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The proposed Project area contains significant CSG resources suited for domestic supply and conversion to liquefied natural gas (LNG) for export. The global demand for gas presents an opportunity to develop these resources for export, with resources still available for the existing domestic market.

The Project will benefit Queensland through long-term royalty contributions to the state economy, and also provide direct benefits to areas surrounding the Project through the creation of employment and small business opportunities.

This chapter which is based on information drawn from the Surat Gas Project EIS (Arrow Energy and Coffey Environments, 2011) describes the need for the Bowen Gas Project to develop CSG for domestic use and for export once converted to LNG. The chapter discusses:

- Projected Australian and worldwide demand for gas and energy (Section 3.1);
- The extent of Australia's natural gas resources and production capacity of the Project (Section 3.2);
- Australian and Queensland government policy supporting the domestic use of gas and the conversion of gas to LNG for export (Section 3.3); and
- Environmental, economic and social impacts of not proceeding with the Project (Section 3.4).

A cross reference to the locations where each of the requirements of the ToR has been addressed is given in Appendix B which references both the study chapters (Sections 1 through 34) and/or Appendices (A through EE).

3.1 Gas and Energy Demand

The following sections discuss international (Section 3.1.1) and Australian (Section 3.1.2) gas and energy demand.

3.1.1 International Demand

Gas is an established energy source that presently meets 21% of the world's energy needs behind oil and coal. Compared to other fossil fuels, gas offers a number of advantages as a fuel: relatively lower greenhouse gas emissions, greater energy efficiency, ease of extraction, ease of transport through pipelines and ease of export once converted to LNG (IEA, 2011). Global gas demand was estimated by the International Energy Agency (IEA) at 3,284 billion cubic metres (bcm) in 2010, up 7.4% from the 2009 levels (IEA, 2011). Demand is expected to increase by 44% between 2008 and 2035, an annual rate of increase of 1.4% (IEA, 2010). This is expected to be provided by a number of international energy suppliers.

Unlike worldwide oil markets, gas has typically been considered a regional resource because of limitations on transport. LNG overcomes those limitations with trade of LNG accounting for 9% of global gas consumption (Geoscience Australia, 2012). Worldwide LNG sales are predicted to rise from 165 Mt in 2007 to between 245 and 340 Mt per year by 2015 (IEA, 2009). By 2035, predictions show a global increase in the gas trade of around 80%, of which more than half takes the form of LNG (IEA, 2010).

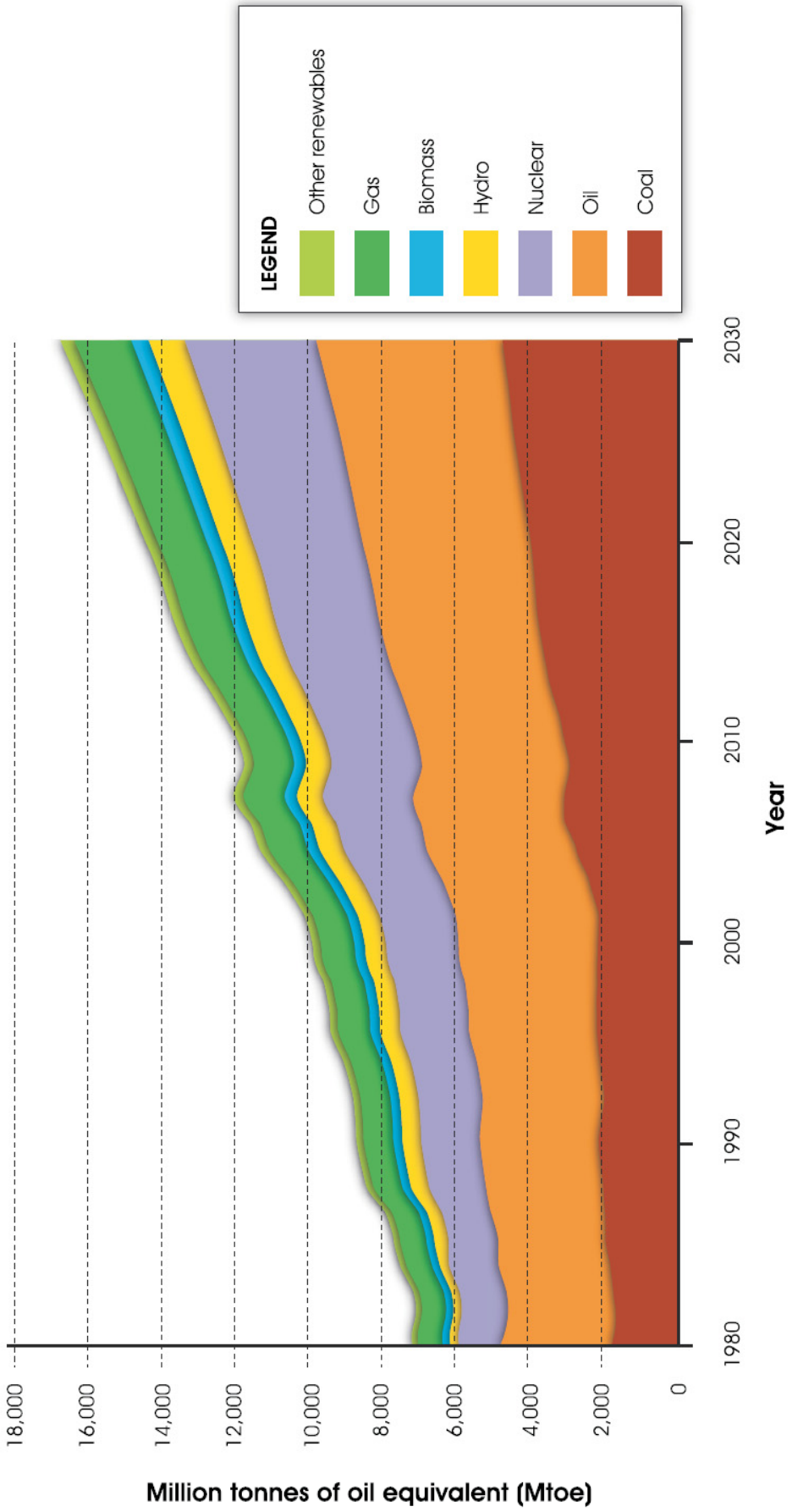
Historically, there have been two LNG import markets: the Asia-Pacific, which includes China, Taiwan, Japan and the Republic of Korea, and the Atlantic, which includes Europe and North America. The growth of Middle East imports in 2010 signals the rise of regions of demand (ABARES, 2010a).

As for many other commodities, Australia is a significant exporter of LNG, with around 50% of gas production exported. In 2009 – 2010, the value of Australian LNG exports was $7.8 billion (ABARES, 2011). LNG exports are expected to grow progressively from around 24.5 bcm as of 2009 – 2010 to 82 bcm by 2015; and potentially LNG exports could exceed 140 bcm by 2030 (IEA, 2011).

Current construction projects underpinning this growth in Australia include the Woodside's Pluto LNG Project and Chevron Gorgon Gas Project in Western Australia, and the QGC and BG Group Queensland Curtis LNG Project, the Origin, ConocoPhillips and Sinopec Australia Pacific LNG Project; and the Santos, Petronas, Total and Kogas Gladstone LNG Project in Queensland. Given the number of projects undergoing feasibility and design, ABARES foresees the potential for Australian LNG exports to continue growing beyond 2015 – 2016 (ABARES, 2011). Presently, Australia's major LNG trading partners include Japan, China and the Republic of Korea. While strong growth in these markets is expected to continue, opportunities are arising in India, Thailand, Singapore and Chinese Taipei (ABARES, 2010a). With sufficient gas resources to meet domestic demand, Australia has an opportunity to strengthen its position as a key participant in global LNG markets.

Worldwide energy demand in 2007 and projected demand in 2030 is shown in Figure 3–1. The IEA estimates that over 20% of the global population still lacks access to electricity. In general, the IEA expects world primary energy demand to increase by 36% to 40% between 2008 and 2035, at an annual average rate of 1.2% to 1.4% (IEA, 2010). Emerging economies led by China and India, and, to a lesser extent, growth in the Middle East, are considered the main drivers for increased demand. Demand in China alone contributes to 36% of this growth.

These projections assume that governments take a cautious approach to implementing greenhouse gas reduction measures. The IEA notes that natural gas, in particular, is set to play a central role in meeting the world's energy needs for the next two-and-a-half decades as governments place greater focus on policies aimed at maintaining economic growth while embracing less carbon-intensive energy technologies. Table 3–1 compares the greenhouse gas emissions of the world's primary fossil fuels (expressed as kg CO_2-e). Gas estimates are given according to the different methods by which gas is supplied for the consumption of natural gas and solid fuels, not taking into account lifecycle factors such as methods of processing and transportation.



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BOWEN GAS PROJECT EIS

PROJECTED WORLDWIDE ENERGY DEMAND 2007 TO 2030

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Figure: 3-1

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Table 3-1 Greenhouse Gas Emissions per GJ of Fuel Combusted

Fuel	Emissions (kg CO_2-e/GJ)
Coal seam methane that is captured for combustion	51.1
Natural gas distributed in a pipeline	51.2
Liquefied natural gas	51.2
Black coal (other than that used to produce coke)	88.4
Brown coal	92.7

Source: DCCEE (2010a).

3.1.2 Australian Demand

ABARES forecasts Australia's primary energy consumption to increase by 1.4% per year, from around 5,772 petajoules (PJ) in 2007 – 2008 to 7,715 PJ by 2029-2030. While this represents an overall increase of around 35%, ABARES predicts Australia's long-term trend will weaken the move towards greater energy efficiency and the use of less carbon-intensive energy sources. ABARES predicts Australia's primary fuel mix will change, aided by policies that encourage the development of gas and renewable energy sources to reduce dependency on coal.

Domestic gas consumption in Australia totalled around 32.8 bcm in 2010, compared to 31.4 bcm in 2009 (IEA, 2011). Natural gas demand is expected to increase at a rate of 3.4% per annum over the next two decades, reaching over 65 bcm (2,575 PJ) by 2030. Gas-fired power generation in Queensland, Victoria and New South Wales being a key driver of demand (AEMO, 2010).

3.2 Gas Resources

The following sections discuss the availability of gas resources in Australia (Section 3.2.1) and the production capacity of the Project (Section 3.2.2).

3.2.1 Australian Gas Resources

The Australian Government has commissioned several reports which examine the availability of Australia's gas resources to meet projected domestic energy demand. These reports include:

- The **Gas Statement of Opportunities** (GSOO), first published by the AEMO in 2009 (AEMO, 2009) and updated in 2010 (AEMO, 2010). The GSOO provides 20-year outlooks on the potential balance of gas supply and demand in Australia, under low-, medium- and high-growth scenarios. Forecasts to 2030 prepared by McLennan Magasanik Associates inform the GSOO; these forecasts consider the availability of proven, probable and possible, as well as contingent gas reserves within Australia, and market demand in Queensland, New South Wales, South Australia, Tasmania, Victoria and the Australian Capital Territory.
- The **Australian Energy Resource Assessment**, published by Geoscience Australia and ABARES in 2010 (Geoscience Australia and ABARES, 2010). The report presented reserves estimates as at

December 2008 and considered factors likely to influence the use and availability of resources during the period to 2030, including new technology development.

- The **Australian Energy Projections to 2029-30**, published by ABARES in 2010 (ABARES, 2010b). The report provides long-term projections of Australian energy consumption, production and trade for the period 2007 – 2008 to 2029 – 2030 and also reports on all proponents gas reserves.
- The **Energy Quest** annual and quarterly reports, published by Energy Quest in 2011 (Energy Quest, 2011).

Further details are provided below.

3.2.1.1 Reporting Method for Reserves

Two systems are used to report gas reserves internationally. The most widely used international standard is the 2007 Petroleum Resources Management System, approved by the Society of Petroleum Engineers, World Petroleum Council, American Association of Petroleum Geologists and the Society of Petroleum Evaluation Engineers in 2007, and updated in 2008 to state the correct conversion ratio for LNG, which is about 1/614 the volume of natural gas (SPE *et al.,* 2007). The system is used within Australia and allowable under the Australian Stock Exchange.

In the United States, the Securities and Exchange Commission (SEC) defined a separate system, which is mandatory. From 2010, the SEC adopted the Petroleum Resources Management System principles in its regulatory framework.

Under Petroleum Resources Management System, **proven (1P)** gas reserves are reserves that, to a high degree of certainty (90% confidence), are recoverable from known reservoirs, using current technology and under current economic and operating conditions.

Proven and probable (2P) gas reserves are proven reserves plus those reserves that analysis of geological and engineering data suggests are more likely than not (50% confidence) recoverable.

Proven, probable and possible (3P) gas reserves are proven plus probable reserves plus those reserves that, to a low degree of certainty (10% confidence), are recoverable. Relatively high risk is associated with these reserves.

Contingent reserves are those quantities of hydrocarbons that are estimated, on a given date, to be potentially recoverable from known reservoirs but are not currently considered commercially recoverable. Although contingent reserves may be significant, they have constraints to development.

From a commercial perspective, the 2P reserves are important, because the establishment of long-term sales gas agreements generally require this level of confidence.

3.2.1.2 Gas Resources and Reserve Growth

Studies show Australia has 60 sedimentary basins and sub basins that potentially contain accumulations of oil and gas. Of these, 31 lie in eastern Australia. To date, gas production has focused on a small number of basins, which McLennan Magasanik Associates (MMA, 2010) believe is attributable to both economic and geological factors, such as proximity to market and basin structure.

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Approximately 92% of Australia's conventional gas resources are located in the Carnarvon, Browse and Bonaparte basins off the north-west coast. There are also resources in south-west, south-east and central Australia (see Figure 3–2) (Geoscience Australia, 2012). At the beginning of 2011, Australia's economic demonstrated resources[1] (EDR) and sub-economic demonstrated resources[2] (SDR) of conventional gas were estimated at 173,000 PJ. At current production rates there are adequate EDR (113,400 PJ) of conventional gas to last another 54 years (Geoscience Australia, 2012).

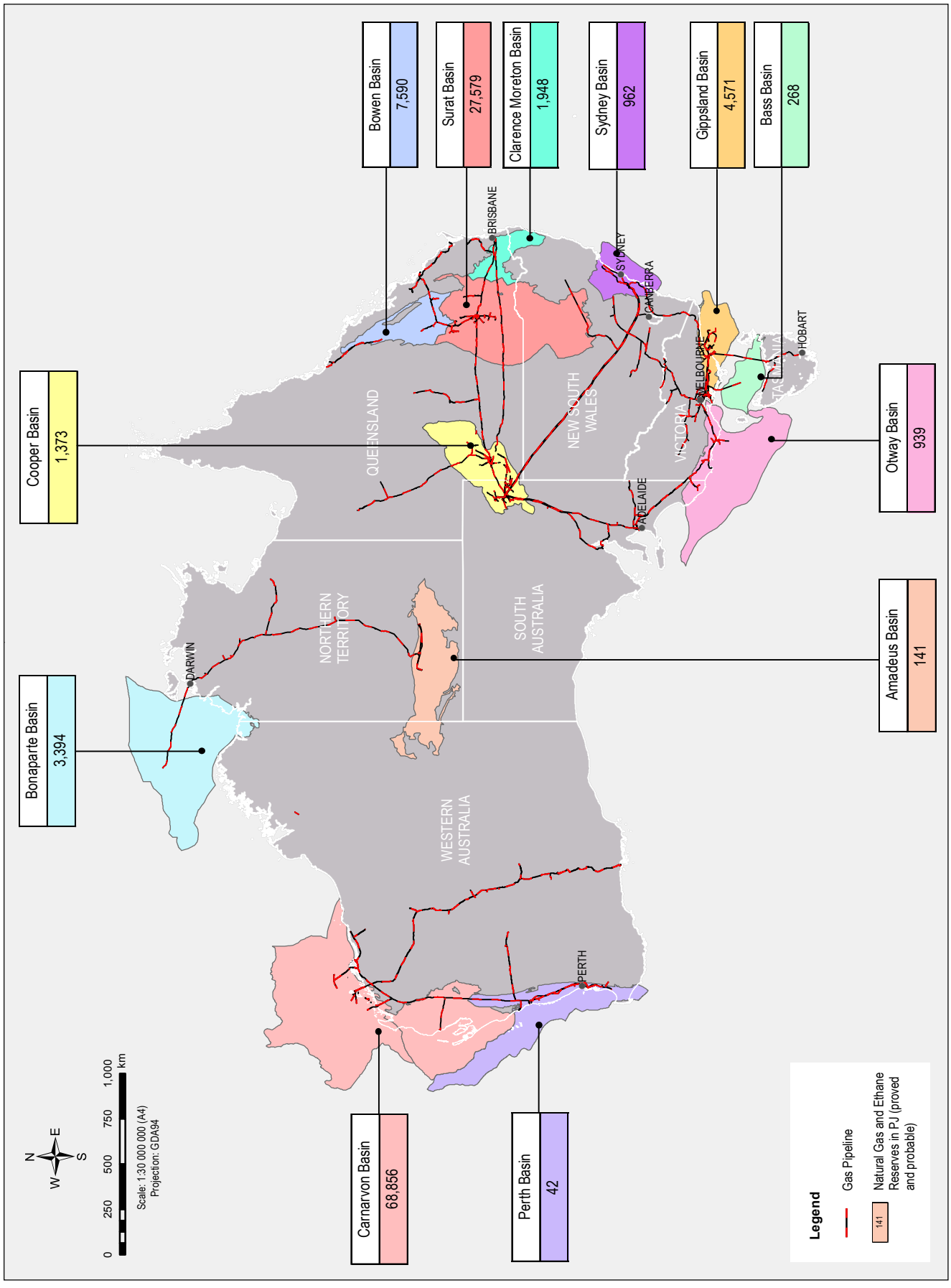
For CSG resources, large deposits exist in the coal basins of Queensland and New South Wales. McLennan Magasanik Associates note that growth in 1P, 2P and 3P reserves has grown exponentially since 2003. McLennan Magasanik Associates identify 2007 and 2008 as particularly strong years, due to the major gas producers accelerating the proving up of reserves to back proposed LNG export projects (MMA, 2010). Presently, the Surat and Bowen basins account for 61% and 34% of current 1P and 2P CSG reserves respectively, with small amounts also discovered in the Clarence-Moreton, Gunnedah, Gloucester and Sydney basins (Geoscience Australia and ABARES, 2010).

Australia's CSG EDR have doubled since 2009 and at the end of 2011 were 35,905 PJ, this is equivalent to about a third of the recoverable reserves from Australia's conventional gas fields. Total identified resources of CSG are estimated at approximately 223,454 PJ, which consist of EDR of 35,905 PJ, SDR of 65,529 PJ and inferred resources of 122,020 PJ (Geoscience Australia, 2012). Reserve life for Australia's CSG is around 150 years at current rates of production, however this is likely to change as production is estimated to significantly increase with the establishment of the CSG LNG industry (Geoscience Australia, 2012).

Queensland has 33,001 PJ (or 92%) of Australia's reserves (DEEDI, 2012 in Geoscience Australia, 2012), with the remaining 2,904 PJ in New South Wales. The majority of current reserves are found in the Surat (69%) and Bowen (23%) basins, with small amounts in the Gunnedah, Gloucester, Clarence-Moreton and Sydney basins (see Figure 3-2). On this basis the Bowen Basin has EDR of 7,590 PJ.

[1] Economic demonstrated resources (EDR) are, "resources with the highest levels of geological and economic certainty. For petroleum these include remaining proved plus probable commercial reserves. For these categories, profitable extraction or production has been established, analytically demonstrated or assumed with reasonable certainty using defined investment assumptions" (Geoscience Australia, 2012).

[2] Sub-economic demonstrated resources (SDR) are, "resources for which, at the time of determination, profitable extraction or production under defined investment assumptions has not been established, analytically demonstrated, or cannot be assumed with reasonable certainty (this includes contingent petroleum resources" (Geoscience Australia, 2012).



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BOWEN GAS PROJECT EIS

AUSTRALIAN GAS RESOURCES BY BASIN

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Figure: **3-2**

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3.2.1.3 Eastern Australian Gas Consumption

AEMO categorises gas consumers into four main groups and, through the GSOO, project gas demand for the years 2011 to 2030 across eastern Australia. The groups, which each having different demand drivers, include:

- The mass market, which includes residential, commercial and small industrial users. Demand is influenced by population, new dwelling construction and activity in the manufacturing sector, as well as the variability of climate (peak winter and summer demand), technological development and government policy initiatives.
- Power generation, which relates to contractual supply to gas-fired power station operators. Influences on this use include demand for new electricity market participants and therefore economic and commercial factors, such as fuel costs, new entry costs for generators, and renewable energy and greenhouse gas abatement schemes.
- Large industrial users, most of which relate to the smelting, refining or processing of minerals. Other customers may include chemical and petrochemical industries. These projects are small in number and demand drivers (such as pricing information) are often confidential.
- LNG exports, such as projects already operating out of Western Australia and the Northern Territory, and proposed for Queensland. Influences on demand for gas for LNG include the global demand for LNG, present supply capacity, the availability of gas resources and LNG pricing and costs associated with resource development.

The various demand drivers for each group were used to develop high-, medium- and low-growth scenarios for the period 2011 to 2030. The GSOO found that, for all scenarios modelled, gas reserves in eastern Australia are sufficient to meet the projected growth in domestic gas and export consumption over the forecast period to 2030 (AEMO, 2010). These findings are consistent with the Australian Energy Projections to 2029 – 2030 (ABARES, 2010b) and the Australian Resources Assessment Report (Geoscience Australia and ABARES, 2010).

3.2.2 Production Capacity of the Project Area

The Project area comprises Authorities to Prospect (ATPs) 1103, 1031, 1025, and a small portion of 759, as well as Authority to Prospect Applications (ATPAs) 742 and 749. In addition Arrow has the following existing gas projects in the Bowen Basin:

- Moranbah Gas Project (Petroleum Lease (PL) 191, PL196 and Petroleum Lease Application (PLA) 222); and
- Carborough Project (PL 223 and PL 224).

Arrow's knowledge of the gas reserves in the Project area is based on the extent of its exploration activities to date in the above tenures. As more extensive exploration and development has been undertaken in Arrow's existing operational tenures, the reserves in the areas adjacent to its existing field developments have a higher level of certainty of being able to be recovered. Arrow's gross gas reserves in and adjacent to the Project area as at 31 December 2011 are presented in Table 3–2 and Table 3–3.

Table 3-2 Certified Project Area Reserves as at 31 December 2011

Tenure	Gross 1P (PJ)	Gross 2P (PJ)	Gross 3P (PJ)
ATP 1103 (Bowen Gas Project)	0	1,536	3,321
ATP 1025 (Bowen Gas Project)	0	148	2,480
ATP 1031 (Bowen Gas Project)	0	37	192
Subtotal	**0**	**1,721**	**5,993**

Table 3-3 Certified Arrow Reserves Adjacent to the Project Area as at 31 December 2011

Tenure	Gross 1P (PJ)	Gross 2P (PJ)	Gross 3P (PJ)
PL 191 (Moranbah Gas Project)	151	392	835
PL 196 (Moranbah Gas Project)	3	80	199
PLA 222 (Moranbah Gas Project)	0	149	410
PL 223 (Carborough)	31	108	201
PL 224 (Moranbah Gas Project)	0	30	86
Subtotal	**185**	**759**	**1,731**

Ongoing exploration throughout the Project area will continue to build Arrow's confidence of total reserves. Arrow's current aim is to increase 2P reserves by 1,500 PJ per year for the next three years. Expected exploration and appraisal activities are discussed in the Project Description chapter (Section 4) of this EIS.

Arrow has and is undertaking basin-wide modelling to estimate the quantity of gas available in the Project area. This modelling suggests that the Project area has the potential to produce approximately 6,492 PJ of gas over the life of the Project, with an estimated annual production of 147 PJ per year under current export scenarios.

3.2.3 Use of the Project Development Area Resource

As set out in Section 3.2.1.3, there are four major gas consumer groups in Australia. These include the mass market, power generators, large industrial users and LNG exporters. Arrow's gas is currently directed to the mass market or power generators under long-term gas sales agreements.

AEMO (2010) has noted mass market and large domestic project consumption in eastern Australia will increase in the period to 2030; however, compared to international demand, the increase in mass market and large industrial consumption is predicted to be very small. Meanwhile, global demand will continue to grow with secure, less-emissions-intensive energy sources preferred. Therefore, the most

likely requirement for gas to cater for Australian and global energy demand during the period involves the use of gas to displace sources of more intensive greenhouse gas emissions, such as:

- New-entrant baseload and intermediate power generation in Queensland; and
- Offshore energy demand, including heavy transport industry fuels.

The suitability of these options is discussed further below.

3.2.3.1 Power Generation in Queensland

A range of generators operate in the national electricity market (NEM) to meet the daily, weekly and seasonal demand for electricity. Generators are typically described in three classes:

- Baseload generators, which operate for the majority of the year to supply constant power needs, such as those generated by industry, commercial developments, public facilities and typical household activities.
- Peaking generators, which meet short-term power needs. This may occur on very cold or very hot days when consumers switch on heating or air-conditioning, and when baseload generators are unavailable as a result of plant failure, forced outages, or planned maintenance outages that coincide with other unforeseen events, such as extreme weather conditions.
- Intermediate generators, which operate in-between the extremes of baseload and peaking generators. Often, intermediate generators will run in the morning when consumers rise and prepare for work or school, or in the evening when they return for their evening meal and entertainment. Intermediate generators often shut down or curtail output during the night when demand for power is the lowest.

Coal-fired generators, due to their low running costs, are the predominate supplier of baseload and intermediate power in the NEM. Comparatively, significant greenhouse gas emissions reductions can be achieved using gas for this purpose. As baseload and intermediate demand grows, government energy policy initiatives such as the Queensland Gas Scheme are creating opportunities for new entrant gas-fired generators.

Arrow supplies approximately 20% of the gas required to fuel Queensland's existing gas-fired plants and, through Braemar 2 Power Station, owns generation capacity in its own right. The Townsville Power Station is a peaking plant, while Braemar and Braemar 2 power stations currently operate in peak and intermediate roles, they can also provide baseload generation. The 33-MW Daandine Power Station, located near the existing Daandine central gas processing facility, provides baseload generation.

3.2.3.2 Offshore Energy Demand

Forecasts show global demand for energy increasing in the period 2007 to 2029. Australia's natural gas resources are significant and are less emissions intensive than other fossil fuels. Conversion of gas to LNG enables transportation of this resource to markets unable to be technically or economically reached by pipeline. LNG can be used to meet the growing demand for less emissions-intensive fuel for power generation, industry and domestic heating and cooling, particularly in Asia.

The Bowen Gas Project, together with the proposed Arrow LNG Plant, provides an opportunity to export gas as LNG to cater for global energy demand. Importantly, Arrow's shareholders, Royal Dutch Shell plc and Petrochina Company Limited (PetroChina), have through their extensive commercial interests, a confirmed market for all LNG produced. Notably, PetroChina, whose sole sponsor and controlling shareholder is the state-owned enterprise, China National Petroleum Corporation, is the largest oil and gas producer and distributer in China.

The IEA 2010 forecasts are for China to contribute to 36% of the growth of global gas demand to 2035.

3.2.3.3 Key Influencing Factors

Both the rate and extent of Project development would ultimately depend on market variables, such as energy market demand, electricity and gas prices, contract quantities, the location of customers and other factors. These other factors include the need for supporting infrastructure and the prevailing regulatory environment.

Since Australia's gas resources are sufficient to sustain both a domestic and export industry, the Project will contribute to ensuring a sufficient supply of gas for the domestic market while still developing Australia's LNG export industry. Should LNG export not proceed, Arrow's gas field developments in the Bowen Basin would progress but on a smaller scale, at a slower rate, and with a reduced level of investment and economic output.

3.3 Policy Framework

Australian and Queensland government energy policy is driven by the need to:

- Grow a diverse economy at regional, state and national levels;
- Reduce greenhouse gas emissions from the stationary energy sector; and
- Support Australian industry and ensure Australia's security of energy supply.

This position, discussed below at national and state level, supports the development of Australia as a global energy producer including growth through the export of LNG.

3.3.1 Australian Government Energy White Paper

In 2008, the Australian Government commenced an Energy White Paper process, with the objective of identifying a comprehensive policy framework durable to 2030 and beyond. The National Energy Policy Framework 2030 Directions Paper (DRET, 2009a) was released in March 2009, followed by the discussion paper, Realising Australia's Energy Resource Potential, in April 2009 (DRET, 2009b). The discussion paper noted that Australia's large energy resources and educated population provide a strong platform from which to further develop the nation's energy resource sector while maintaining long-term energy security, and that Australia's extensive gas reserves and expected long-term growth of the LNG market provide significant export opportunities to the Asia-Pacific region.

In February 2011, the Australian Government issued an update on the Energy White Paper process. The White Paper will seek to deliver a whole-of-government policy framework, focused on providing certainty for investors and reliable and secure energy supply for the Australian community (DRET, 2011).

3.3.2 Queensland Climate Change Strategy and the Queensland Government Gas Scheme

The Queensland Government considers gas to be a key transitional fuel source to reduce the greenhouse gas emissions intensity from electricity generation. The Queensland Gas Scheme is one of the state's key energy initiatives under the state's ClimateSmart 2050 strategy (Queensland Government, 2007).

The scheme was established in 2005 to diversify the sources from which the state draws its energy and is regulated under Chapter 5A of the *Electricity Act 1994* (Qld). The scheme sets a mandatory gas-fired electricity generation target for the state of 15% in 2010, which will increase to 18% by 2020.

Ensuring the Queensland Gas Scheme would remain sustainable in the advent of an LNG industry was one driver behind the domestic market security-of-supply study commissioned in 2009 by the Queensland Government, described below.

3.3.3 Domestic Gas Market Security of Supply

In 2009, McLennan Magasanik Associates was commissioned by the Queensland Government to assess the sustainability, costs and benefits of developing an LNG industry in Queensland. The Queensland LNG Industry Viability and Economic Impact Study (MMA, 2009) assessed several scenarios, including 10 million tonnes per annum (mtpa), 28 mtpa and 40 mtpa industries (with 28 mtpa considered the standard scenario) and a scenario where LNG is not developed.

The report found that the development of the LNG industry could have the following potential effects:

- Increase gross domestic product, gross state product and Queensland Government royalties;
- Generate a movement of labour resources from other states to Queensland for employment; and
- Increase domestic gas prices by around $2/GJ by 2015 due to higher export prices and flow-on effects on electricity prices. The highest impact would be felt by the electricity market, which competes for lowest cost generation.

As indicated in Section 3.1.2, a significant driver for forecast growth of gas demand in Queensland is increased gas-fired power generation. Due to concern over potential gas price increases affecting the affordability of gas for future electricity generation and large industrial customer needs, the Queensland Government released the Domestic Gas Market Security of Supply consultation paper in September 2009 (DEEDI, 2009a).

As a result of the paper, the Queensland Government announced the following policy position in November 2009:

- A percentage of gas from all fields will not be required to go to domestic supply.

- Should it be determined that domestic supply faces constraint, the Queensland Government will reserve future exploration areas for domestic gas supply (a Prospective Gas Production Land Reserve).
- The Queensland Government will facilitate the development of a short-term gas trading market.

3.3.4 Blueprint for Queensland's LNG Industry

In September 2009, the Queensland Government released its Blueprint for Queensland's LNG Industry, which sets out the Queensland Government's support for CSG and LNG industries (DEEDI, 2009b). The blueprint discusses the environmental benefits and economic strengths of gas, and considers the likely impacts and benefits of developing a local industry. The blueprint outlines the government's approach to working with industry and community to develop the state's LNG industry. Government support includes, but is not limited to, the following:

- Preparing and implementing the Sustainable Resource Communities Policy; and
- Extending the Gladstone State Development Area to include part of Curtis Island as an LNG precinct. A benefit of the development of the Gladstone region as a LNG hub is its central location to both the Surat and Bowen basin's CSG resources.

In November 2010, the Queensland Government released the report, Queensland's LNG Industry – a once in a generation opportunity for a generation of employment, which builds upon the Blueprint for Queensland's LNG Industry by providing both a progress update on actions listed above, and setting out further areas of government support (Queensland Government, 2010). These further areas include, but are not limited to:

- Finalising and implementing new land access laws;
- Preparing an industry-based CSG / LNG Skills Formation Strategy, as well as a A$10 million-CSG / LNG Industry Training Program, funded 50/50 by government and industry;
- Conditioning projects for local impacts;
- Implementing the strategic cropping land policy;
- Developing legislation to better protect against environmental groundwater impacts arising from the CSG hydraulic fracturing (fraccing) process;
- Establishing a LNG Enforcement Unit and releasing compliance information; and
- Reviewing the petroleum tenure framework to ensure certainty for investors in the CSG and LNG industries.

3.4 Environmental and Social Impacts of Not Proceeding

The direct consequences of not proceeding with the proposed Project comprise positive and negative environmental, economic and social impacts. In summary, should the Project not proceed, positive impacts include:

- Potential environmental impacts of the Project will be avoided. The impacts on land, water and air (and associated physical, biological and social impacts) arising from the development of the Project will not occur.

- Potential draw of skilled workers from industries such as agriculture to the locally operated gas industry will be avoided.
- Aspects of the rural lifestyle can be maintained. While there are benefits to growing and diversifying the regional economy, this has the potential to change the rural atmosphere.
- Potential demand generated by the Project on local and regional infrastructure and services will not occur. This includes the demand for childcare and educational facilities, health care facilities, policing and emergency services, and water and electricity utilities.
- Potential diversion of labour, land, capital expenditure and investment from other businesses will be avoided.

Should the Project not proceed, negative impacts include:

- Economic benefits will not be realised. Economic modelling indicates the Project's contribution to Gross Regional Product, above the baseline scenario, is estimated to increase steadily over a six year ramping up period to plateau at approximately $600 million by 2021 – 2022. Further, Arrow is committed to supporting local businesses for service support and delivery.
- Job opportunities will be lost. The direct creation of approximately 1,760 jobs during the Project's peak construction phase and up to 607 long-term jobs created during the Project's operational phase will not go ahead.
- The permanent lift in the local skills base will not occur, as the implementation of skills development and training strategies as part of the Project will not proceed.
- Potential investment in local and regional infrastructure and services may not occur or may occur more gradually. While the Project may generate demand on services, the occurrence of such will in turn encourage government and private investment. The expansion of services will be of social benefit to local and regional communities.
- The opportunity to diversify local industry will be reduced.
- The opportunity to market the gas generated by mine degassing will be lost reducing the government royalty for this gas and increasing the potential for mine gas to be directed to lower value markets and/or to be vented or flared.
- The opportunity to contribute to further growth of the Queensland Gas Scheme will be lost. The Queensland Government hopes to increase the mandatory gas-fired electricity generation target to 18% by 2020. Arrow already supplies approximately 20% of the gas used to fuel the state's existing gas-fired generators.
- Most of the Bowen gas is likely to remain undeveloped and Queensland will have a reduced opportunity to capitalise on forecast global demand for LNG. Australian and Queensland government policy supports the continued development of Australia's LNG industry and the country's potential as a global energy producer of less carbon-intensive energy resources.

3.5 Summary of Project Need

Global gas demand was estimated by the IEA at 3,284 bcm in 2010 (IEA, 2011). Demand is expected to increase by 44% between 2008 and 2035, an annual rate of increase of 1.4% (IEA, 2010). The Project, along with the proposed Arrow LNG Plant, will assist in meeting the export demand for LNG to the international market.

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CSG, once converted to LNG, has emerged as a resource that provides more favourable environmental outcomes than other types of fossil fuels, including lower greenhouse gas emissions.

The Project captures the significant CSG resources that exist in the Bowen Basin for LNG export and it will be developed in the most beneficial manner to the State consistent with the requirements of the Blueprint for Queensland's LNG Industry.

The Project will generate significant economic benefits to the region and the State including:

- Increased employment of approximately 1,760 jobs during the Project's peak construction phase and up to 607 long-term jobs created during the Project's operational phase;
- Increases in industry output, gross regional product and incomes throughout the region and the State;
- Opportunities for local business to secure new contracts and increase sales to supply and service the needs of both the Project and the workforce; and
- Increased opportunities for skills training to develop CSG industry skills in the local workforce.