6.15 Economics

6.15.1 Introduction

This section addresses a number of aspects within Section 3.10 of the Terms of Reference (ToR). The ToR required that the EIS examine certain aspects of the area's existing socio-economic environment, which may be affected by the project.

To better understand the potential economic impacts of different aspects of the project, such as the coal seam gas (CSG) field, the gas transmission pipeline and the liquefied natural gas (LNG) processing facility, the full project area was divided into two regions – gas transmission pipeline/CSG fields region and LNG facility region. The LNG facility region covers Gladstone and surrounding areas, while the gas transmission pipeline/CSG fields region covers the area inland, including the towns of Roma, Injune, Rolleston and Emerald. The reason for this split is based on data availability and is explained further in Section 6.15.2.1.

6.15.2 Methodology

The process for addressing the ToR involved researching the following:

1) Regional economic profile;
2) Project and industry context; and
3) Labour, then assessing
   - Labour market impacts; and
   - Economic impacts.

The methodology for undertaking these steps is outlined below.

6.15.2.1 Regional Economic Profile

The economic structure of Queensland, the LNG facility region and the gas transmission pipeline/CSG fields region was reported using data sourced primarily from the ABS 2006 Census of Population and Housing. Based on examination of this data, it was apparent that the gas transmission pipeline and CSG fields regions were very similar in industrial composition and other characteristics. For the purposes of the study therefore, these two regions were merged to form the gas transmission pipeline/CSG fields region. The LNG facility region is described and analysed separately.

The major industries within the project region include coal mining, gas and petroleum, manufacturing, construction, the Port of Gladstone operations, agriculture, commercial fishing, and tourism and recreation. Data describing each of these industries were obtained from a variety of government and industry sources.

6.15.2.2 Project and Industry Context

To gain an appreciation of the natural gas market context in which the proposed project will operate, the Australian and International natural gas markets were described, using a variety of government and industry sources. A description of other major industries in each of the CSG fields/pipeline and Gladstone areas was also included in Sections 6.15.4.2 and 8.15.4.2 respectively.

6.15.2.3 Labour Market

Data from the ABS was used to describe labour supply and demand for the LNG facility region and the gas transmission pipeline/CSG fields region. Occupational composition, labour mobility, non-resident

labour force and earnings data were analysed to gain an understanding of the current labour market conditions in the proposed project regions.

6.15.2.4 Economic Impact Assessment

The economic impacts of the project have been assessed at a state and national level using a general equilibrium model of the Australian economy, the Monash Multi-Regional Forecasting Model (MMRF-Green).

At the regional level, the MMRF-Green model provides estimates of output and employment changes for each of the regions of the Queensland economy (on a Statistical Division basis). Changes in output (or the real value of production) indicate changes in the extent of economic activity but do not provide measures of the change in the regional GDP or regional consumption expenditure. The latter two aggregates are measures of net regional benefit. In this economic impact assessment, therefore, URS has inferred the likely order of magnitude of regional net benefits based on preliminary expenditure estimates from Santos and assumptions about the ratio of value-added to output.

The economic impact was assessed for:

- Scenario 1: an LNG facility with nameplate capacity[1] of 3.4 Mtpa (assumed to produce 3 Mtpa on average), with the gas transmission pipeline and CSG fields developments to supply the required feedstock;
- Scenario 2: An expanded LNG facility capable of producing 10 Mtpa with additional CSG fields development necessary to supply such a plant and a single pipeline;
- A sensitivity analysis of the 3 Mtpa project based on variations about the central price and cost assumptions and assumptions about Australian equity in the project; and
- A sensitivity analysis of both project scenarios to variations in greenhouse gas emission permit prices and policy regimes.

The economic impacts of the project were assessed by subtracting the values of the following variables for the “with project” scenario from their values under the baseline (“without”) scenario. The economic impact is measured in terms of deviations in the following economic variables:

- Real private consumption expenditure;
- Real investment;
- Real exports;
- Real imports;
- Real GDP;
- Employment ; and
- GHG emissions.

The differences are calculated at both the national level and the Queensland level to provide an Australia-wide economic impact assessment and regional economic effects were inferred from these results. The implications for government revenues are not reported separately because of the assumption that the governments return additional revenues to the community. All variables are measured in real or current dollars.

The MMRF-Green model estimates the increment to the base case employment in each year for which the economic impact of the Project is modelled. The model estimates the increase in demand for labour in

[1] Nameplate production capacity can differ from actual production depending on the rate of utilisation of the plant which will be affected by such things as planned and unplanned maintenance time, seasonal variations etc.

terms of labour hours and this is converted into a full-time equivalent basis. In practice, the increase in demand for labour will be met by a combination of increased hours worked by existing employees and by new employment.

For Scenario 1 (3 Mtpa), the results of the economic impact assessment are reported in terms of the construction and operational phase. In presenting the results of Scenario 2 (10 Mtpa), the differences between the construction and the operations phases have not been distinguished. This is because over a long period, construction associated with the expansion of the project takes place while the project is operating.

Estimates of capital and operating expenditure, and workforce requirements were provided for the CSG fields development, the gas transmission pipeline and the LNG facility.

The sensitivity of the project's economic impacts was also tested with regard to variations in greenhouse gas emission permit prices and domestic and international policy settings. The central case was based on the Garnaut-25 emission permit price path and assumed that the project qualified for shielding at a rate of 60 % of its direct emissions. It was also assumed that an international emissions permit market will be fully developed by 2023. Under these assumptions, the impact of the emissions trading scheme and variations in permit prices was relatively small because world LNG prices will rise to reflect the higher costs associated with the purchase of emission permits. In the absence of an international permit market, the economic impact of the project will be significantly reduced as the project will be unable to pass on the higher cost to overseas customers. For example, in the latter case, the NPV of the increase in Australia's real GDP under Scenario 2 (10 Mtpa) was estimated to be $1.6 billion or about 6 % lower than under the central case policy scenario.

6.15.3 Regulatory Framework

6.15.3.1 The Central Queensland Strategy for Sustainability

The Central Queensland area covers the northern half of the project area. It extends from Wandoan in the south to Nebo in the north, and includes coastal towns such as Gladstone and Rockhampton. In 2004, the Fitzroy Basin Association, in collaboration with the residents of the area, developed a regional development plan. This plan, the Central Queensland Strategy for Sustainability (CQSS), sets out the community's aspirations in relation to its environment, economy, cultural heritage and governance (Fitzroy Basin Association, 2005). Of relevance to this economic impact assessment is Section 3.8 of the CQSS, which addresses the community's vision for the regional economy.

The aspirational target for the regional economy is that 'by 2050, the region has a robust and well-balanced economy which is economically, socially and ecologically sustainable, and able to withstand external pressures.'

This economics report has not commented on the social and environmental impact of the project (refer to the separate specific EIS sections of interest for comments on these impacts); however, the potential economic impact of the project is consistent with the development of a robust and well-balanced economy, through the provision of goods and services, employment and regional value-added activity. In addition, the project offers opportunities for diversification away from traditional industries such as agriculture and mining, which will likely increase the resilience of the regional economy.

6.15.4 Existing Environmental Values

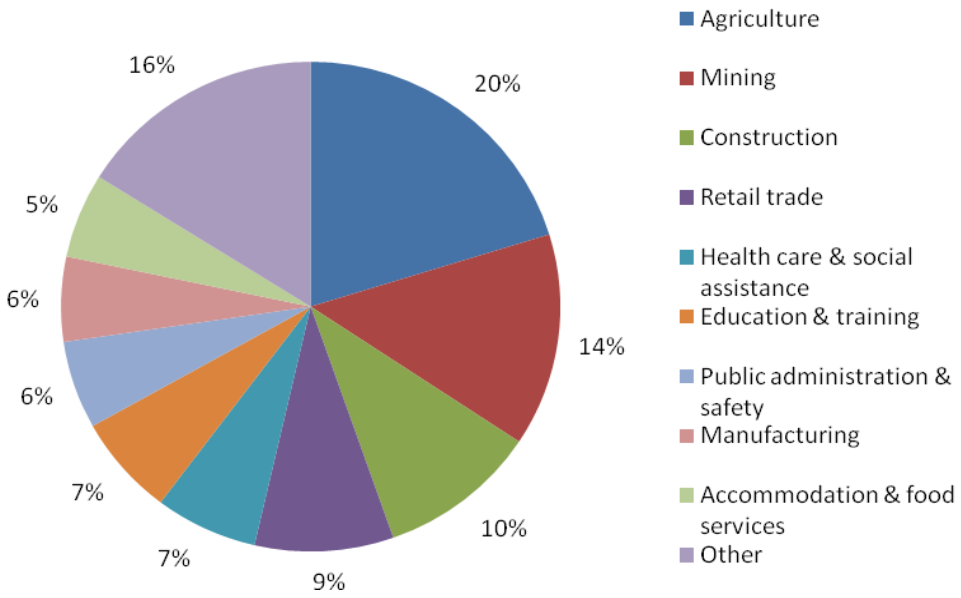
6.15.4.1 Regional Economic Profile

Employment has been growing and unemployment falling strongly in the gas transmission pipeline/CSG fields region over the last decade. Total employment in 2006 was 40,400 people, with an unemployment rate of 2.7 %. This is lower than in 1996, when unemployment stood at 6.1 %, and it is much lower than the national average. Basically, the region had a fully employed labour force meaning that any new activity will need to compete with existing employers to supply workers or bring in a large proportion of its

workforce from outside of the region. The recent economic downturn is likely to contribute to a reduction in employment growth in the region which could result in some increase in the rate of unemployment over the next two years.

The total labour force has also expanded by 4,056 people since 1996, an increase of 13.1 %. This is significantly lower than the Queensland average of 23 % growth over the same time period. However, unemployment in the region is lower than the Queensland average of 4.7 % in 2006, and there are more people of working age participating in the labour force (67.5 % compared to 61 % on average in Queensland).

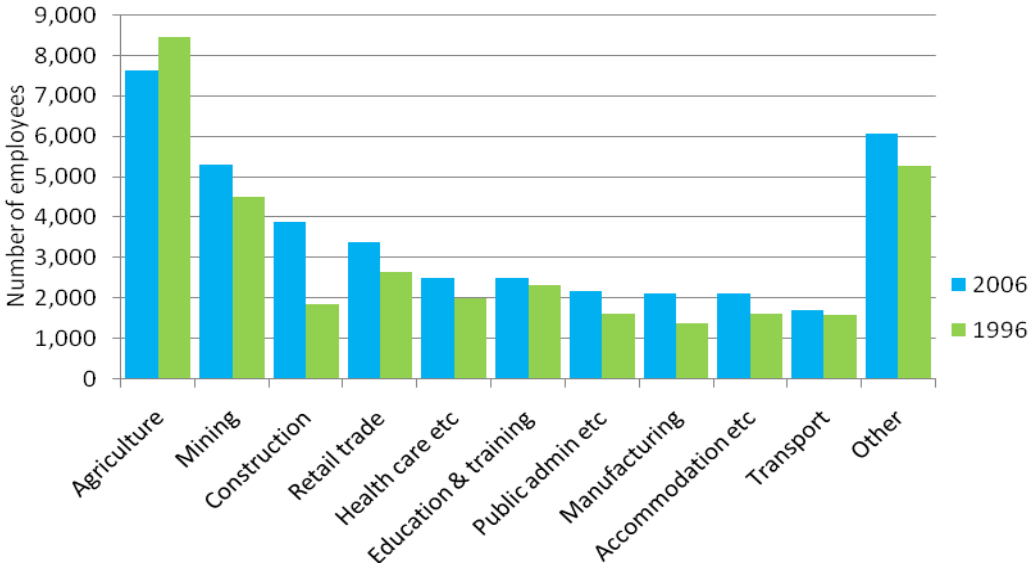
The gas transmission pipeline/CSG fields region is characterised by a large proportion of employment in agriculture (20 % of total employment), mining (14 %) and construction (about 10 %) (see Figure 6.15.1).



Source: ABS Population Census, 2006.

Figure 6.15.1 Gas Transmission Pipeline/ CSG Fields Region employment by industry (%) (2006)

Over the ten years to 2006, significant changes have occurred in the industry composition of the gas transmission pipeline/CSG fields region, with certain sectors growing considerably (see Figure 6.15.2). Construction, in particular, rose strongly, with an increase in employment of almost 110 %. This far exceeds the strong state-wide growth of 70 % for this industry over the same time period. Administration and support services, and manufacturing, have increased, by 76.2 % and 52.1 % respectively. Rental, hiring and real estate services also increased, by 48.4 %.



Source: ABS Population Census, 2006.

Figure 6.15.2 Gas Transmission Pipeline/CSG Fields employment by industry (1996 and 2006)

Other sectors have experienced declines in employment. Information, media and telecommunications employment fell by 46.2 % and wholesale trade has fallen by 12.9 %. In spite of a decline of 9.8 % between 1996 and 2006, agriculture still represents the largest industry employer in the gas transmission pipeline/CSG fields region. The decline of this industry in the gas transmission pipeline/CSG fields region is less pronounced than in Queensland as a whole, where over 10,000 jobs (14.3 % of total employment in the industry) have been lost in the ten years to 2006.

Over the next few years, there is likely to be some slowing in economic activity and new construction projects. This will impact on the mining and construction sectors of the local economy, sectors that will be competing for the same labour skill sets as the project.

6.15.4.2 Project and Industry Context

Coal Mining

The project area lies in one of the world's great coal provinces - the central Queensland Surat and Bowen Basins. The Bowen Basin contains Queensland's largest *in situ* reserves of coal, with 21 billion tonnes of thermal and coking coal estimated in 2003. The Surat Basin, the second largest known coal reserve in Queensland (Queensland Department of Mines and Energy, 2003), contains reserves of 4.2 billion tonnes of coal. The hard coking coals of the Bowen Basin are regarded as among the best in the world, and all fifteen of Queensland's underground mines are located here. The Surat Basin, while relatively undeveloped, is attracting interest for open-cut mining (Queensland Department of Mines and Energy, 2007a).

Coal produced in the Surat Basin is primarily used for domestic power generation and industrial boilers, while coal produced in the Bowen Basin is primarily exported to Japan, with Europe, Korea and India also significant buyers. In 2006-07, Queensland exported a total of 153 million tonnes of coal, valued at $16.3 billion. Australia is the world's largest coal exporter with the majority of this coal coming from Queensland.

The Queensland Government projected that the coal industry in Queensland is projected to grow between 7 % and 10 % a year for the next five to ten years (Queensland Department of Tourism, Regional Development and Industry, 2007).

However these growth forecasts were made in an expansionary global economic climate which is no longer the case. The projected growth of the coal industry may now be significantly lower than previously forecast, particularly over the next few years, mitigation potential competition for resources from CSG.

While the CSG industry is considered to be part of the petroleum and gas industry rather than coal mining, they both depend on the same resource base. Extraction of CSG largely occurs in those deposits not considered viable for their coal resource.

Gas and Petroleum

Queensland's petroleum and gas industries have grown significantly since exploration first began in the 1960s. While much of the State remains unexplored, commercial deposits of gas and petroleum have been found in several areas, including the Bowen and Surat Basins, which lie under the project area. The town of Roma, in the Surat Basin, was the first place where gas was discovered in Queensland, and the origin of the first gas transmission pipeline in Queensland, which was built in 1969 from Roma to Brisbane (Department of Mines and Energy, 2007b).

The Bowen and Surat Basins together have been Queensland's petroleum production centres for more than forty years. Currently, approximately 20 % of Queensland's oil production and 49 % of Queensland's Liquid Petroleum Gas (LPG) production comes from the area. During 2005-06, exploration activity in these areas increased significantly. For the State as a whole, spending on exploration was $135 million, up from $104 million in the previous year. In the same year one new oil field and three conventional gas fields were discovered in the Bowen and Surat Basins (Department of Mines and Energy, 2007b).

In 2005-06, the value of production of gas and petroleum products in Queensland was $942 million, an increase of 34 % since 2001-02 (ABS 2007b). This highlights the rapid expansion of the gas industry in Queensland, with most of this increase in value due to new production of coal seam gas. Boosted by expectations of a global surge in demand for gas, new projects are being proposed across Australia, with the value of projects under development or in the planning stages estimated at more than $100 billion (Fitzgerald, 2008).

Agriculture

Agriculture in Queensland is dominated by livestock production, with cattle and calf disposals worth $3,625 million in 2006-07 (41 % of the total value of agricultural production in Queensland). Sugarcane is the second largest industry ($1,075 million). Other industries of importance include bananas ($400 million), nurseries ($375 million), and wheat ($240 million) (Queensland Department of Primary Industries and Fisheries, 2008a).

Across southern and central Queensland (throughout much of the CSG fields region), agricultural production is dominated by livestock production for meat and wool, and broad-acre grain cropping. The majority of enterprises are beef cattle, or mixed livestock/grain enterprises (see Table 6.15.1). Data from the Agricultural Census 2001 (the latest available data with value of production by commodity) shows that for the project area Statistical Local Areas (SLAs) surveyed[2], the value of cattle and calves slaughtered was $872 million, and this represented the largest category by value for all SLAs except Balonne, Mundubbera and Peak Downs.

[2] Gladstone was not included as there are no farms identified in the SLA, and Woorabinda in 2001 was part of Duaringa SLA.

Table 6.15.1 Farms in the Gas Transmission Pipeline/CSG Fields Region (2006)

Farm type	Number of farms
Cattle grazing	2,803
Broadacre cereal cropping	1,262
Sheep grazing	361
Broadacre non-cereal cropping	328
Fruit orchard	76
Vegetables	46

Source: ABS, 2008b.

Much of Queensland, including most of the gas transmission pipeline/CSG fields region area, has been drought stricken for several years. In late 2008, 58 % of Queensland was drought declared, only slightly down from 60 % in 2007 (Queensland Department of Primary Industries and Fisheries, 2008b).[3]

The drought does not appear to have significantly impacted on the total value of agricultural production, as prices of agricultural commodities have been rising. The only exceptions to this were barley, oilseeds, peanuts and tobacco (Queensland Treasury, 2007). The increase is likely to be due to a number of factors such as increased input costs (particularly fuel and freight), increased demand and lowered production in major producing countries due to adverse weather conditions such as drought (Wight and Laffan, 2008). However, the state-wide increase in the value of production masks significant changes at the regional level, as crops have failed and livestock numbers have declined during the drought. Farm profits are lower, rural debt has increased (ABARE, 2008a) and employment in agriculture throughout Queensland is declining, with a loss of 10,000 jobs between 1996 and 2006 (ABS, 2007c).

Tourism and Recreation

Major towns in the area, such as Roma, Surat and Taroom, are of historical significance and popular attractions include historical cattle stations and homesteads, and sites relating to early explorers and settlers in the region.

Despite these attractions, most tourists to Queensland visit Brisbane, the Gold Coast and Tropical North Queensland, with relatively few venturing inland to the areas that this project covers. The gas transmission pipeline/CSG fields region areas of Fitzroy, Outback and Darling Downs combined attracted 9 % of international tourists and 16 % of domestic tourists over the 2008 calendar year (Tourism Queensland, 2008a). The tourism industry in the region is therefore small. In the entire Outback region, for instance, there are only 26 licensed hotels with five or more rooms (ABS, 2008c).

6.15.4.3 Natural Gas in Australia

The natural gas industry in Australia is characterised by dislocation between gas reserves and markets. The vast majority of Australia's reserves are in the Carnarvon, Browse and Bonaparte Basins of Western Australia. The areas of highest demand are situated along the eastern seaboard.

The Carnarvon Basin in Western Australia met 95 % of Western Australia's gas demand (Australian Energy Regulator, 2007) and contributed nearly 70 % of Australia's total natural gas production in 2006-07. Queensland contributed only 1.4 %, or 567 million m^3 of gas, out of Australia's total production of almost 40 billion m^3. Queensland's gas production comes mostly from the Bowen-Surat Basin (555 million m^3) and, to a much lesser extent, from the Adavale Basin (11.6 million m^3) (ABARE, 2008b).

[3] Some of the Gas Transmission Pipeline/CSG fields region such as Duaringa Shire (now in the Central Highlands Regional Council) and Booringa Shire (now in Roma Regional Council), have been eligible for drought relief since 2002 (Queensland Department of Primary Industries and Fisheries, 2008c).

In 2007, Australian production of natural gas reached 44 million m^3 (ABARE, 2008a). ABARE (2007) projects that Australian production will increase by 252 % between 2005-06 and 2029-30 to meet growth in both domestic and international demand (see Table 6.15.2). If these predictions are realised, total Australian natural gas production will reach 6,135 petajoules (PJ) by 2029-30.

Table 6.15.2 Annual Gas Production Projections

	2005-06	2029-30
Natural gas production	1,742 PJ	6,135 PJ
Net exports of LNG	678 PJ	4,153 PJ

Source: ABARE, 2007.

International Markets

Exports of LNG have increased strongly over the past 20 years, and have risen particularly rapidly over the past 5 years. In 2007, Australia exported just over 15 million tonnes of LNG, valued at $5,368 million (ABARE, 2008a).

This growth in exports is projected to continue, with natural gas exports expected to grow by almost 8 % per year until 2030 (ABARE, 2008c). Most of this growth is expected to come from increased production from the established North West Shelf project and the Conoco-Phillips LNG facility in Darwin. The combined production of these two projects places Australia fifth among the world's LNG exporting countries. More operations are in the development phase, including Gorgon and Pluto in the Carnarvon Basin, and several in the Browse Basin.

The majority of the world's large importers of LNG are in the Asia Pacific region, giving Australia a natural advantage in terms of the relatively short distances to these key markets. In 2007, most of Australia's exports to the Asia Pacific region went to Japan and China (see Table 6.15.3).

Table 6.15.3 Australian Trade in LNG (2007)

Trading partner	LNG imported from Australia (Billion M^3)
Japan	16.0
China	3.3
South Korea	0.6
Taiwan	0.3

Source: BP, 2008.

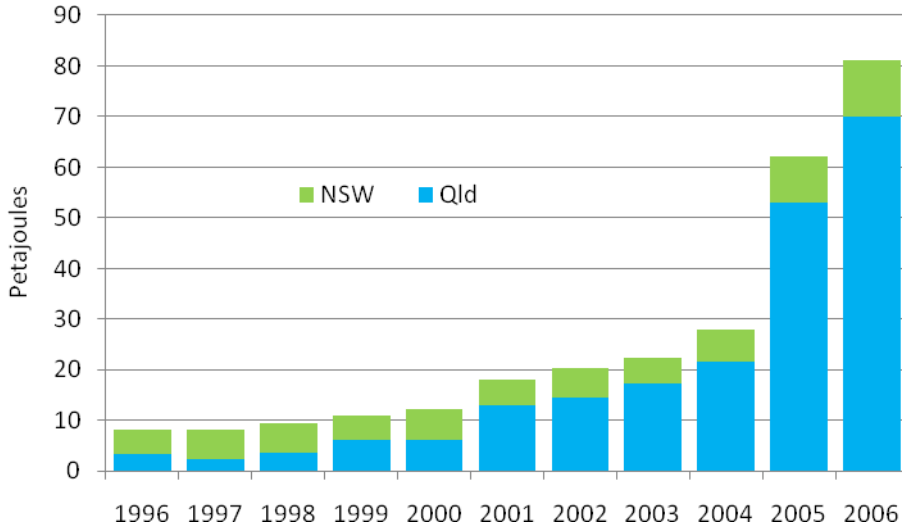
Domestic Natural Gas Markets

Increasing Australian demand is likely to change the structure of the natural gas market in coming years. At present there are a small number of producers and a small number of large consumers, with relatively low household consumption. In 2007 there were approximately 3.8 million households in Australia using natural gas, most supplied by low pressure gas pipelines (ABARE, 2008c).

Domestic consumption of natural gas is predicted to nearly double by 2030 (ABARE, 2008c). This increase is due to increased demand for natural gas in electricity generation, manufacturing and mining, partly as a result of government policy incentives such as the Queensland 13 % Gas Scheme. The target will increase to 18 % by 2020. In 2005-06, natural gas accounted for 565 petajoules of Australia's domestic energy consumption, or around 16 % of total consumption. This is projected to increase to 18 % by 2029-2030 (ABARE, 2007).

Coal Seam Gas

The CSG industry has undergone a significant transformation in the last twelve years, with rapid increases in supply, particularly in Queensland (see Figure 6.15.3). There has been much activity among the companies actively exploring and developing new CSG reserves. Mergers and acquisitions have resulted in many of the smaller companies being purchased by larger ones, with the three largest companies, Origin Energy, Santos and BHP Billiton accounting for over 60 % of total CSG production (Australian Energy Regulator, 2007).



Source: Australian Energy Regulator, 2007.

Figure 6.15.3 Australian Coal Seam Gas Production (1996 – 2006)

Domestic Gas Market Developments

By 2004-05, CSG already accounted for over 60 % of Queensland's gas market, a total of 49 PJ. Combined CSG production in Queensland and NSW was 58 PJ in 2004-05, but by 2007 had already reached 113 PJ (Robertson, 2008). By 2029-30 CSG production is predicted to reach 529 PJ, an increase of 469 % on 2007 production (ABARE, 2007).

Companies involved in CSG are rapidly developing projects to extract and distribute CSG in order to meet growth in gas demand. Other key players already in production include Origin Energy, Arrow Energy and the Queensland Gas Company.

Origin Energy has CSG projects in the Peat, Spring Gully, Fairview, and Walloon fields, and has large areas under exploration. Around 70 % of its proven and probable reserves are CSG (Origin Energy, undated).

Arrow Energy is producing over 80 terajoules of CSG per day from its operations in the Daandine, Kogan North, Moranbah and Tipton West gas fields. It has already built one power station to run on CSG at Daandine, and another, Braemar 2, is in development (Oil and Gas Gazette, 2008).

The Queensland Gas Company has operations in the Berwyndale South gas field, providing CSG to the Swanbank E and Braemar power stations, an operation in development at the Argyle-Kenya gas field, and more exploration sites. Future projects being investigated include several power stations and a gas pipeline from the Surat Basin to New South Wales (Queensland Gas Company, 2008).

Molopo Australia Limited is producing CSG from two production licences located in the Mungi gas field, and has authority to prospect over almost 2,000 km^2 more (Molopo Australia Limited, undated).

Export CSG Developments

In addition to the development of CSG fields to supply domestic gas markets, there are a number of projects either committed (in one case) or under consideration that involve the export of LNG produced from CSG. All of these proposals for Queensland are large scale projects. Aside from this project, the other projects are:

- Gladstone LNG Pty Ltd and Arrow Energy are considering the construction of an LNG facility based on coal seam capacity with an initial export capacity of 1.5 Mtpa. Initial exports are envisaged by the project proponent to commence in 2011. A second phase of the project will raise production capacity to 3 Mtpa.
- The Queensland Curtis LNG: QGC and BG Group are studying a proposal for an LNG production facility to process coal seam gas. Production is envisaged to be between 3 and 4 Mtpa initially, subsequently increasing to 12 Mtpa.
- The Project Sun LNG facility is a joint venture involving the Sojitz Corp and Sunshine Gas Ltd. The proponents are studying a proposal to construct an LNG facility with an initial production capacity of 0.5 Mtpa, subsequently increasing to 1.5 Mtpa. The proponents intend to commence construction in 2009 with production commencing in early 2012.
- Origin and ConocoPhillips are also proposing an LNG production facility to process coal seam gas. This involves a 50/50 joint venture with Origin operating the CSG fields and ConocoPhillips operating the LNG facility. Phase 1 of the project will involve the construction of two 3.5 Mtpa LNG trains. A second phase involving the construction of two more 3.5 Mtpa trains will take project production capacity to 14 Mtpa. Production is planned to commence in 2014.
- The Southern Cross LNG Project (LNG Impel) is a somewhat different proposal. It involves the development of an open access LNG terminal of up to 3.5 Mtpa capacity with an initial 1.3 train to be completed by 2013.

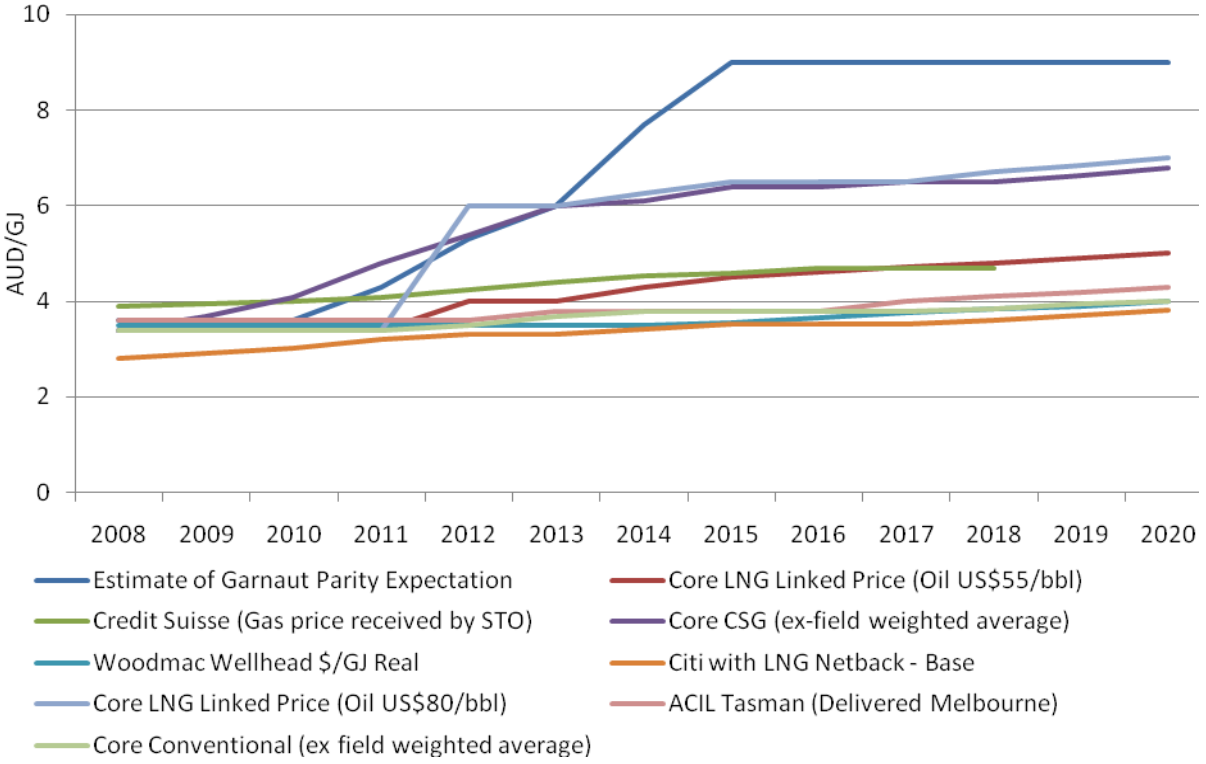
In the event that all of these projects were to proceed along with the GLNG Project, at full capacity they will have a combined production and export of LNG of 44 Mtpa. This compares with Australian exports of LNG in 2007 of 15.2 mt.

Impact on domestic gas market and prices

The growing demand for gas has, and is expected to continue to, place upward pressure on domestic gas prices. Eastern Australia domestic gas prices have already increased from around $2.60/GJ in 2000-01 to around $3.90/GJ in 2007-08 (VENCorp average spot market price). This is an increase in real terms of 2.7 % per annum. However, there is now considerable debate regarding future increases in the forward price, because of the expected increases in supply from the vast CSG resources in Eastern Australia.

Various market analysts have considered demand[4] , supply and cost factors and have put forward gas price forecasts for Eastern Australia. Forecasts from several of the most recognised market analysts presented in Figure 6.15.4 (Data compiled by Santos). The majority view seems to be that gas prices will increase from the current level of around $3.50/GJ to between $4.00/GJ and $6.00/GJ (ex-field) in the longer term.

[4] Including demand for power generation and for LNG exports projects, such as Santos' GLNG Project.



Data compiled by Santos.

Figure 6.15.4 Gas Price Projections

EnergyQuest (2008) state that CSG fields reserves and resource estimates, more than conventional Australian fields, are sensitive to gas price assumptions. Currently proven and probable (2P) reserves in Eastern Australia comprise nearly 20 Tcf, with CSG accounting for approximately 59 % of this reserve. In 2000, CSG accounted for only 3 % of 2P reserves. As gas prices increase and market opportunities grow, more of Australia's contingent and potential resources will become economic.

The consensus view is that there is likely to be greater than 250 Tcf of gas in place in Eastern Australia (excluding conventional gas). This volume will meet demand for the next approximately 100 years, including LNG, power generation and domestic requirements. At some potential gas price, and with a sufficiently large market, all of the recoverable resource in Eastern Australia will become available. One of the key factors in determining the potential price is the cost at which CSG can be brought online to satisfy the growing demand. Morgan Stanley (2008) estimate that industry-wide operating and development costs for CSG are in the order of $2.20/GJ to $2.70/GJ, however as resource quality declines and recovery becomes more difficult, these costs are expected to increase, notwithstanding any technological break throughs.

The project may initially supply domestic gas markets, but it is not diverting gas from local markets to export markets. The project's supply of gas to the domestic market is uncertain at this stage. Options to manage ramp up gas and any gas that is surplus to the requirements of the LNG facility include a range of commercial and technical possibilities. Therefore the project has no direct implications for domestic gas prices. The gas to supply the LNG facility will come from newly developed CSG fields. The amount of gas is very small relative to the identified conventional and CSG fields reserves available to supply the Australian east gas fields. It is therefore unlikely to contribute to a future shortage of gas in the domestic market.

The project's estimated GHG emissions and the proposed mitigation measures are discussed in Section 6.9 of this EIS. This report refers to the economic implications that flow from assumptions regarding the nature of the Carbon Pollution Reduction Scheme.

The Queensland Gas Scheme refers to gas-power level targets for the electricity sector. Depending on how ramp up gas and any gas that is surplus to the requirements of the LNG facility is managed, the project may be able to contribute to government gas power-level targets.

6.15.4.4 Labour Force

As noted already, the gas transmission pipeline/CSG fields region has lower levels of skilled labour compared to the rest of Queensland, with high concentrations of labourers and tradespeople. Unemployment across the region is low, at 2.7 % in 2006 compared to 4.7 % for Queensland as a whole (see Table 6.15.4).

Occupations

In terms of occupations, 21 % of workers are managers (higher than the Queensland average of 12 %) and 10 % are professionals (lower than the Queensland average of 17 %) (see Figure 6.15.5). This reflects the high proportion of agriculture in regional employment. There are high concentrations of labourers (15 %) and machinery operators and drivers (15 %). These are all higher than the Queensland average.

Table 6.15.4 Labour force status by SLA, Gas Transmission Pipeline/CSG Fields Region (2006)

SLA	Participation rate (%)	Employment rate (%)	Unemployment rate (%)
Balonne (S)	68.8	96.7	3.3
Banana (S)	69.1	97.7	2.3
Bauhinia (S)	72.2	98.3	1.7
Bendemere (S)	63.0	95.4	4.6
Booringa (S)	61.3	96.6	3.4
Bungil (S)	79.2	99.3	0.7
Chinchilla (S)	63.1	96.7	3.3
Duaringa (S)	70.4	98.1	1.9
Eidsvold (S)	62.4	94.5	5.5
Emerald (S)	67.6	97.3	2.7
Murilla (S)	61.9	97.3	2.7
Peak Downs (S)	65.9	98.6	1.4
Roma (S)	69.2	97.3	2.7
Tara (S)	55.3	92.4	7.6
Taroom (S)	72.5	98.9	1.1
Warroo (S)	72.3	98.1	1.9
Woorabinda (S)	51.8	95.1	4.9
Gas transmission pipeline/CSG fields region average	**66.2**	**97.0**	**3.0**
Queensland	**61.1**	**95.3**	**4.7**

S = Shire
Source: ABS Population Census, 2006.

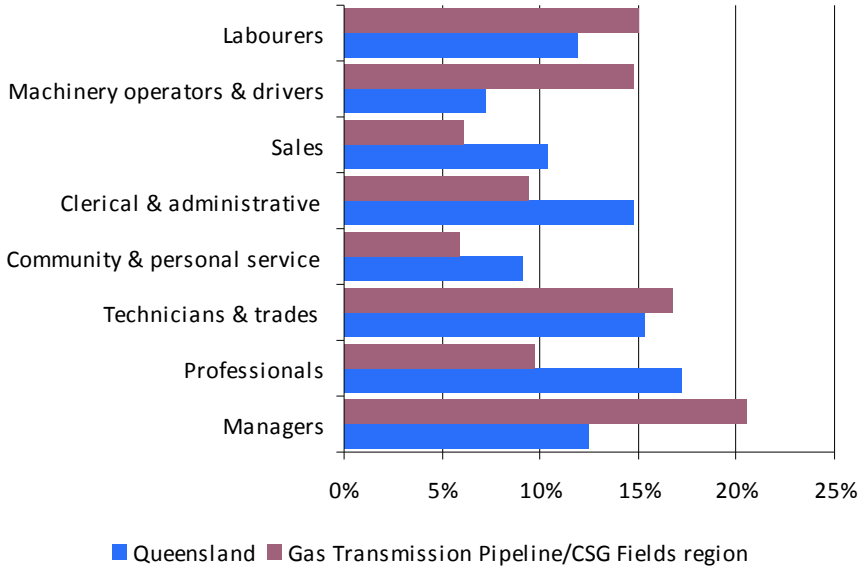


Figure 6.15.5 Employment by Occupation (2006): Gas Fields Region

Education

Education levels across the region are lower than the rest of Queensland, with only 30 % of the population graduating from Year 12 (see Figure 6.15.6). The Queensland average for Year 12 education is much higher at 41 %. Of the gas transmission pipeline/CSG fields region population, 50 % have completed no more than Year 10, compared to 41 % state-wide.

Non-school qualifications such as Certificates I to IV are common across the region, with 19.3 % of the population holding a Certificate. University qualifications are not common, with only 6.4 % of the population holding a Bachelor Degree and 0.7 % holding a Postgraduate Degree. By comparison, 14 % of Queenslanders have a Certificate qualification, 8 % have a Bachelor Degree and 1.5 % has a Postgraduate Degree. This reflects the low levels of skilled labour in the gas transmission pipeline/CSG fields region.

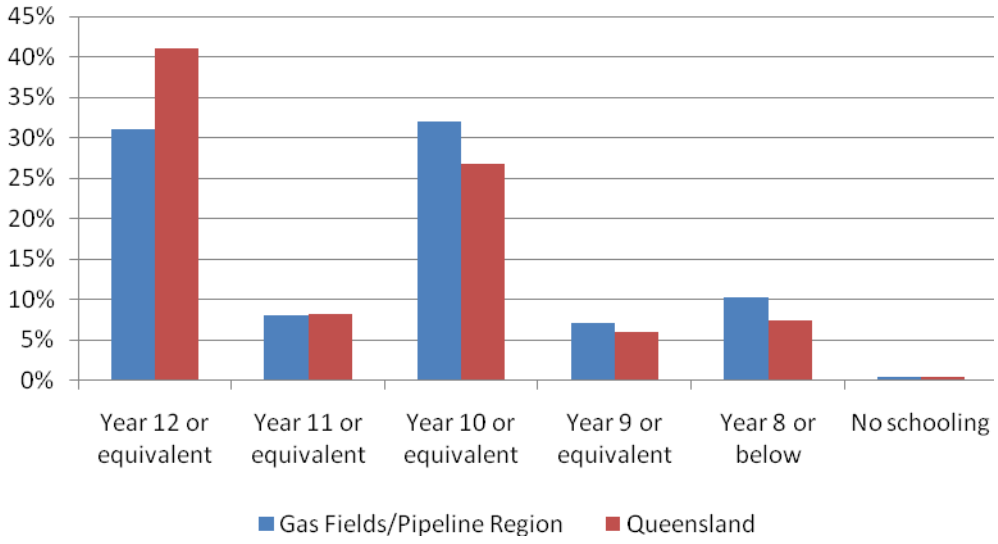


Figure 6.15.6 Educational Attainment: Gas Fields Region

Labour Mobility

Population mobility in the gas transmission pipeline/CSG fields region, like the LNG facility region, is slightly higher than for Queensland overall, with 22 % of the population living at their current address for less than a year, and 50 % living there for less than five years (ABS Population Census, 2006).

The Non-local Labour Force

Securing an adequate supply of labour of appropriate skills is a challenge for major projects in areas such as Central Queensland. Large construction projects such as major plants in Gladstone, pipelines and mining and other resource projects such as CSG developments elsewhere in the project area have traditionally depended on workers coming from other areas for the duration of the construction. The mining industry also often employs personnel on a fly-in/fly-out (FIFO) or drive-in/drive-out roster. While many people employed in Central Queensland's inland resource industries live in regional towns such as Roma or Emerald, others live on the Central Queensland coast or further afield, in Southeast Queensland, or even interstate. Thus, non-resident labour plays an important role in augmenting the resident labour supply in terms of both numbers and skills.

The Queensland Department of Infrastructure and Planning (DIP) has been monitoring growth in the non-local workforce in the Bowen Basin for some years. A report released by the Planning Information Forecasting Unit (PIFU) suggests that over one in four jobs in the Bowen Basin[5] are performed by non-local workers. Surveys of accommodation providers in the area have been used to estimate the non-local worker population as a percentage of full time employee (FTE) population[6] (see Table 6.15.5).

Table 6.15.5 Non-local Workers in Selected Local Government Areas 2007

LGA	Non-local worker population at 31 July 2007	Non-local worker population as % of FTE population
Banana	1,278	8
Bauhinia	65	3
Duaringa	1,028	12
Emerald	636	4
Peak Downs	623	15

Source: PIFU, 2007.

Comparison between place of usual residence and place of work in the Population Census statistics suggests that the gas transmission pipeline/CSG fields region has slightly higher numbers of people employed than employed residents. This suggests that there is a non-local working population present in the project region. For some SLAs in the region, this is particularly evident – Peak Downs, for instance, according to the Population Census data, has a working population based on place of work 82 % higher than its working population based on place of residence (ABS Population Census, 2006). This may be due to the large coal mining and CSG industries in the area, with many workers likely to live in mine accommodation, single person quarters or construction workforce accommodation facilities during their shifts, and to return to their principal residence on their days off.

It has been suggested that many of these non-local workers FIFO or drive-in/drive-out from their homes on the Queensland coast (McMahon, 2006). Whilst it is difficult to determine exactly where they are coming from without a comprehensive survey, an initial examination of the Population Census data suggests that this may be the case (ABS Population Census, 2006). The coastal SLAs in the statistical

[5] The Bowen Basin includes the project area SLAs of Banana, Bauhinia, Duaringa, Emerald and Peak Downs.

[6] Full time employee population refers to the total number of people resident in an area, plus non-resident workers. It is a snapshot estimate of the number of people living in an area at a particular point in time, excluding overnight/short-term visitors.

divisions of Mackay and Fitzroy, to the east and northeast of the project area, exhibit an outflow of workers, with almost 9 % more workers present as residents than actually working in the SLAs. Whilst it is not clear where these workers are actually employed, it is possible that they are among those employed in the mining/construction industry in the gas transmission pipeline/CSG fields region.

From an economic perspective, most consumption by non-local workers will be in their normal place of residence outside the region. For this study it is assumed that 90 % of the construction workforce required for the gas transmission pipeline/CSG Fields will be supplied by workers who reside outside the project region.

The non-local workforce can be seen as a reflection of the economic benefits of labour market flexibility. When workers choose to supply their labour where it is most highly valued, but live where they most enjoy it, their welfare will be greater and so will the productive capacity of the economy. This translates into improved living standards.

However, the non-local workforce can also be interpreted as a symptom of market failure, particularly if families consider that the provision of public goods such as education and health services in the workplace region is inadequate.

To the extent that such families reside in communities that are already endowed with infrastructure such as education and health services, the demand for new regional services is reduced. This may be more economically efficient because meeting the infrastructure needs of fluctuating non-resident and resident populations can be a challenge for both the regions of their employment and the 'dormitory' regions where they and their families reside. However, the obverse side of this coin is that it may retard the development of social infrastructure in parts of Central Queensland.

The social issues involved are discussed separately in Section 6.14.

Earnings

Individual yearly income in 2003-04 across much of the gas transmission pipeline/CSG fields region was higher than for Queensland as a whole as shown in Table 6.15.6. This is particularly the case in the mining communities of Duaringa and Peak Downs. Peak Downs has the third highest income in the State, following the nearby mining communities of Broadsound and Belyando. Those SLAs which rely more on agriculture and forestry income (such as Taroom, Mundubbera and Eidsvold) had the lowest incomes of the project area.

Table 6.15.6 Income by SLA

SLA	Wage & Salary Earners (no.)	Total Income ($)	Average Wage and Salary Income ($)	Median Wage and Salary Income ($)
Balonne (S)	1,863	59,731,000	32,062	30,265
Banana (S)	5,525	230,298,832	41,683	35,356
Bauhinia (S)	766	26,544,288	34,653	32,746
Bendemere (S)	250	7,380,741	29,523	28,836
Booringa (S)	471	13,868,571	29,445	28,651
Bungil (S)	805	27,177,434	33,761	31,035
Chinchilla (S)	1,666	50,925,506	30,568	28,389
Duaringa (S)	2,975	158,698,450	53,344	47,780
Eidsvold (S)	234	6,734,202	28,779	26,918
Emerald (S)	6,313	276,550,791	43,807	37,771
Murilla (S)	851	27,333,465	32,119	29,839
Peak Downs (S)	1,377	74,586,953	54,166	44,800
Roma (T)	2,806	96,510,758	34,394	32,187

SLA	Wage & Salary Earners (no.)	Total Income ($)	Average Wage and Salary Income ($)	Median Wage and Salary Income ($)
Tara (S)	1,087	30,743,761	28,283	26,693
Taroom (S)	707	20,992,806	29,693	27,357
Warroo (S)	407	12,682,058	31,160	30,622
Woorabinda (AC)	n.a.	n.a.	n.a.	n.a.
Gladstone (C)	12,489	564,837,591	45,227	41,483
Calliope (S) - Pt A	5,892	266,477,204	45,227	41,445
Calliope (S) - Pt B	1,322	58,501,452	44,252	39,532
Queensland	**1,510,911**	**57,243,547,268**	**37,887**	**33,551**

S = Shire, AC = Aboriginal Council, C = City, T = Town.
ABS, 2007e.

6.15.5 Potential Impacts and Mitigation Measures

6.15.5.1 General Economic Benefits and Impacts of the Project

As discussed in Section 6.15.2, URS has inferred the likely order of magnitude of regional net benefits based on preliminary expenditure estimates from Santos and assumptions about the ratio of value-added to output.

For convenience, all economic impacts (regional, state and national) have been reported in Section 8.15.5 of this EIS.

6.15.5.2 Labour Market Impacts

Scenario 1

The GLNG Project requires labour for both the construction and operational stages.[7]

Construction Phase

A CSG fields construction workforce will be needed over the life of the project as CSG wells and associated infrastructure are completed to supply feed-gas to the LNG Facility (see Figure 6.15.7). The following estimates are of the size of the construction workforce necessary to construct CSG fields capacity sufficient to supply the first phase of the GLNG Project (with 3.4 Mtpa nameplate capacity).

The size of the required construction workforce varies significantly over the life of the project. In the period from 2010 to 2014 up to the first exports of LNG, the CSG fields construction workforce is estimated to be on average around 600 employees. During the period after 2014, an estimated construction workforce of around 200 will be required for the construction of new wells. Construction of the gas transmission pipeline requires a workforce of between 1,000 and 1,500 during its construction period (2011-2012) (see Figure 6.15.7).

Relative to the size of the regional labour market, the construction workforce for the gas transmission pipeline/ CSG fields region constitutes a relatively significant increase in regional labour demand. Moreover, given the specialised nature of the work and the use of contractors, around 90 % of this workforce is likely to be brought in from outside the region on a FIFO basis and located in temporary accommodation facilities in the vicinity of the construction activity.

[7] All workforce numbers are expressed in terms full time equivalents.

Operational Phase

Figure 6.15.8 depicts the estimated project operational workforce for the gas transmission pipeline/CSG fields region over the life of the project.

The operational workforce is described as follows:

- The gas transmission pipeline workforce will have an operational/maintenance workforce of eight people; and
- The CSG fields workforce is likely to increase over time as the number of wells increases and will have an estimated average workforce of around 740 during the operational phase of the project (that is, the period from mid-2014 when the LNG facility is operational).

The gas transmission pipeline/CSG fields region operational workforce is larger both in absolute terms and relative to the total labour supply in the region. The nature of the CSG fields operation and the occupational composition of the local workforce dictate that around 50 % of employees will be employed on a FIFO basis and reside in temporary accommodation facilities (TAF) near the gas wells. There are expected to be employment opportunities for residents in the region, depending on the available skills.

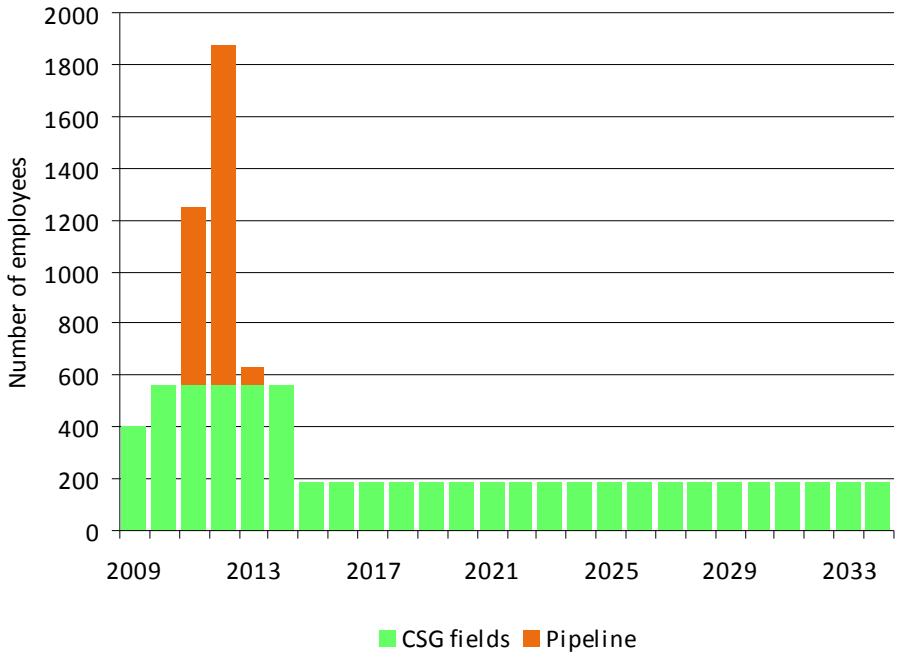


Figure 6.15.7 Scenario 1: Estimated Project Construction Workforce

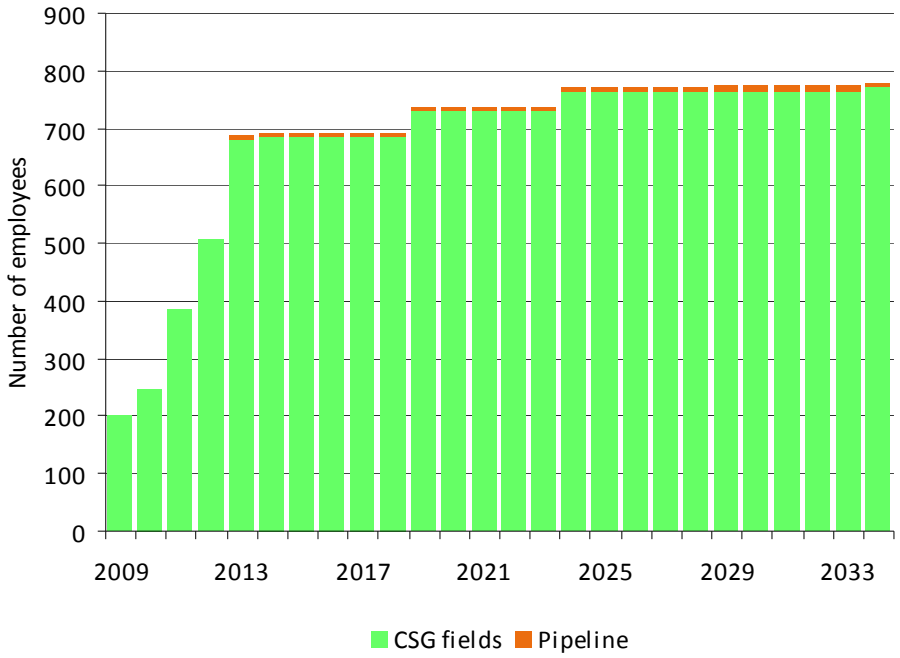


Figure 6.15.8 Scenario 1: Estimated Project Operational Workforce

The labour market analysis indicates that labour markets in the gas transmission pipeline/CSG fields region are already tight. The demands of the project, if entirely locally sourced will therefore compete for labour along side existing businesses in the region. However, given the nature of the skills required and the low availability of these skills in the region, the project's employment policy will relieve local labour market pressures by bringing employees from outside the region either on a temporary (FIFO) or permanent basis. In response to the project's labour demands there will be an increase in the region's population and the size of its workforce. To the extent that these employees are relatively highly paid compared to existing wage rates in the region, this will constitute a significant regional economic benefit.

The impact of the project's demand on the regional labour market is likely to be affected by the slow down in the world and Australian economies. This is expected to result in some job losses in the project region, freeing up workers for potential employment by the project. As a result, the local sourcing of construction labour and operational labour may be somewhat higher than assumed in the labour market impact and economic impact analysis. The project could therefore play an important role in providing increased employment opportunities at a time when local unemployment rates are rising.

Scenario 2

Construction Phase

The workforce figures mentioned for Scenario 1 relate to the GLNG Project-employed CSG construction workforce required to construct sufficient CSG capacity to supply the 3.4 Mtpa nameplate production LNG facility. For Scenario 2, additional CSG fields development will be needed. This development could be undertaken by the project or the project may source the additional gas to supply the 10 Mtpa facility from other suppliers. In the economic impact analysis of Scenario 2, the CSG construction workforce was increased to reflect this additional CSG fields development.

Figure 6.15.9 depicts the estimated number of employees in the CSG fields and gas transmission pipeline region over the life of the project for Scenario 2.

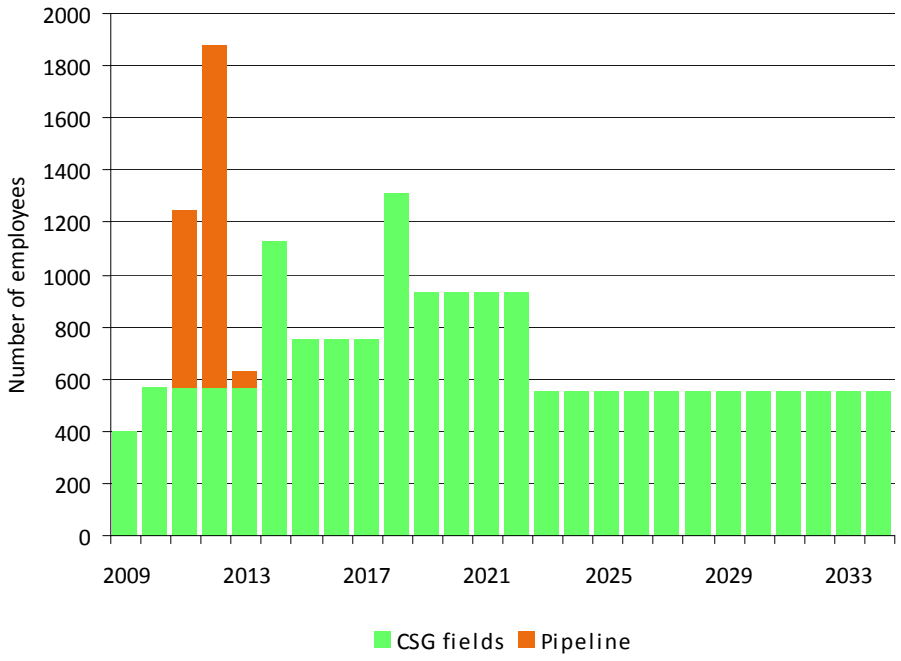


Figure 6.15.9 Scenario 2: Estimated Project Construction Workforce

Operational Phase

The operational phase workforce requirements of the project under Scenario 2 was scaled up from Scenario 1 in proportion to the additional CSG fields development required to supply the larger facility (see Figure 6.15.10).

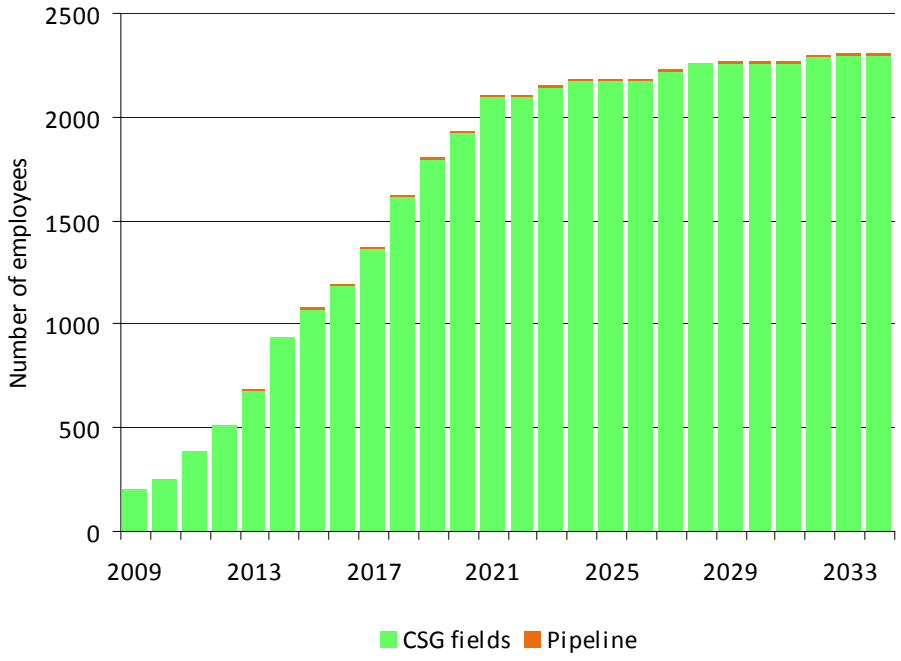


Figure 6.15.10 Scenario 2: Estimated Project Operational Workforce

As with Scenario 1, the nature of the CSG fields operation and the occupational composition of the local workforce dictate that around 50 % of employees will be employed on a FIFO basis and reside in TAFs near the CSG wells. There are expected to be employment opportunities for residents in the region, depending on the available skills.

6.15.5.3 Agriculture

The project requires access to agricultural land and this potentially reduces the amount of land available for agricultural purposes. In this case however, the amount of land taken up by the pipelines, CSG wells and ancillary facilities is very small relative to the amount of land devoted to grazing and other agricultural activities. For example the estimated area needed for the CSG wells is around 2,500 hectares. The direct impact on agricultural productivity is therefore likely to be negligible and, in any case, the project is required to pay compensation to landholders as part of the terms of access.

In addition, the project's CSG fields development may have beneficial implications for the agricultural sector, particularly in times of drought, due to the large volumes of associated water potentially available. This benefit has yet to be quantified and is not taken into account in the current economic impact assessment.

The project could potentially compete with other industries for labour in the region. However, the nature of the skills required means that the project will use labour brought in from outside the region either on a permanent or a temporary (FIFO) basis.

6.15.5.4 Tourism

The direct impact on the tourism industry, in the context of accommodation occupancy rates, is likely to be positive and as such is not likely to require mitigation.

6.15.5.5 Need for Additional Infrastructure

Development of the CSG fields will generally be self-reliant for infrastructure provision.

The analysis of the project's traffic impacts on the existing road network has been summarised in Section 4.14.2. This includes information regarding the implications for upgrading various existing road sections and intersections. While Santos will contribute to the cost of the works associated with the GLNG Project, additional funding may be required to complete the necessary upgrades.

Santos will enter into discussions with the Queensland Government and the relevant local authorities regarding infrastructure required for the project.

6.15.5.6 Implications for Future Development in the Locality

As discussed in Section 8.15.5.1, development of the CSG fields will have a significant economic benefit in the region. Many existing industries are likely to benefit and there is also potential for new business to be established in the area. Some project expenditures, currently paid to businesses outside the region, may be sufficiently large to justify the establishment of a local supplier. In effect, the project may provide some scope for regional 'import substitution' and economic diversification. This increased economic activity is expected to lead to further growth and development in the region.

Potential negative impacts of the project will arise if the project were to use a resource required by other businesses in the project area. For example, the CSG fields require access to land that is currently used for agricultural production (predominantly grazing) thus reducing the amount of land available for agricultural purposes. In this case however, the amount of land taken up by the project is very small relative to the overall area of land devoted to grazing and other agricultural activities. The direct impact on agricultural productivity is therefore likely to be negligible and, in any case, the project is required to pay compensation to landholders as part of the terms of access.

The project may also compete with existing businesses in the region for labour. This effect is mitigated by the fact that the project draws on different skills to those required by many existing regional businesses

and therefore will recruit a large proportion of its workforce from outside the region. It may also be mitigated by a weakening in regional labour demand and perhaps some increase in unemployment levels as the overall Australian economy weakens along with the slowdown in world economic activity.

Assessment of the implications of the project for existing land uses in the region and their future development is given in Section 6.11.5.

6.15.5.7 Cumulative Impacts

Cumulative economic and labour impacts associated with the project are discussed in Section 8.15.5.

Table 6.15.7 below provides a summary of potential economic impacts and mitigation measures for the gas transmission pipeline/CSG fields.

Table 6.15.7 Potential Economic Impacts and Mitigation Measures

Aspect	Potential Impact	Mitigation Measures	Objective
Construction			
Local water supply.	Overuse of local water supply.	• Develop water supply strategy, including license requirement to extract water.	Protect local water supply.
Agriculture industry	Reduction in land available for agriculture.	• Adhere to legislated requirements for compensation of landholders.	Protect local agricultural operations.
Local community impacts	Not utilising the local workforce.	• Assess local skills capacity, prospects of local training programs and interest in employment.	Utilise and up skill the local workforce.
	Real or perceived fear of social dysfunction as a result of external workers in the community.	• Contribute to local liveability programs. • Initiate community consultation and awareness campaign to promote project benefits to the community. • Develop and implement project sponsorship / community support program to enhance corporate investment in the community, and specific community events.	Understand and minimise the impact of workers from outside the local area.
Operation – Refer "Construction" above			
Decommissioning and Rehabilitation – Refer "Construction" above.			

6.15.6 Summary of Findings

The workforce for the CSG fields and gas transmission pipeline constitutes a relatively significant increase in regional labour demand relative to the size of the regional labour market. The nature of the skills available in the region compared to the nature of the skills required dictate that a larger proportion of the construction workforce will be brought in from outside the region. Moreover, given the specialised nature of the work and the use of contractors, around 90 % of this workforce is likely to be employed on a FIFO basis and located in TAFs in the vicinity of the construction activity.

The extent to which the project competes with local businesses for local labour is likely to be mitigated by the downturn in economic activity resulting in a slowing in regional employment growth which may contribute to rising unemployment in the region over the next two years. Increased availability of local labour with project relevant skills may increase the opportunity for local sourcing of both construction and operational labour. The project will therefore assist in providing employment opportunities in a time of low or even negative employment growth in the region.