. NIEIR is a forecasting consultancy that has spent more than 25 years modelling various gas and electricity markets across Australia, including WA. For this GSOO, NIEIR updated its WA gas forecasting models developed for the July 2013 GSOO to provide revised forecasts of gas demand and supply.

1.1. Key Findings of the GSOO

Key findings for the 2014 to 2023 period are:

- as WA has an abundance of gas reserves and existing and planned gas processing capacity, these are not meaningful measures of supply to the domestic market. Rather, it is important to consider the extent to which this gas will be made available to the domestic market (the 'potential supply');
- there is likely to be adequate potential gas supply to meet existing contracted gas demand and expected growth in gas demand in the domestic market for the 2014 to 2020 period assuming that commercially acceptable terms can be agreed between suppliers and customers;
- **for the 2021 to 2023 period, the availability of gas to the WA domestic market is likely to be sufficient if the North West Shelf (NWS) Joint Ventures (JVs) supply at levels considered in the Upper potential supply forecasts, but may not be sufficient (at forecast prices) to meet forecast domestic demand if the NWS JVs do not supply gas to the domestic market beyond existing contracts (as reflected in the Lower potential supply forecasts)**;
- **estimates suggest while the NWS has sufficient 2P[2] reserves for the forecast period, the availability of gas supply from the NWS JVs is pivotal to the domestic gas supply-demand balance for the 2021 to 2023 period and is dependent on:**
    - **the outcomes of ongoing discussions between the WA Government and the NWS JVs that relate to the status of remaining NWS reserves;**
    - **investment decisions required by the NWS JVs to access remaining undeveloped reserves; and**

[2] Proven and probable gas reserves. 2P is an estimate of reserves with medium confidence, also referred to as 'P50', see Australian Stock Exchange (ASX) (2013), *ASX Listing Rule Amendments – Reporting Requirements for Oil and Gas Companies*, http://www.asx.com.au/documents/asx-compliance/asx-oil-and-gas-asx-presentation-july-2013.pdf, accessed 18 December 2013.

    - **investment required to extend the life of the aging (30-year old) domestic gas production facility the Karratha Gas Plant (KGP),**

  each of which will involve consideration of the commerciality and profitability of ongoing operations at the KGP;
- the average annual growth in WA's potential domestic gas supply is forecast to be between -0.8% and 1.7% per annum, dependent on the availability of gas from the NWS, while the average annual growth in WA's domestic gas demand for existing and sanctioned projects is forecast to be 0.4% per annum;
- consistent with the July 2013 GSOO, gas production capacity is anticipated to be almost double the forecast level of domestic gas demand by the end of 2023;
- gas demand growth is anticipated to be higher in areas located outside the South West interconnected system (SWIS) compared to within the SWIS;
- total gas demand in WA, including both LNG and floating LNG (FLNG) production (feedstock and processing) and domestic demand, is forecast to grow at approximately 9.5% per annum until 2023 as a result of the expected commencement of production at the Gorgon and Wheatstone LNG and Prelude FLNG projects during the 2014 to 2023 period;
- existing gas resources are forecast to be sufficient to meet forecast domestic, LNG and FLNG demand levels for the forecast period, however longer-term supplies rely heavily on WA's unconventional gas resources (tight and shale resources), which have not yet been verified;
- WA is highly reliant on the Carnarvon Basin for gas reserves and resources and more consideration may be warranted to encourage the diversity of gas supply from other gas basins (e.g. the Browse and Canning Basins) within WA; and
- there are several medium to long-term growth challenges confronting the WA LNG market which may have an impact into the future, but are not expected to affect the domestic natural gas sector in the forecast period, such as:
    - the potential end of premium Asia Pacific LNG pricing;
    - a move toward shorter-term LNG contracts in the Asia Pacific region;
    - the high relative cost of LNG production in Australia; and
    - the threat of unconventional gas entering the international gas market.

Each of these findings is explained in more detail in section 1.2 below.

1.1.1.Changes from the July 2013 GSOO – Key Drivers

The key drivers of the changes to the forecasts since the July 2013 GSOO are set out below.

- Domestic gas consumption forecasts have reduced due to improved assumptions for alumina refining and electricity generation, and an increase in the estimated price elasticity of demand. These improvements were informed by data from the Gas Bulletin Board, which commenced operation on 1 August 2013.
- Total gas demand forecasts have increased due to the inclusion of estimated gas requirements for Prelude FLNG in all total gas demand scenarios and the inclusion of Bonaparte FLNG for the High total gas demand scenario only.
- Gas supply forecasts have reduced due to improvements to the potential supply model, which now considers different segments of supply (contracted and uncontracted) for each production facility, with the uncontracted (or 'price-sensitive') segment influenced by a facility's production costs, required rate of return and forecast gas prices.
- Gas supply forecasts have also reduced due to changes in the assumptions about the capability of the NWS to supply to the domestic gas market following the expiry of existing contracts.
- The model for forecasting medium to long-term average (ex-plant) new contract gas prices has been improved through the revised application of exchange rates and oil-LNG relationships and a shorter time lag between movements in LNG and domestic gas prices.

1.1.2. Response to Stakeholder Feedback on the July 2013 GSOO

Feedback on the July 2013 GSOO was received from confidential one-on-one meetings, a stakeholder workshop held on 7 October 2013 and Gas Advisory Board (GAB) meetings held prior to the release of this GSOO. In response to this feedback, the following changes have been implemented in this GSOO:

- an investigation into the capability of the NWS to continue to supply to the domestic market;

- an investigation of the quantum of reserves supporting each production facility;
- improvements to modelling potential supply (such as the consideration of different production costs for each facility and inclusion of an assumed required rate of return);
- changes to the modelled price elasticity of demand in recognition of observed responsiveness to price rises;
- realignment of the medium to long-term average (ex-plant) new contract prices forecast model; and
- other modelling adjustments to potential supply (e.g. reduction in the time lag for LNG prices to influence domestic gas prices).

The following suggested changes by stakeholders have not been implemented:

- the inclusion of speculative projects (those yet to reach favourable final investment decision) in the GSOO forecasts; and
- analysis of the impact of United States (US) LNG exports on LNG pricing in the Asia Pacific region.

Speculative projects are not included in forecasts for this GSOO as the IMO does not speculate on the timing and outcomes of potential projects that have not obtained favourable investment decisions. However, this GSOO includes a non-exhaustive list of potential upcoming projects in WA (outlined in Appendix 3) that may alter gas demand in the forecast period.

The impact of US LNG exports on LNG pricing is not considered in the forecasts in this GSOO as it is uncertain. Japanese LNG purchasers have indicated their preference for lower LNG purchase prices and their preference for LNG supply contracts to be linked to the Henry Hub[3] gas prices in the US, which are comparatively lower than in the Asia Pacific region.

However, financial institutions have revealed that a shift to Henry Hub-linked LNG pricing is unlikely, as market-reliant gas pricing (such as the Henry Hub) prevents these institutions from managing their lending risks and funding new LNG export capacity[4]. This impasse has curtailed the rapid expansion of LNG export capacity internationally. In addition, recent increases in US domestic gas consumption and prices may reduce the price advantage of US LNG exports into the Asia Pacific region.

1.2. Supply-Demand Balance

Since the publication of the July 2013 GSOO, some market participants have voiced concerns about the continued availability of gas from the NWS JVs to the domestic market beyond 2020, citing a lack of new long-term domestic gas supply contracts from the NWS.

Ongoing supply from the NWS JVs beyond the terms of their existing contracts is dependent on a range of factors, including:

- **the outcomes of ongoing discussions between the WA Government and the NWS JVs that relate to the status of remaining NWS reserves;**
- **investment decisions required by the NWS JVs to access remaining undeveloped reserves; and**
- **investment required to extend the life of the aging KGP,**

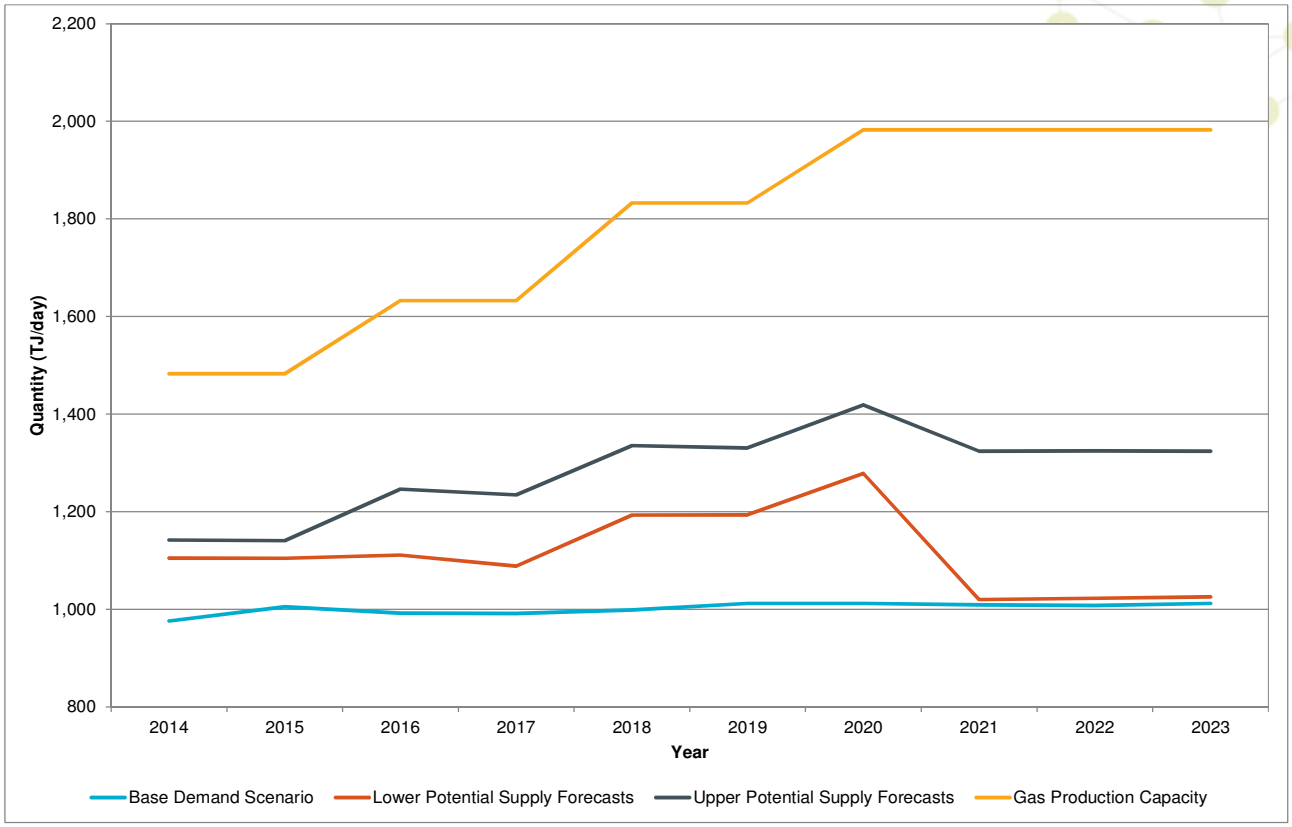
each of which will involve consideration of the commerciality and profitability of ongoing operations at the KGP.

Due to this uncertainty, two potential supply scenarios have been developed for the 2014 to 2023 period in this GSOO. The first scenario (the Upper potential supply forecasts) assumes the NWS JVs will continue to supply gas to the WA domestic market for the full forecast period, while the second scenario (the Lower potential supply forecasts) suggests the NWS JVs will only supply domestic gas under their remaining contracts.

[3] Henry Hub is the main gas price point for the US.
[4] This is consistent with the presentations made by several financial institutions presenting at the 2nd Asia Gas Summit 2013 in Singapore, 30 October to 1 November 2013.

These forecasts are presented in Figure A, which shows the supply-demand balance for the 2014 to 2023 period, comparing the two potential supply scenarios with gas production capacity and the Base demand forecasts.

Figure A – Supply and Demand Balance, 2014 – 2023



Source: NIEIR Forecasts 2014 – 2023.

Figure A suggests the domestic gas market will be well supplied for the period from 2014 to 2020, the year in which the last of the existing NWS domestic gas supply contracts are estimated to expire.

However, for the 2021 to 2023 period, the balance of gas supply and demand in the WA domestic market is contingent on the continuation of supply from the NWS. The Upper potential supply forecasts suggest that the market will continue to be well supplied if the NWS continues to supply to the domestic market. However, the Lower potential supply forecasts suggest tight market conditions (at forecast prices) with the relatively small gap between demand and supply being within the margins of error of the forecasts.

If the NWS continues to supply to the WA domestic market beyond 2020, potential supply to the WA market in the 2014 to 2023 period is forecast to grow at approximately 1.7% per annum from 1,142 terajoules (TJ)/day (417 petajoules (PJ)/annum) in 2014 to 1,324 TJ/day (483 PJ/annum) in 2023, while domestic gas demand is forecast to only grow by 0.4% per annum from 976 TJ/day (356 PJ/annum) to 1,012 TJ/day (369 PJ/annum) in 2023. The supply-demand gap (the difference between the potential domestic supply and domestic demand forecasts) is forecast to increase from approximately 166 TJ/day in 2014 to about 312 TJ/day in 2023. By the end of 2023, potential domestic gas supply is expected to be almost 31% higher than forecast demand for the WA domestic market. The growth in supply is driven by the upcoming Gorgon and Wheatstone domestic gas production facilities.

If the NWS continues to supply the domestic gas market, the potential excess supply of gas in the WA domestic market presents an opportunity to further deepen the gas market through the development of a formalised short-term trading market. A formalised short-term trading market can more rapidly signal gas shortages and excess supply. It may also increase opportunities for trade between gas producers not intending to enter into longer-term gas supply contracts and gas consumers that are considering shorter-term gas requirements for portfolio rebalancing. The GAB has indicated interest in investigating potential gas and capacity trading markets for WA.

However, as shown in Figure A, the supply-demand balance is highly contingent on the NWS JVs being willing to continue to supply gas to the WA domestic market in the forecast period. Recent statements made by the Woodside Energy Chief Executive Officer[5] suggest the NWS is willing to continue to supply to the WA domestic market as long as the price is commercially viable.

If the NWS elects not to supply domestic gas beyond its remaining contracts, it is estimated that the potential supply to the domestic market would increase between 2014 to 2020 from 1,105 TJ/day to 1,278 TJ/day, but would then fall to approximately 1,020 TJ/day in 2021 before increasing slightly to 1,026 TJ/day in 2023. This has the potential to create a very tight WA domestic gas market towards the end of the forecast period which may result in gas prices rising above the forecasts used in this GSOO.

Section 3.1 of this GSOO provides further information on the NWS JVs' existing domestic gas supply contracts, gas reserves and the requirements of the State Agreement with the WA Government.

Forecast supply and demand are further considered below.

1.2.1. Potential Supply

The potential supply forecasts generated for this GSOO are shown in Figure A. These forecasts take into account:

- the timing of upcoming domestic gas production facilities (Gorgon Phases 1 and 2 and Wheatstone);
- the estimated contracted level for each production facility;
- the estimated cost of production (and growth of costs) for each production facility;
- the required rates of return on investment;
- NIEIR's forecast medium to long-term average (ex-plant) new contract prices;
- the continued willingness of the NWS to supply to the WA domestic market; and
- the influence of alternative gas markets (LNG).

The Upper and Lower potential supply forecasts for the 2014 to 2023 period are subject to the assumptions that:

- the start-up timeframes announced for the Gorgon (Phases 1 and 2) and Wheatstone domestic gas production facilities are accurate and remain unchanged;
- there are adequate gas reserves connected to production facilities;
- the performance of each gas field connected to gas production facilities remains unchanged over the forecast period;
- there are no gas supply disruptions to gas production and transmission;
- the estimated new contract prices follow the price path of NIEIR's Base scenario for long-term average (ex-plant) new contract prices; and
- other assumptions applied by NIEIR to the modelling of potential supply are representative of the domestic market.

The Upper potential supply forecasts assume the KGP will supply to the market at a maximum of 470 TJ/day to 2020 (inclusive) and subsequently up to 450 TJ/day to 2023. As domestic gas contracts start to expire from 2015 to 2020, potential supply from the NWS is forecast to fall from 459 TJ/day in 2014 to 299 TJ/day in 2023, assuming none of the 450 TJ/day supply capacity is recontracted between 2021 and 2023[6].

The Lower potential supply forecasts assume the KGP will only supply the NWS JVs' remaining domestic gas supply contracts, with supply declining over the period to 2020 and reducing to zero from 2021 to the end of the forecast period.

In addition to generating a forecast of potential supply as outlined above, this GSOO also considers two other perspectives, namely the availability of gas production capacity and the adequacy of gas reserves to continue to meet gas demand in WA.

[5] According to the West Australia (2013f), *Woodside signals LNG shift*, 11 December 2013, the Chief Executive Office of Woodside Energy has suggested he would like to sell its remaining gas at higher gas prices.
[6] The forecasts of potential supply from the NWS for 2021 to 2023 are 304, 302 and 299 TJ/day.

In the 2014 to 2023 period, a total of 500 TJ/day of domestic gas production capacity is anticipated to be added to existing gas production capacity servicing the domestic gas market, bringing the total gas production capacity to 1,977 TJ/day in 2023. This growth in production capacity, shown in Figure A, is driven by the commencement of the Gorgon (Phases 1 and 2) and Wheatstone domestic gas production facilities.

Figure A also provides a comparison of the forecasts of total gas production capacity, potential supply and the domestic demand for the 2014 to 2023 period. This comparison suggests that over the forecast period, as an aggregate, gas producers are not expected to fully utilise their gas production capacity to supply to the domestic market. It also shows the amount of gas production capacity available to the domestic market in 2023 is predicted to approach almost twice the level of forecast gas demand for that year (see Chapter 9).

1.2.2. Gas Resources and Reserves

In terms of gas resources, WA remains the most gas-endowed state in Australia. The Australian Bureau of Resources and Energy Economics and Geoscience Australia estimate WA onshore and offshore basins hold a total of 159,000 PJ of economic and sub-economic resources in conventional gas, while other studies by the Energy Information Administration in the US report an estimated 305,412 PJ of unconventional gas resources located within WA's basins at the end of 2012. Based on these resource estimates and forecasts of total gas demand (domestic market and the LNG industry) for 2023, and assuming no additional gas resources are discovered by 2023, conventional and unconventional gas resources in WA have the potential to last for at least another 118 years beyond 2023[7].

While there appears to be sufficient gas resources in WA to meet demand well into the future, it should be noted that the majority of reported gas resources (more than 65%) are unconventional (shale and tight gas resources) and have not been properly verified or commercialised. Accordingly, this GSOO takes a conservative approach and only considers conventional gas resources in WA. These conventional gas resources are estimated to last between 27 and 42 years beyond 2023, depending on whether all sub-economic resources will become economic in the future.

Currently 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 domestic consumption and LNG requirements for approximately another 27 years from 2013. 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 in WA's sources of gas supply.

1.2.3. North West Shelf Reserves

In addition to considering the impact on potential supply by the NWS, this GSOO also reviews the continued ability of the NWS to supply to the WA domestic market through the adequacy of gas reserves.

Based on IMO estimates of reserves from public information, the NWS has sufficient 2P reserves to supply the WA domestic market for the 2014 to 2023 period, estimated to be between 12 to 13 years from the end of 2013.

However, it is understood the availability of these reserves will be contingent on the outcome of ongoing discussions between the WA Government and the NWS JVs relating to the status of remaining reserves that have yet to be committed to sale contracts. Under the *North West Gas Development (Woodside) Agreement Act 1979*, the WA Government has to decide the quantum of remaining gas reserves the NWS JVs are allowed to export from WA. This means continued gas supply to the WA domestic market from the NWS is contingent on the outcome of discussions between the State Government and the NWS JVs.

The NWS JVs face increasing costs to produce gas from the aging domestic gas production facility, and to access remaining gas reserves from smaller gas reservoirs. As a proportion of the future capital expenditure relates to capital reinvestment in the domestic gas production plant, a facility that is already more than 30 years old, the IMO considers that the NWS JVs may delay their investment decisions until discussions with the WA Government are completed. If the NWS JVs are unable to agree commercially acceptable terms

[7] The estimate assumes that total gas demand in WA remains constant at approximately 3,596 PJ/annum beyond 2023.

for further sales of domestic gas beyond their existing contracts, they may consider retirement of the domestic gas facility.

Hence, until the outcomes of the discussions and investment decisions of the NWS are established, it remains uncertain whether the NWS JVs will be prepared to commit to longer-term gas supply agreements during the forecast period and the KGP is unlikely to operate at its maximum capacity over the period.

Section 3.1 provides more information on the potential future supply of gas to the domestic market by the NWS JVs.

1.2.4. Domestic Gas Demand

The forecasts of domestic gas demand represent NIEIR's estimates of the quantity of gas required by the domestic market within WA (comprising industrial, commercial and residential demand, but excluding LNG processing consumption) for the 2014 to 2023 period.

Figure A includes the Base demand forecasts for the 2014 to 2023 period prepared by NIEIR. The forecasts predict that domestic gas demand will grow at approximately 0.4% per annum from about 976 TJ/day (356 PJ/annum) in 2014 to about 1,012 TJ/day (369 PJ/annum) in 2023, taking into account NIEIR's forecast average (ex-plant) new contract gas prices in the domestic market.

Domestic gas demand forecasts for the 2014 to 2023 period are based on the following assumptions:

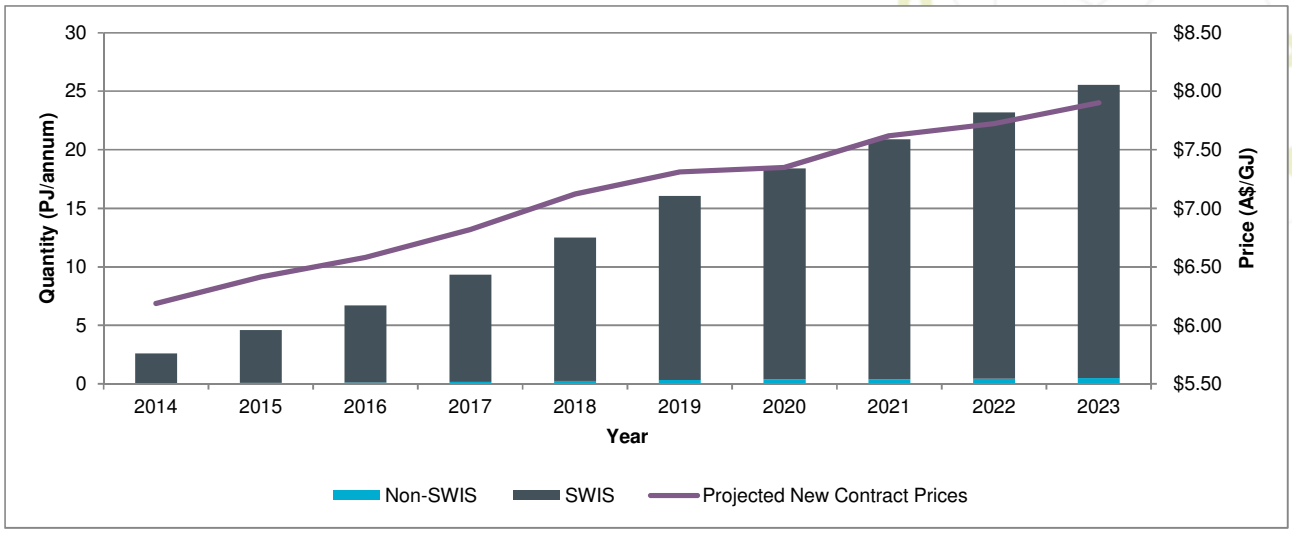
- the WA economy follows the forecast economic growth path;
- the estimated gas consumption forecasts for mining, aluminium, and major industrials are representative;
- the gas consumption for SWIS electricity corresponds with SWIS electricity demand forecasts;
- the price elasticity assumed in the modelling of gas demand is representative; and
- other applied price impacts on gas demand are accurate.

The updated domestic gas demand forecasts in this GSOO suggest that demand will be affected by increasing average new contract gas prices for the 2014 to 2023 period. Whereas the July 2013 GSOO suggested that domestic gas consumption was likely to be quite inelastic, that assumption has been revised for this GSOO as domestic gas sales data for 2012-2013 reported by the Department of Mines and Petroleum suggests recent price increases have started to affect domestic gas demand.

This means increases in average medium to long-term new contract gas prices will be reflected more rapidly by suppression of gas demand over the forecast period. The suppression in gas demand is particularly sharp for areas in the SWIS where there are more readily available substitutes (for example, coal and renewables) for gas consumption for electricity generation.

Figure B presents the suppression of gas demand due to forecast gas prices. This represents additional gas demand that may be realisable if real gas prices remain constant over the forecast period. With constant gas prices, it is forecast that gas consumption in WA in 2023 could be about 27 PJ/annum higher, of which 26 PJ/annum (or 2.5% of total gas demand) is in areas that comprise the SWIS and about one PJ/annum (or 0.1% of total gas demand) is in areas located outside the SWIS.

Figure B – Demand Suppression due to Forecast Real Prices (SWIS and Non-SWIS Demand), 2014 – 2023



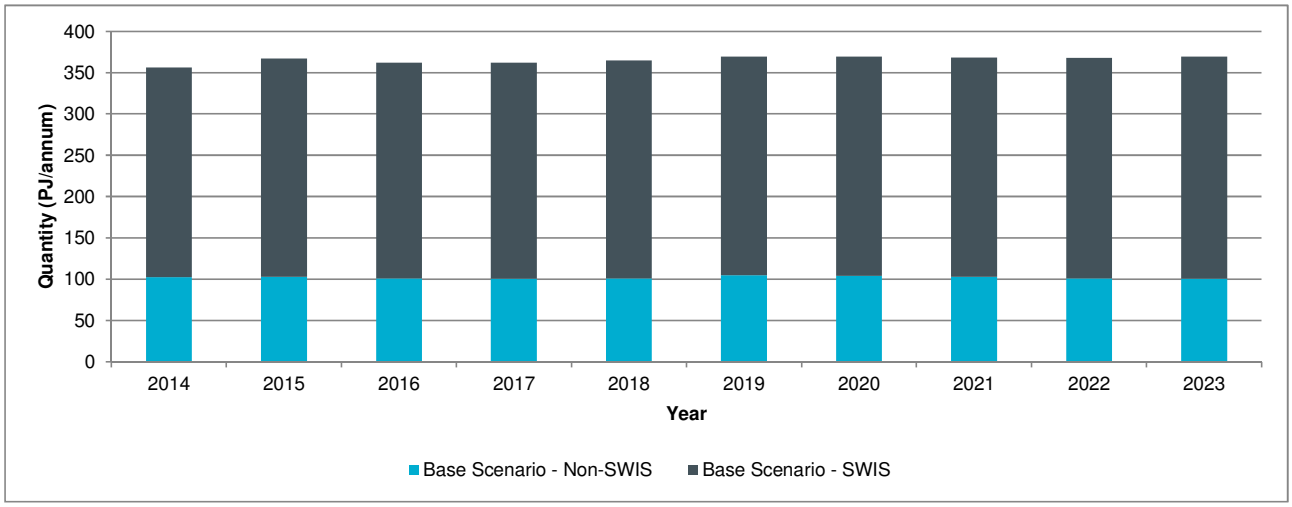
Source: NIEIR Forecasts 2014 – 2023.

1.2.5. Gas Demand by Areas

In assessing domestic gas demand, the IMO has separately considered gas demand in the SWIS and the remainder of the state, recognising that the drivers of gas demand may differ for different areas. For example, demand for gas in the SWIS is heavily impacted by its use for electricity generation, while demand outside the SWIS is largely driven by resource projects that may have limited access to alternative fuels.

Figure C presents the gas demand forecasts for the SWIS and areas outside the SWIS. Gas demand in the SWIS is projected to grow from 254 PJ/annum in 2014 to 269 PJ/annum in 2023. For areas outside the SWIS, gas demand is forecast to be flat from approximately 102 PJ/annum in 2014 to 101 PJ/annum by the end of 2023[8].

Figure C – Gas Demand by Areas, 2014 – 2023



Source: NIEIR Forecasts 2014 – 2023.

1.2.6. Total Gas Demand

Although forecasts suggest that growth in domestic gas demand is expected to be slow, total gas demand (domestic gas demand plus LNG, including feedstock and gas consumed in LNG production) is expected to rapidly increase. This growth is driven by the gas feedstock and processing requirements of the Gorgon and

[8] Noting that only projects that have been approved have been included in the gas demand forecasts.

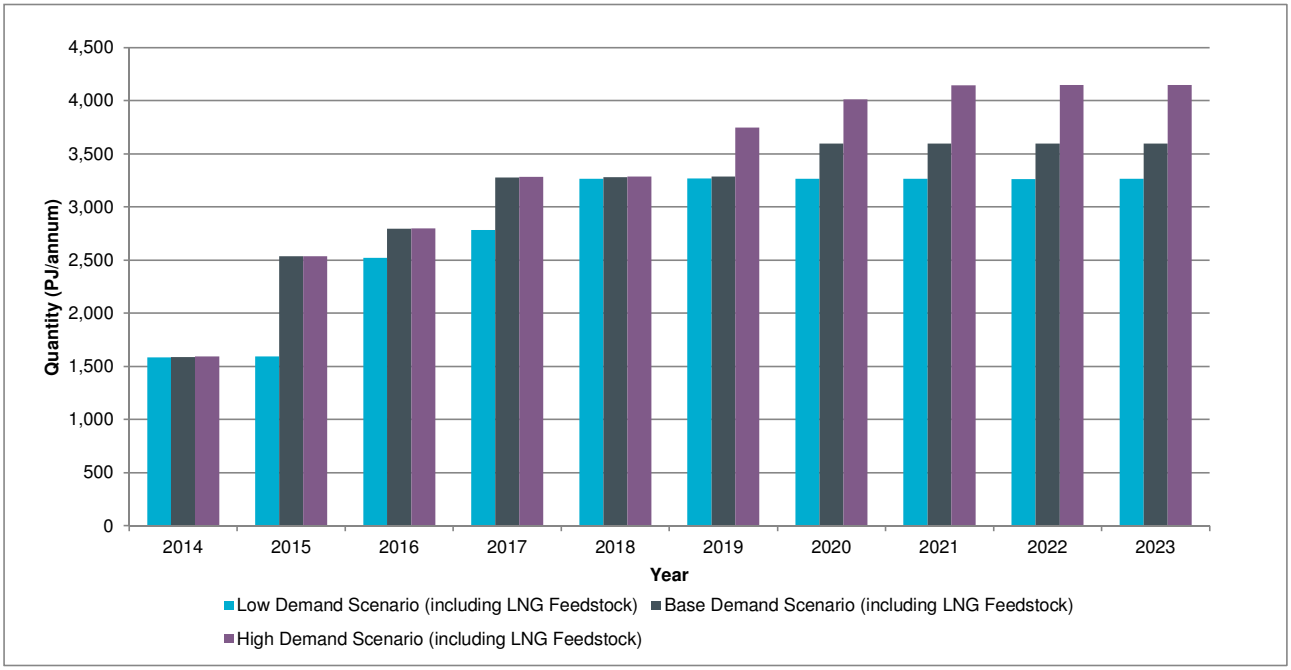
Wheatstone LNG and Prelude FLNG facilities that are anticipated to be completed in the 2014 to 2023 period.

The total gas demand forecasts for the 2014 to 2023 period are based on the assumptions that:

- start-up dates assumed for LNG facilities currently under construction are accurate and remain unchanged; and
- estimates of gas utilised for LNG processing are accurate[9].

This GSOO forecasts total gas demand will increase at approximately 9.5% per annum between 2014 and 2023, from 1,590 PJ/annum in 2014 to about 3,596 PJ/annum in 2023, with LNG requirements projected to increase from 1,142 PJ/annum in 2014 to approximately 2,988 PJ/annum in 2023. Total gas demand for the forecast period is presented in Figure D, with further information available in Chapter 7.

Figure D – Total Gas Demand, 2014 – 2023



Source: NIEIR Forecasts 2014 – 2023.

1.3. Growth Challenges for Western Australia's LNG Exports

Similar to the domestic gas market, WA's LNG export market is also going through a phase of significant expansion and development. In the 2014 to 2023 period, international LNG demand is expected to grow rapidly, with WA's LNG export capacity anticipated to increase from 21 million tonnes per annum (Mtpa) to about 50 Mtpa, more than doubling WA's LNG exports over this period.

Notwithstanding the positive outlook, there are several medium to long-term challenges that are currently confronting the WA LNG industry, including:

- changes to international LNG supply;
- the end of premium LNG pricing in the Asia Pacific region;
- the high relative cost of LNG production in WA;
- the emergence of unconventional gas as a source of supply; and
- potential changes in LNG contracting behaviour in the Asia Pacific region.

[9] These forecasts assume LNG processing requirements of 8% of total LNG feedstock. The IMO notes that EnergyQuest (2013) *EnergyQuarterly*, November 2013 Report, suggests a different estimate of 13%.

WA predominantly exports its LNG to customers located in the Asia Pacific region. Due to the large price differentials between the Asia Pacific LNG market and other LNG markets, several countries such as Russia, the US and Canada have announced their intentions to increase supply to the Asia Pacific LNG market. If all of these planned LNG export projects go ahead, they are likely to be in competition with WA LNG exports.

Increasing competition in the supply of LNG to the Asia Pacific market may trigger a reduction in premium LNG prices in the Asia Pacific region relative to the rest of the world. In addition, an increase in LNG exports from North America to the Asia Pacific, which is anticipated towards the end of the forecast period, may weaken LNG prices agreed in existing contracts that are predominantly linked to oil indexes.

Although HSBC Global Research[10] details a slowdown in construction cost increases in Australia, the high cost of LNG production in Australia remains an issue for the LNG export market. McKinsey[11] reports that the cost of developing LNG production and export facilities in Australia is now 20% to 30% higher than that in North America and East Africa. If the cost of developing LNG projects remains high relative to other potential LNG export regions, LNG developments currently planned for WA may be delayed or abandoned.

The emergence of unconventional gas as a new source of gas supply is also a game changer. In the last decade, unconventional gas has transformed the US from a net importer into a net exporter of gas. Unconventional gas is also transforming gas markets in eastern Australia and there are indications that WA is well endowed with unconventional gas resources. While production is still in its early stages around the world, unconventional gas has the potential to transform as well as disrupt the international gas market. The impact of unconventional gas on LNG exports remains unclear and will need to be monitored closely by WA LNG exporters, market regulators and governments.

While these challenges facing the LNG export sector are not expected to affect the domestic supply of natural gas in the forecast period, they may have an impact over the longer-term. More information is provided in Chapter 8.

1.4. Future Anticipated Developments for Western Australia's Gas Market, 2014 – 2023

Further development of the WA gas market is expected over the forecast period. Known and potential developments include:

- the potential construction and completion of the proposed Bunbury to Albany Pipeline to service customers in the South West, the recently announced Fortescue River Gas Pipeline in the Pilbara to ship gas to Fortescue Metals Group's Solomon Hub iron ore operations[12] and another potential pipeline, the proposed Great Northern Pipeline in the north-west of WA;
- the Australian Consumer and Competition Commission's review of the applications for joint marketing of gas (if any) from the NWS JVs and Gorgon JV before the end of 2015;
- the expected submissions to the Economic Regulatory Authority of WA by ATCO Australia, the APA Group and DBNGP (WA) Transmission Pty Limited for gas access arrangements for the WA gas distribution network, the Goldfields Gas Pipeline and the Dampier to Bunbury Natural Gas Pipeline respectively, expected in 2014 and 2015;
- completion of the Gorgon, Wheatstone and Prelude LNG production and export facilities;
- the development of the two new domestic gas production facilities associated with the Gorgon and Wheatstone LNG facilities[13];
- the final investment decisions for potential domestic gas production facilities including Warro, Pluto and Yulleroo/Valhalla; and

[10] HSBC Global Research (2013b), *Downunder Digest, Australia's growing role in Asian gas markets*, 26 September 2013, https://www.research.hsbc.com/midas/Res/RDV?p=pdf&key=Qae96RMqxq&n=387725.PDF, accessed 18 November 2013.

[11] See McKinsey (2013), *Extending the LNG boom: Improving Australian LNG productivity and competitiveness* http://www.mckinsey.com/global_locations/pacific/australia/en/latest_thinking/extending_the_lng_boom, accessed 20 November 2013.

[12] The IMO's forecasts were concluded prior to this announcement. It has been estimated that approximately 25 TJ/day of new gas consumption will be transported via the pipeline, which is expected to be completed by the end of 2014 (see DUET Group (2014), *Fortescue River Gas Pipeline Project and $100M Placement, ASX Announcement*, 16 January 2014, http://www.asx.com.au/asxpdf/20140116/pdf/42m4lh487qwc8p.pdf, accessed 16 January 2014 and the West Australian (2014b), *Pilbara pipeline deal a gas for miner*, 17 January 2014).

[13] These facilities are anticipated to proceed as Gorgon's (Phase 1) domestic facility is already fully contracted to supply domestic gas to Synergy (previously Verve Energy) and an unnamed party, and the Gorgon (Phase 2) and Wheatstone domestic gas production facilities are attached to State Agreements and Domestic Gas Producer Agreements signed between the WA Government and the project partners. See the July 2013 GSOO, available at http://www.imowa.com.au/gsoo, for more details.

- the final investment decisions on other potential LNG projects such as Browse, Equus, Gorgon Train 4, Scarborough and others located within WA.