

Economic Impact of Queensland Petroleum & Gas Sector 2011-18

Prepared for APPEA

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Prepared by:





INTRODUCTION

Lawrence Consulting was commissioned by the Australian Petroleum Production & Exploration Association (APPEA) to undertake an economic impact assessment of the Queensland petroleum and gas industry over the period from 2011/12 to 2017/18 (2011-18). The analysis utilised data from the annual expenditure survey completed by Queensland Resources Council (QRC) of its full-member companies and selected key service members which asks companies to disclose expenditure and other information by postcode in the following categories:

- Employee salaries and wages (by place of residence) for full-time direct employees as well as the number of FTE employees by place of operation;
- Goods and services expenditure by individual supplier, including separate identification of both operational expenditure (opex) data for current projects and capital expenditure (capex) data from projects currently under development;
- Voluntary community contributions by individual organisation;
- Local government payments, including council rates and infrastructure charges; and
- State government payments, including royalties, stamp duty, payroll tax and land tax.

The oil and gas sector companies that provide expenditure data annually as part of the QRC study and which have been aggregated to represent the impact of the industry as contained in this report are shown in Table 1.

Table 1: Petroleum & Gas Companies Supplying Expenditure Data	
Arrow Energy Limited	Santos/TOGA Pty Ltd (GLNG)
ConocoPhillips/APLNG	Senex
Origin Energy (APLNG)	Westside Corporation
QGC Limited (BG) (QCLNG)	

The data was supplied by Australian postcodes where the salary was paid (residence of the direct employee) and where the community contributions and business expenditures were made. The postcode spend data were then aggregated to identify the geographical spread of direct impacts from the petroleum and gas sector across Queensland at a number of different geographic scales:

- State (the whole area of Queensland);
- Regional (represented by 13 Statistical Divisions in Queensland);
- Local (represented by 78 Local Government Areas in Queensland);
- State electoral divisions (represented by 93 SEDs in Queensland); and
- Commonwealth electoral divisions (represented by 30 CEDs in Queensland).

This report concentrates on the direct spending and other impacts and benefits of the Queensland petroleum and gas industry over the period 2011-18; detailed economic modelling of the flow-on impacts from this direct expenditure – specifically, indirect and consumption-induced impacts – are contained in Appendix A. The report also focuses more on state and regional profiles, whilst data tables for LGA, SED and CED areas are contained in the Appendices. Note, data for SED and CED areas are available for the period 2012/13-2017/18.



ECONOMIC BENEFITS

Direct Spending

Expenditure data indicated that the **petroleum and gas sector contributed approximately \$54.5 billion** in direct spending to the Queensland economy over the period 2011/12 to 2017/18, including:

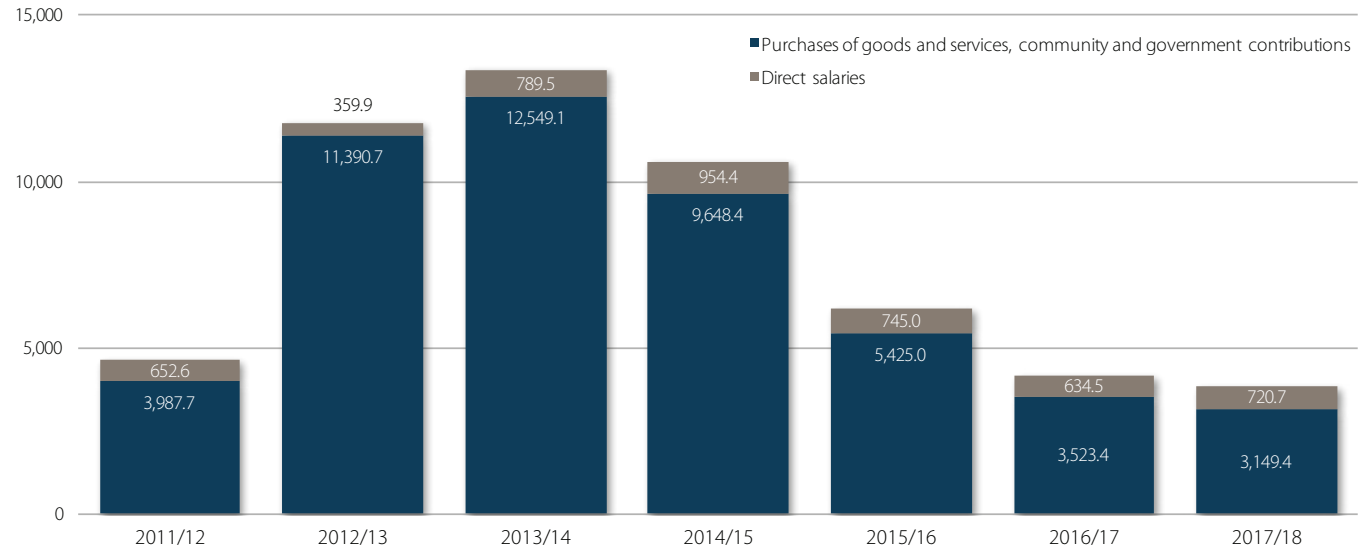
- **\$4.9 billion in wages and salaries** to an average direct workforce (i.e. not including all contract workers who work on mine sites) of approximately **4,606 fulltime resident employees**, representing an average salary level across the sector of approximately \$150,617 per annum; and
- **\$49.7 billion** in purchases of goods and services from local businesses (including contract payments), community contributions and payments to local government (including rates, developer contributions and other payments) and state government (including royalties, stamp duty, payroll tax and land tax).

In addition, data collected in recent years as part of the expenditure survey indicates that the petroleum and gas sector made **\$322.2 million in total payments to local government** and **\$489.0 million in state government payments** over the past five years and supported an average of **3,304 local suppliers each year** over the last four years.

Table 2: Direct Impact of Qld Petroleum & Gas Sector, 2011-18								
	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18	Total
Direct full time employees (FTEs)	5,220	2,628	6,109	5,268	4,727	4,156	4,137	4,606 (avg)
Associated salaries (\$M)	\$652.6	\$359.9	\$789.5	\$954.4	\$745.0	\$634.5	\$720.7	\$4,856.6
Business purchases, community and govt payments (\$M)	\$3,987.7	\$11,390.7	\$12,549.1	\$9,648.4	\$5,425.0	\$3,523.4	\$3,149.4	\$49,673.7
Total spend (\$M)	\$4,640.3	\$11,750.6	\$13,338.6	\$10,602.8	\$6,170.0	\$4,157.0	\$3,870.1	\$54,529.4

Direct Expenditure of Qld Petroleum & Gas Sector

Queensland (\$ million)

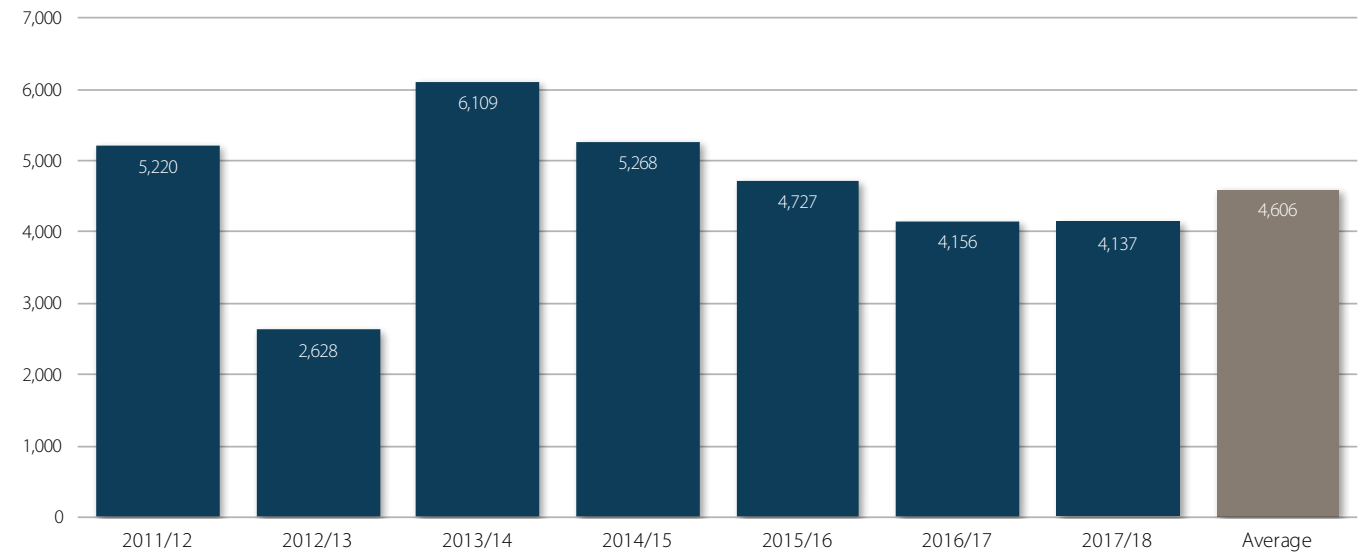




Annual spending by the Queensland petroleum and gas sector was highest in 2013/14 (\$13.3 billion) during the peak construction period for CSG/LNG infrastructure, with levels of spending following this peak normalising for the operational phase, reaching \$3.9 billion in 2017/18. Similarly, the number of direct employees reached its highest level over the past six years in 2013/14 (6,109 FTEs), consolidating in the period since to a level of 4,137 FTEs in 2017/18.

Direct Employment Workforce of Qld Petroleum & Gas Sector

Queensland (FTEs)



Note: Direct employees measures the number of workers by place of residence within Queensland.



Number of Businesses Directly Supported

Details of businesses supplying goods and services to the resources sector were analysed to determine the total number of businesses supported by Queensland petroleum and gas companies. Duplicates were removed to the best extent practicable to ensure an accurate estimation of the number of individual businesses engaged in the supply chain of the resources sector.

On average over the past four years, approximately 3,304 businesses in Queensland received payments for goods and services supplied to those petroleum and gas companies that provided supplier details. The highest average number of suppliers was recorded in the Brisbane region (1,761 businesses), followed by Darling Downs (478 businesses), Fitzroy (427 businesses) and South West (383 businesses).

Table 3: Number of Businesses Supported by Region, 2014-18					
Region	2014/15	2015/16	2016/17	2017/18	Average
Brisbane	1,990	1,764	1,711	1,580	1,761
Central West	<10	<10	<10	<10	<10
Darling Downs	766	380	371	398	478
Far North	15	10	10	<10	11
Fitzroy	508	442	429	332	427
Gold Coast	96	73	68	59	74
Mackay	26	21	20	72	35
North West	<10	<10	<10	<10	<10
Northern	28	21	20	22	23
South West	431	384	363	354	383
Sunshine Coast	66	51	47	56	55
West Moreton	18	14	14	16	15
Wide Bay-Burnett	50	36	35	30	38
Total Queensland	4,001	3,198	3,091	2,926	3,304

Note: Only for those companies that provided supplier details.

Community Organisations Supported

Over the period 2014/15 to 2017/18, Queensland petroleum and gas companies contributed to an annual average of 246 separate community groups in a wide range of areas including health, education, environment and the arts. Again, duplicates were removed to the best extent practicable to ensure an accurate estimation of the number of individual community organisations supported.

Table 4: Number of Community Organisations Supported by Region, 2014-18					
Region	2014/15	2015/16	2016/17	2017/18	Average
Brisbane	29	37	38	50	39
Central West	<10	<10	<10	<10	<10
Darling Downs	124	66	66	109	91
Far North	<10	<10	<10	<10	<10
Fitzroy	92	30	30	101	63
Gold Coast	<10	<10	<10	<10	<10
Mackay	11	17	17	15	15
North West	<10	<10	<10	<10	<10
Northern	<10	<10	<10	<10	<10
South West	60	12	12	48	33
Sunshine Coast	<10	<10	<10	<10	<10
West Moreton	<10	<10	<10	<10	<10
Wide Bay-Burnett	<10	<10	<10	<10	<10
Total Queensland	324	168	169	324	246

Note: Only for those companies that provided supplier details.



Regional Impact

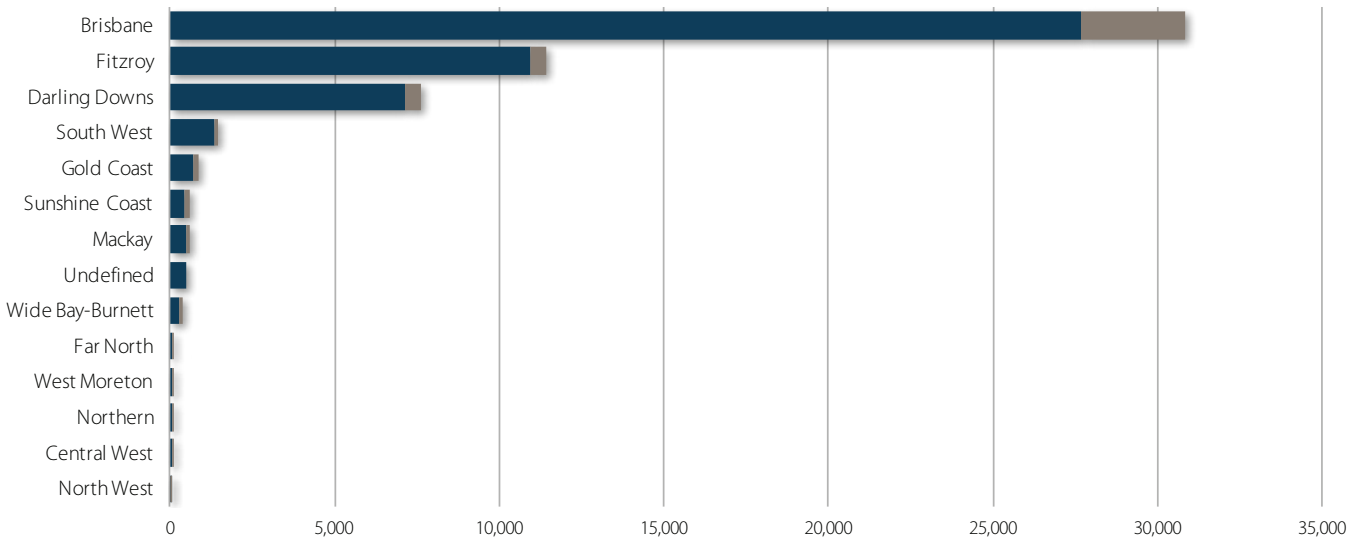
As specified earlier, the postcode expenditure data provided by companies was aggregated using geographical concordances at the regional (or SD) and local (LGA) levels. The level of average employment and total aggregate direct expenditure on employees and business purchases over the period 2011/12 to 2017/18 is summarised for the 13 major regions in Queensland in Table 5. The data illustrates that the largest proportion of direct expenditure from the petroleum and gas sector in Queensland over the past seven years was in the Brisbane region (\$30.8 billion), followed by Fitzroy (\$11.4 billion) and Darling Downs (\$7.6 billion).

Table 5: Direct Impact of Qld Petroleum & Gas Sector by Region, 2011-18				
Region	Average residing employees (FTEs)	Associated salaries (\$M)	Business purchases, community and govt payments (\$M)	Total direct spending (\$M)
Brisbane	2,900	3,147.4	27,684.3	30,831.7
Central West	2	1.6	40.1	41.7
Darling Downs	551	515.2	7,114.2	7,629.4
Far North	16	16.0	75.0	91.0
Fitzroy	395	453.6	10,959.8	11,413.3
Gold Coast	128	131.0	712.6	843.6
Mackay	154	132.5	465.6	598.0
North West	1	0.7	3.5	4.2
Northern	21	20.0	33.5	53.5
South West	144	126.9	1,347.6	1,474.5
Sunshine Coast	179	191.0	430.2	621.2
West Moreton	35	36.4	43.4	79.9
Wide Bay-Burnett	81	84.4	274.4	358.8
Undefined ^(a)	0	0.0	488.9	488.9
Total Queensland	4,606	4,856.6	49,673.0	54,529.6

Note: (a) Includes State Government payments, which are not region specific.

Direct Petroleum & Gas Sector Spending by Region

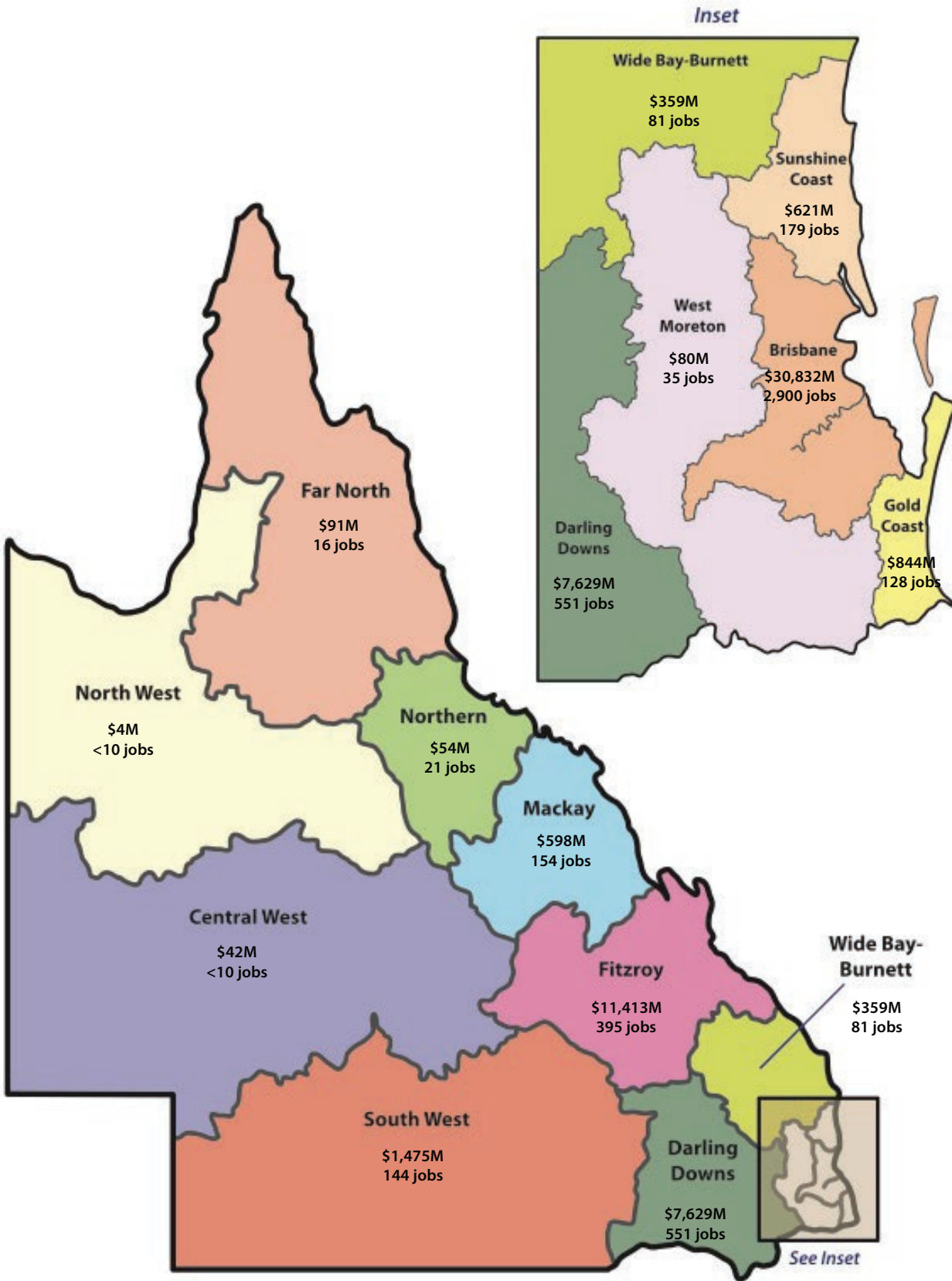
Queensland, 2011/12-2017/18 (\$ million)



With regard to employment, the largest average direct full-time resident employee workforce across Queensland was again recorded in the Brisbane region (2,900 FTEs), followed by the Darling Downs (551 FTEs) and Fitzroy (395 FTEs) regions.

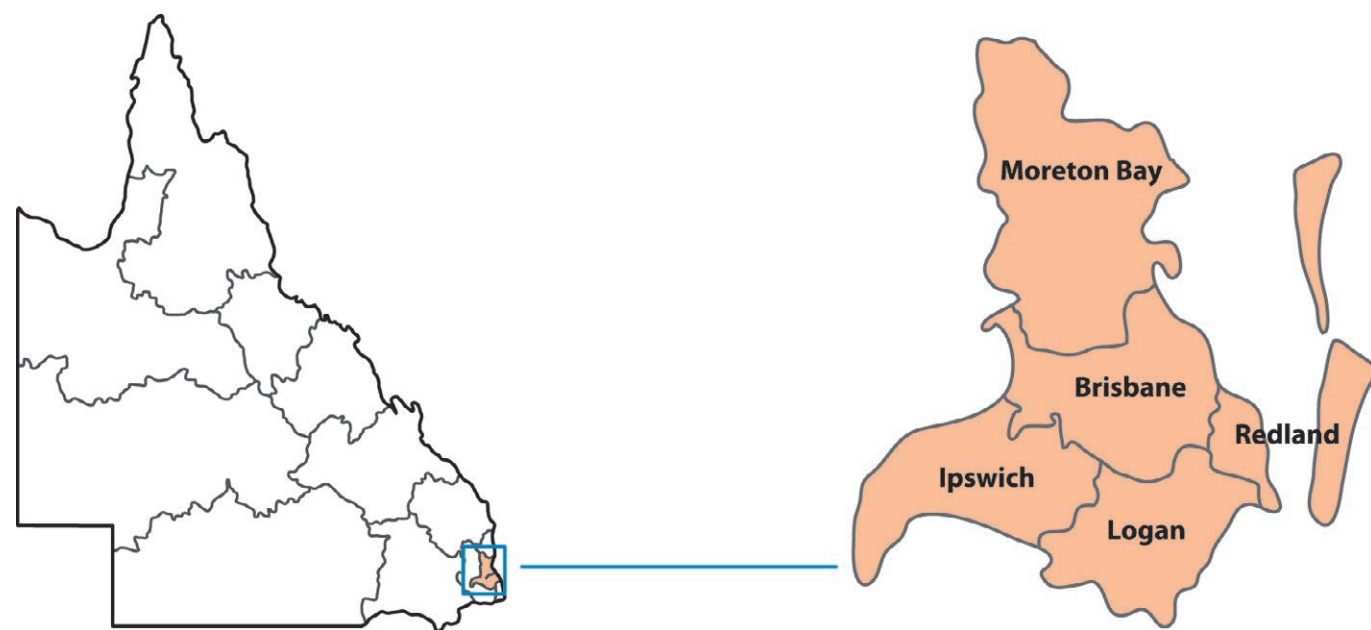


Figure 1: Total Direct Spending and Average Employment by Region, 2011-18





Brisbane

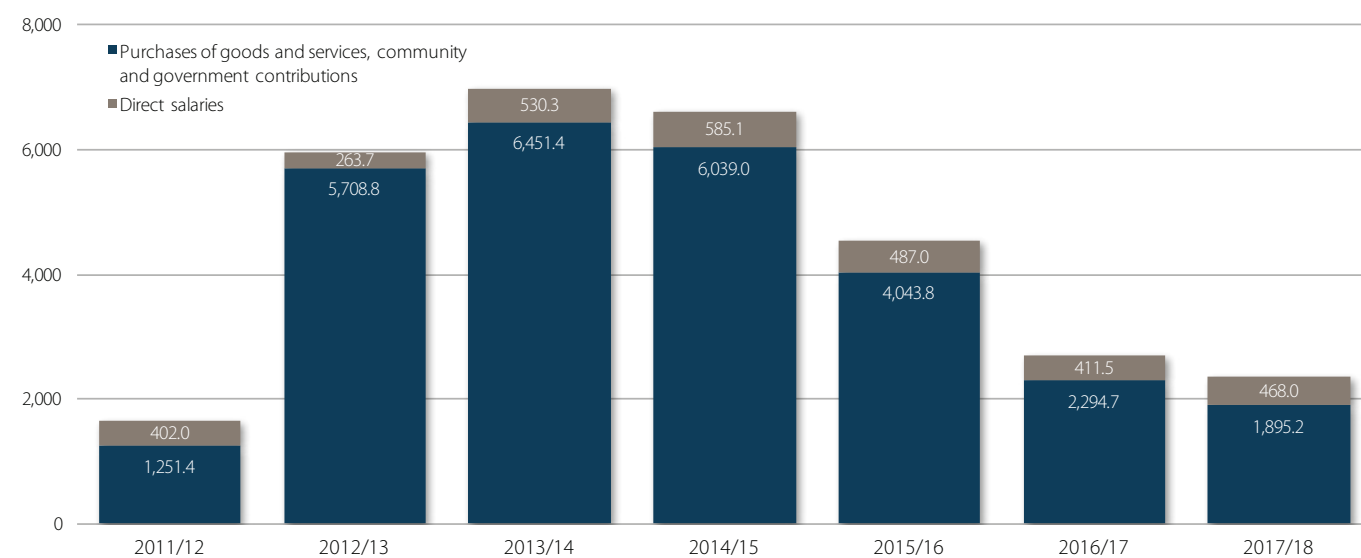


Over the period 2011/12 to 2017/18, the petroleum and gas sector in this region contributed:

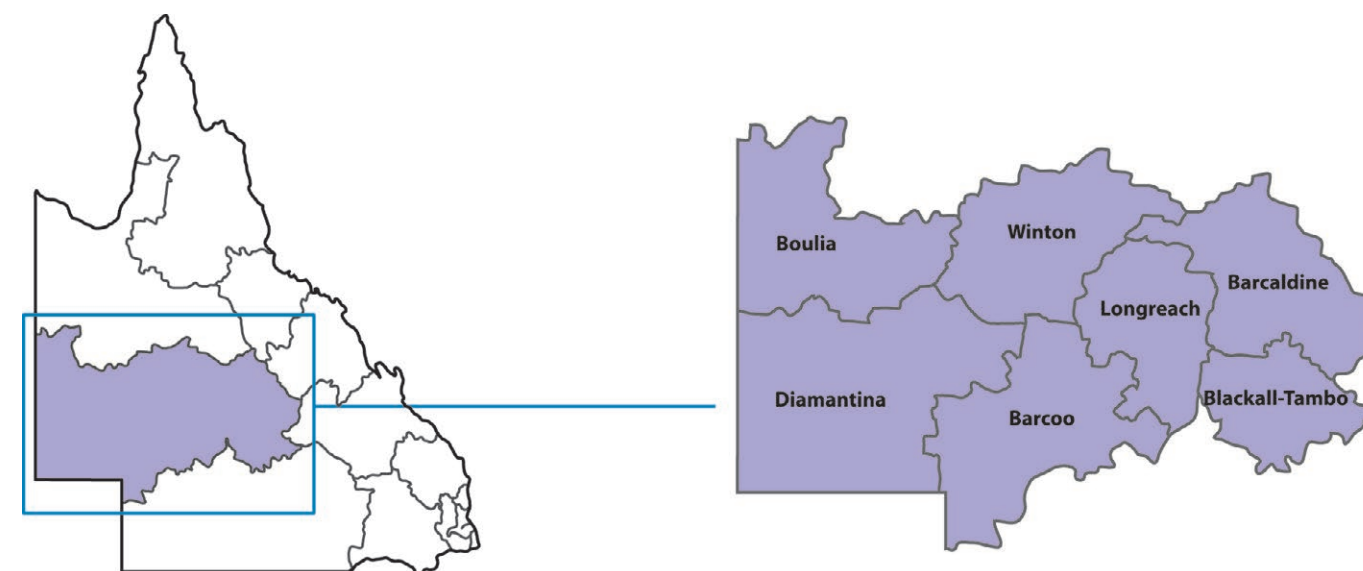
- \$3.1 billion in total wages and salaries to 2,900 average direct fulltime employees, with an average salary of \$155,064; and
- \$27.7 billion in purchases of goods and services from an annual average of 1,761 local businesses (including contractors), community contributions and local government payments.

Direct Expenditure of Qld Petroleum & Gas Sector

Brisbane (\$ million), 2011/12-2017/18



Central West

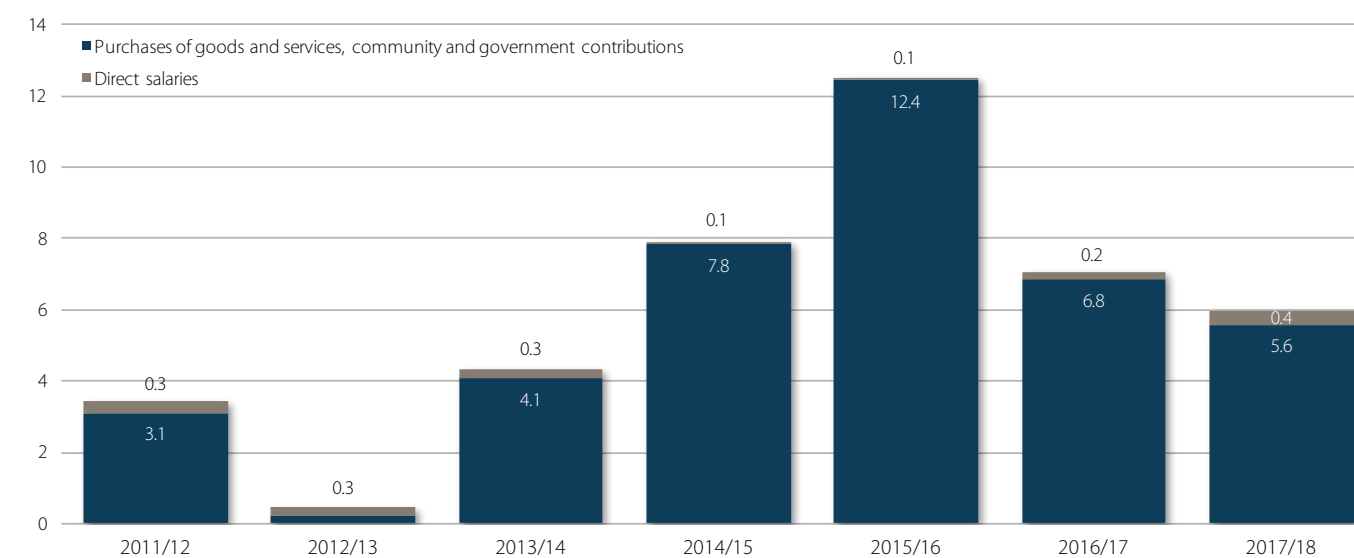


Over the period 2011/12 to 2017/18, the petroleum and gas sector in this region contributed:

- \$1.6 million in wages and salaries, with an average salary of \$124,796; and
- \$40.1 million in purchases of goods and services from local businesses (including contractors), community contributions and local government payments.

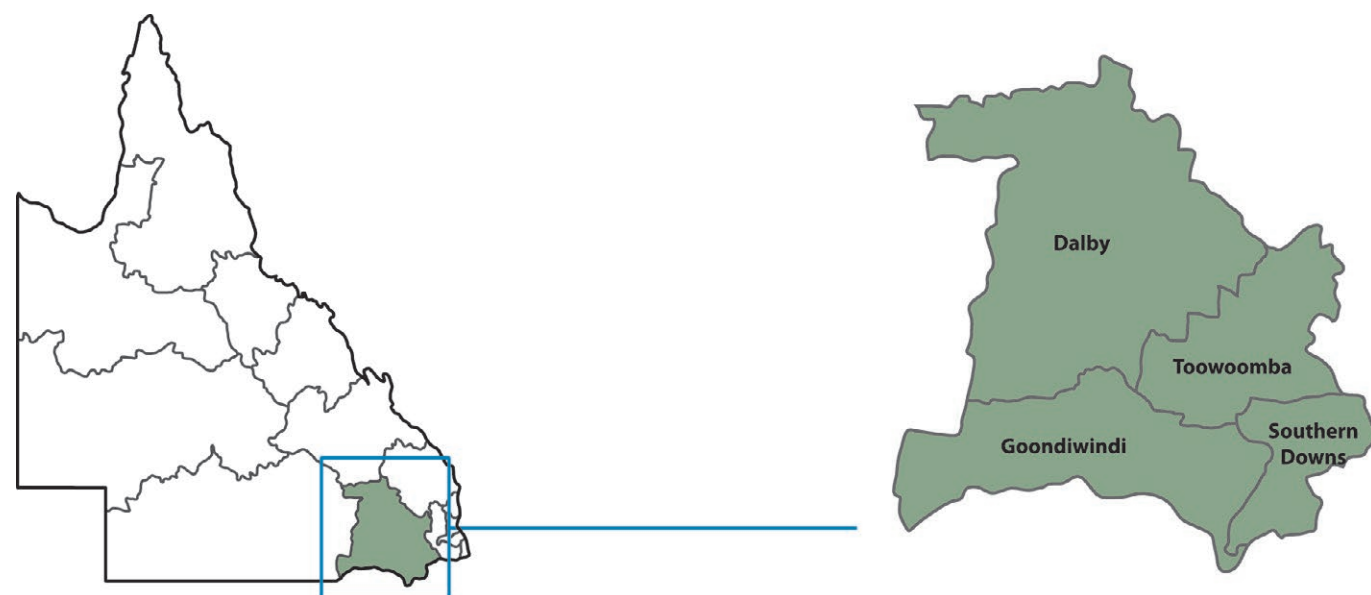
Direct Expenditure of Qld Petroleum & Gas Sector

Central West (\$ million), 2011/12-2017/18





Darling Downs

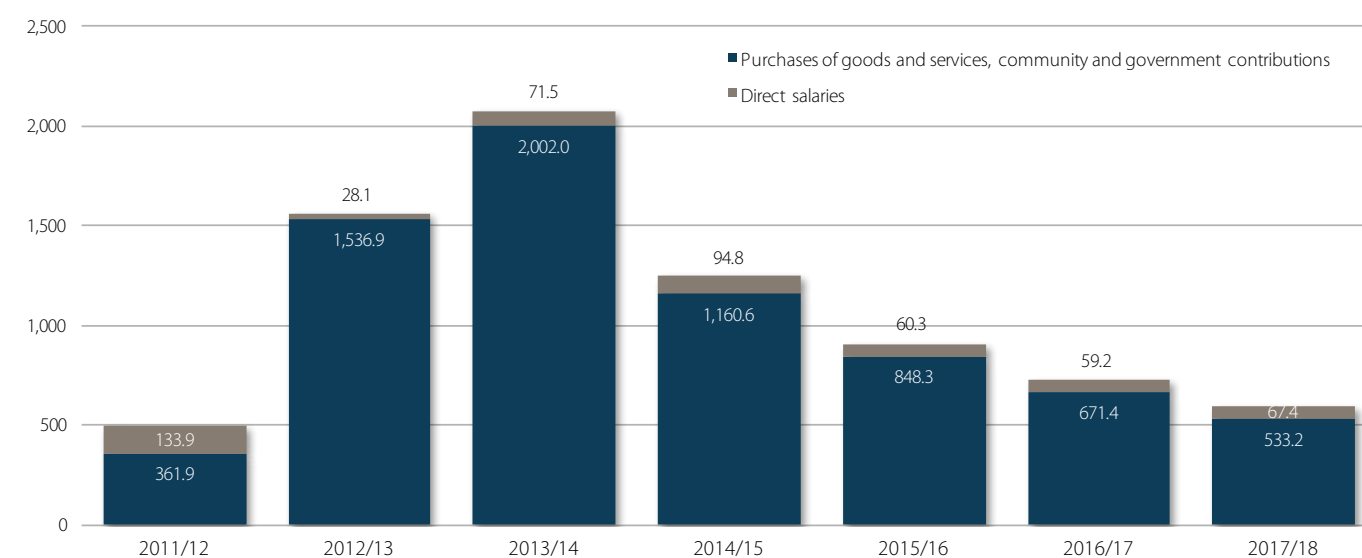


Over the period 2011/12 to 2017/18, the petroleum and gas sector in this region contributed:

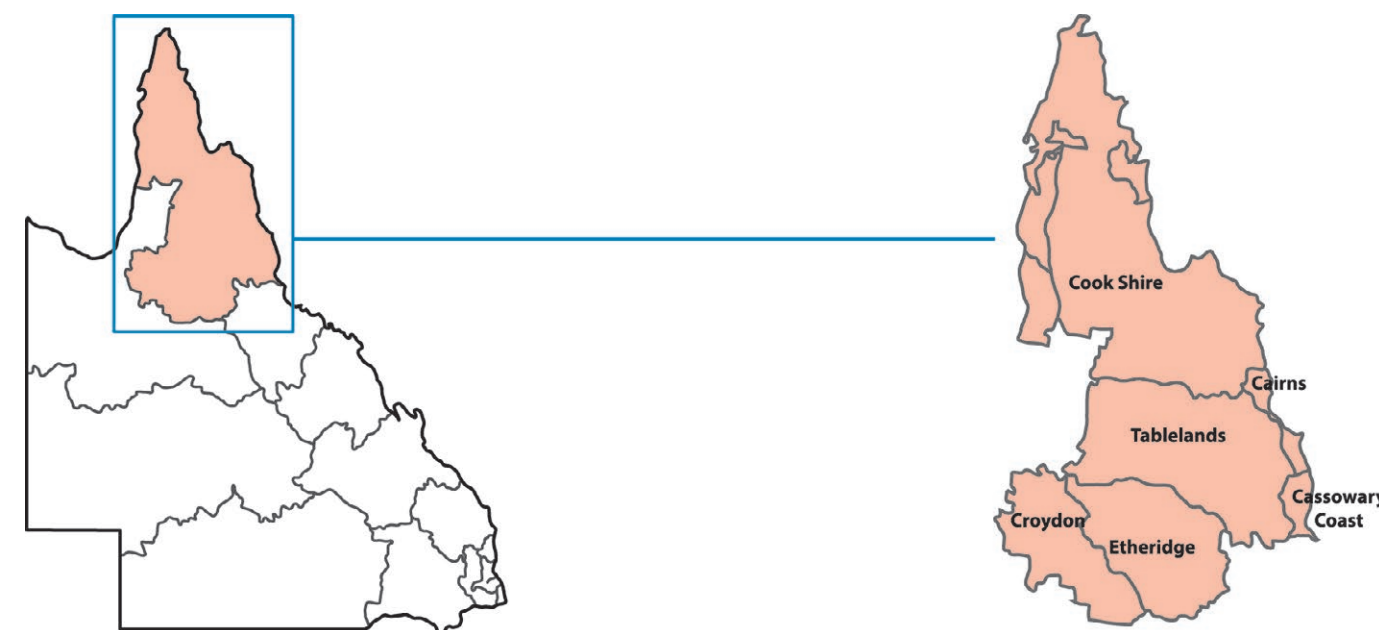
- \$515.2 million in total wages and salaries to 551 average direct fulltime employees, with an average salary of \$133,542; and
- \$7.1 billion in purchases of goods and services from an annual average of 478 local businesses (including contractors), community contributions and local government payments.

Direct Expenditure of Qld Petroleum & Gas Sector

Darling Downs (\$ million), 2011/12-2017/18



Far North

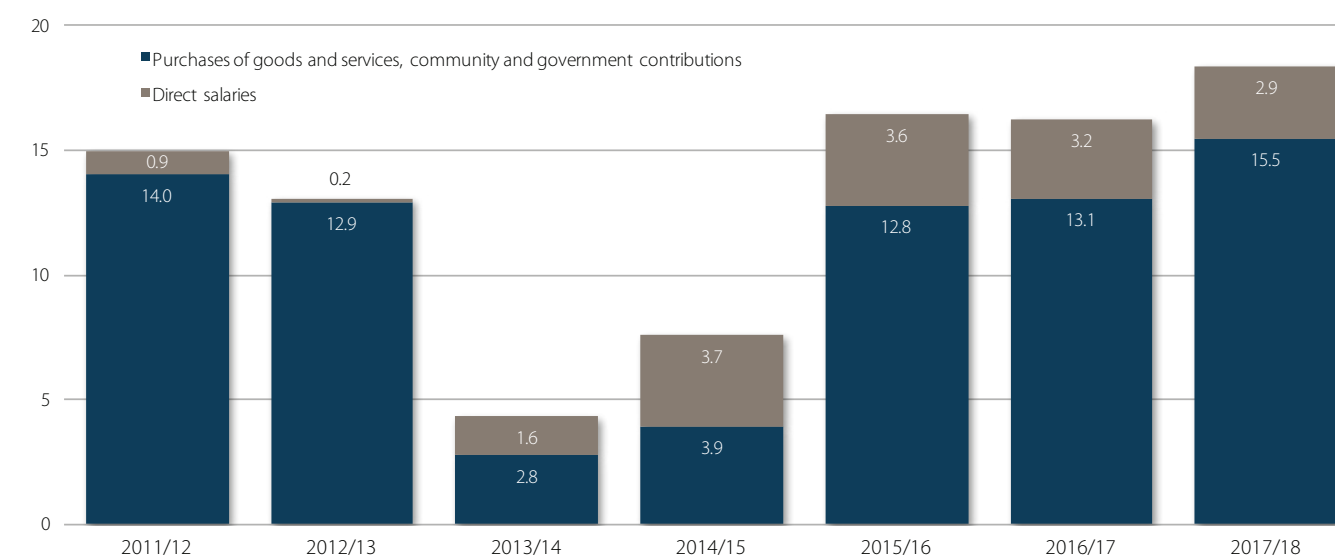


Over the period 2011/12 to 2017/18, the petroleum and gas sector in this region contributed:

- \$16.0 million in total wages and salaries to 16 average direct fulltime employees, with an average salary of \$143,073; and
- \$75.0 million in purchases of goods and services from local businesses (including contractors), community contributions and local government payments.

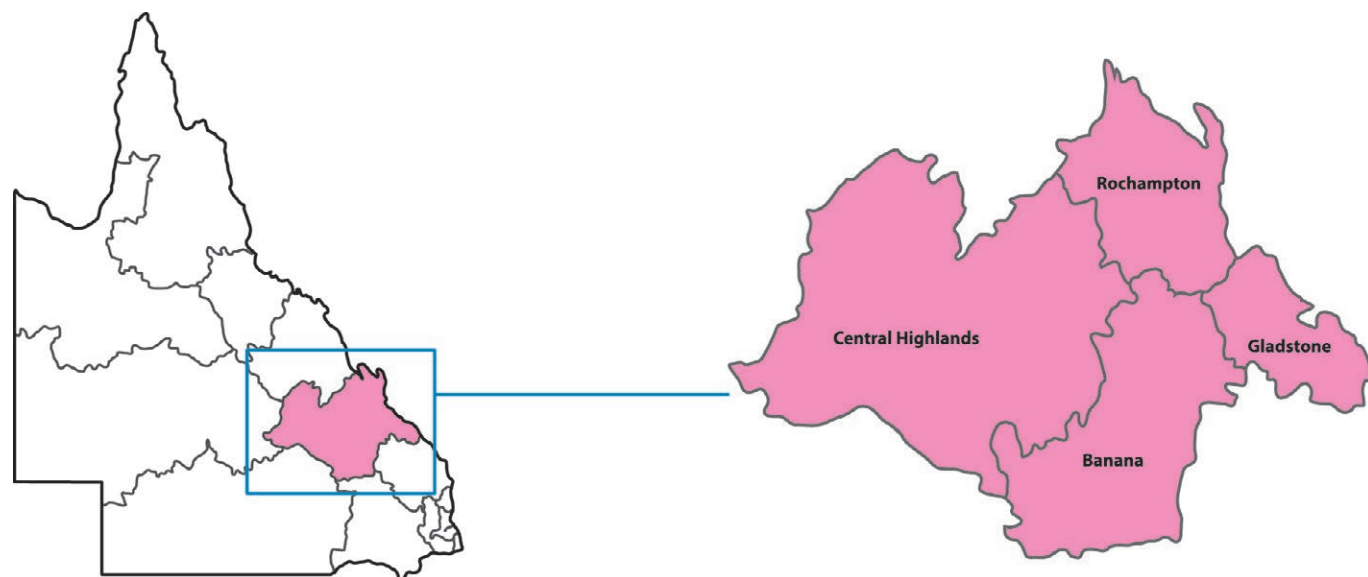
Direct Expenditure of Qld Petroleum & Gas Sector

Far North (\$ million), 2011/12-2017/18





Fitzroy

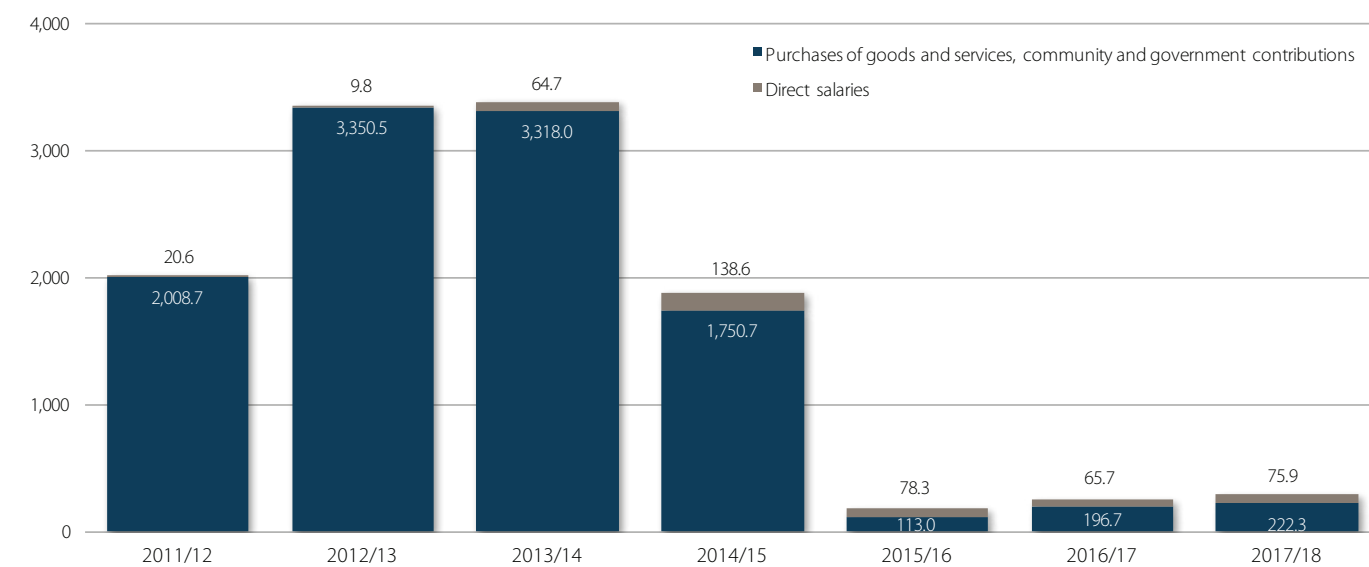


Over the period 2011/12 to 2017/18, the petroleum and gas sector in this region contributed:

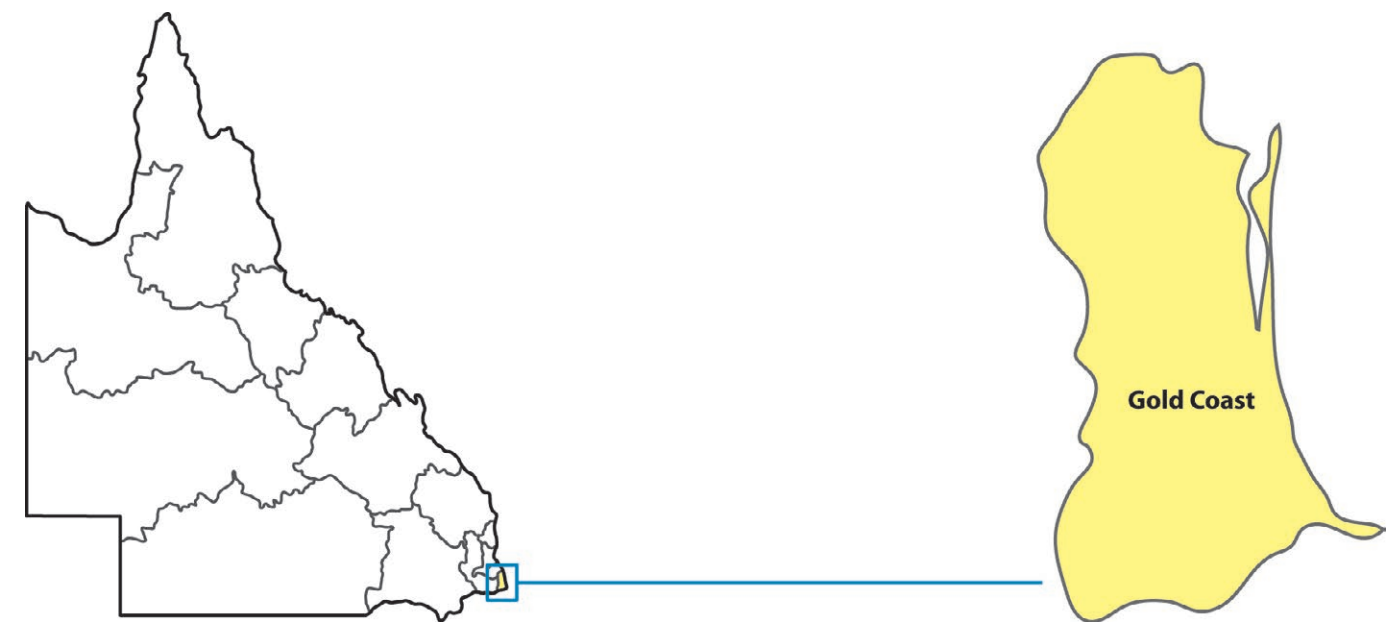
- \$453.6 million in total wages and salaries to 395 average direct fulltime employees, with an average salary of \$163,870; and
- \$11.0 billion in purchases of goods and services from an annual average of 427 local businesses (including contractors), community contributions and local government payments.

Direct Expenditure of Qld Petroleum & Gas Sector

Fitzroy (\$ million), 2011/12-2017/18



Gold Coast

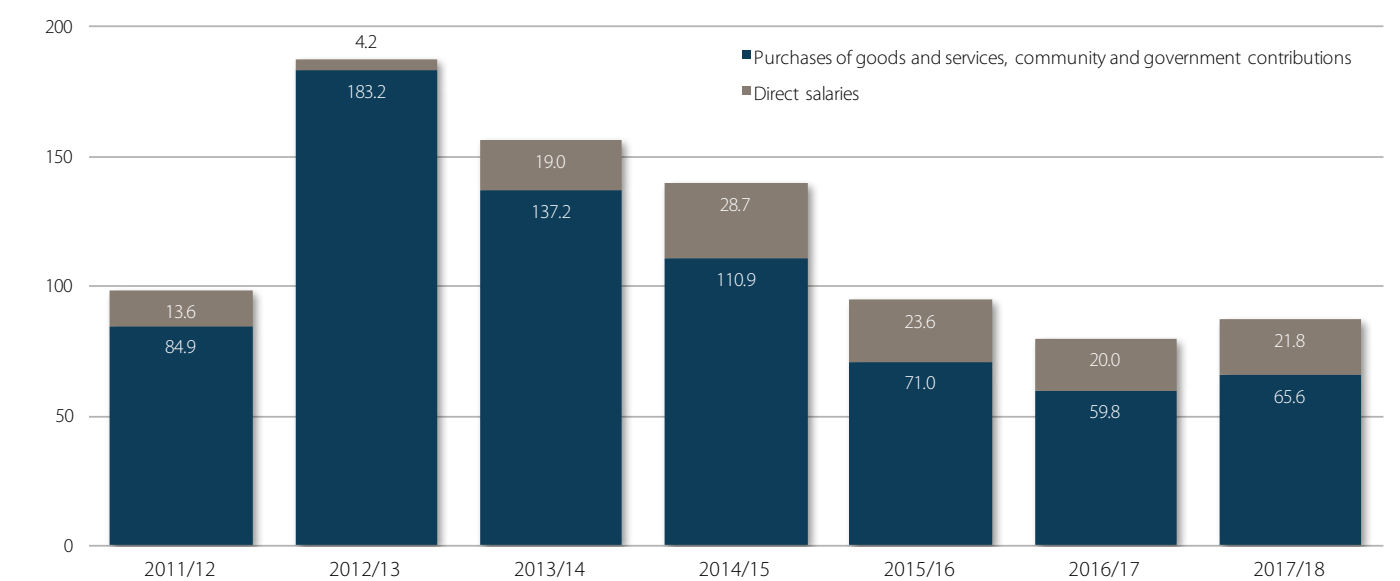


Over the period 2011/12 to 2017/18, the petroleum and gas sector in this region contributed:

- \$131.0 million in total wages and salaries to 128 average direct fulltime employees, with an average salary of \$146,722; and
- \$712.6 million in purchases of goods and services from an annual average of 74 local businesses (including contractors), community contributions and local government payments.

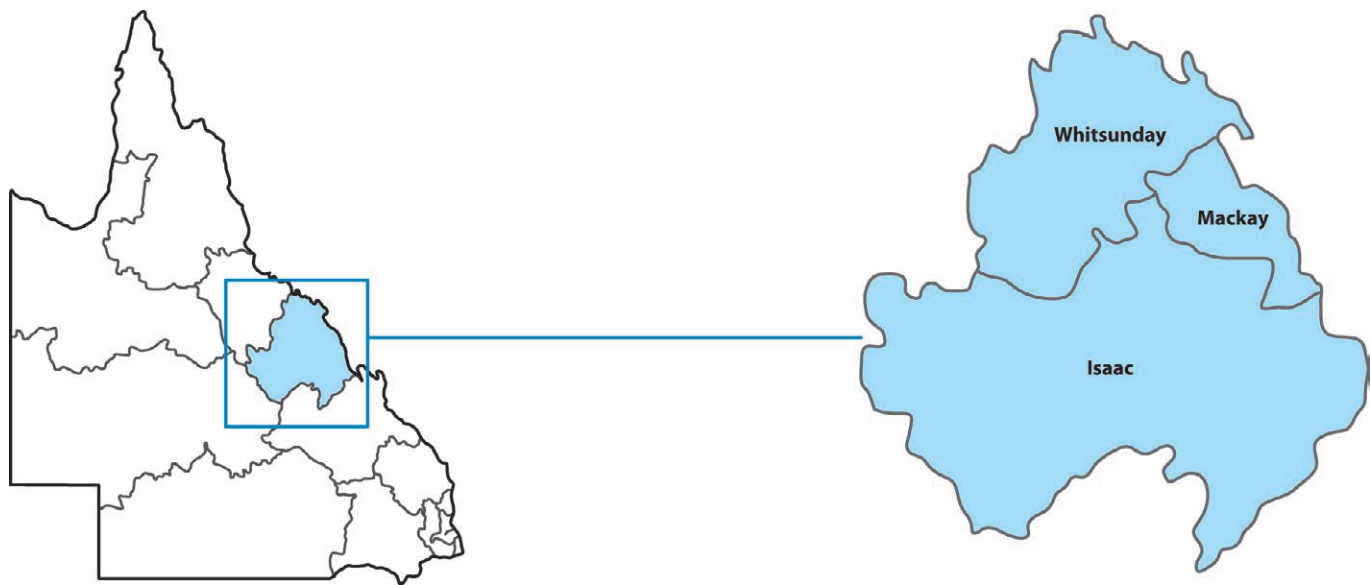
Direct Expenditure of Qld Petroleum & Gas Sector

Gold Coast (\$ million), 2011/12-2017/18





Mackay

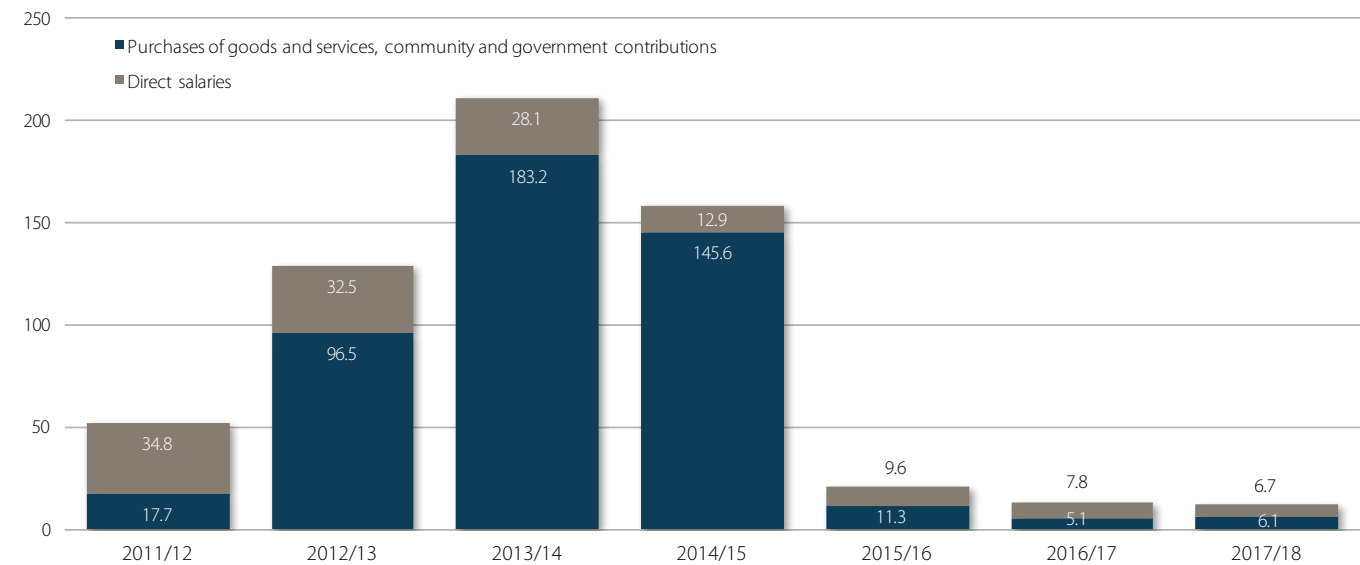


Over the period 2011/12 to 2017/18, the petroleum and gas sector in this region contributed:

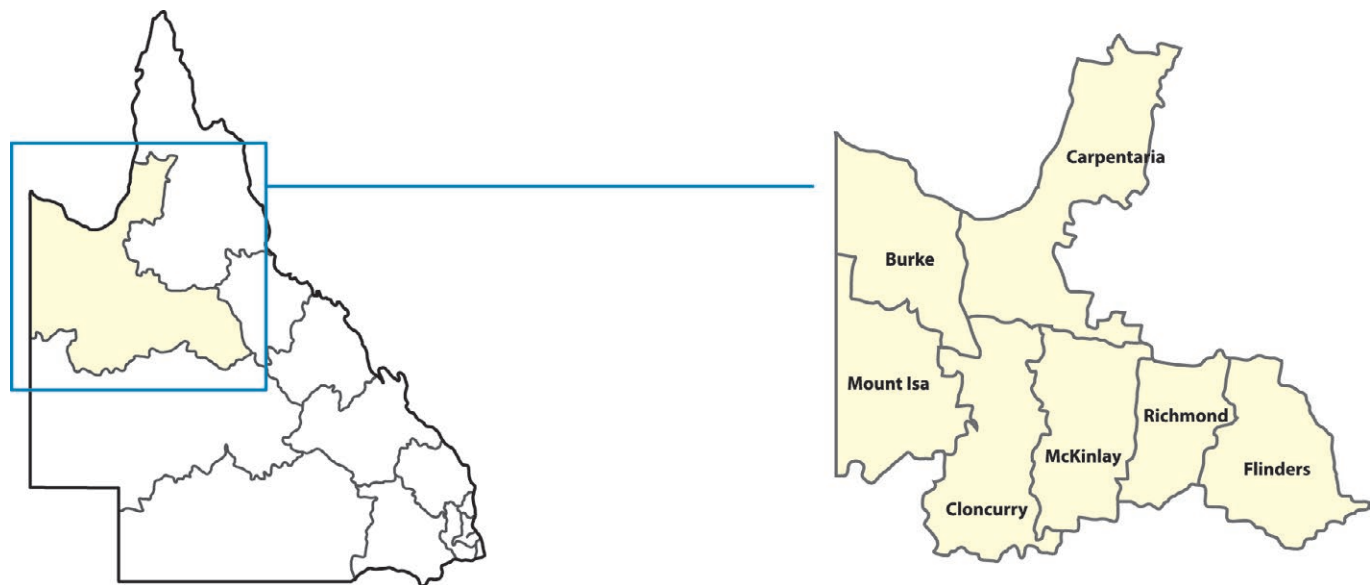
- \$132.5 million in total wages and salaries to 154 average direct fulltime employees, with an average salary of \$123,227; and
- \$465.6 million in purchases of goods and services from an annual average of 35 local businesses (including contractors), community contributions and local government payments.

Direct Expenditure of Qld Petroleum & Gas Sector

Mackay (\$ million), 2011/12-2017/18



North West

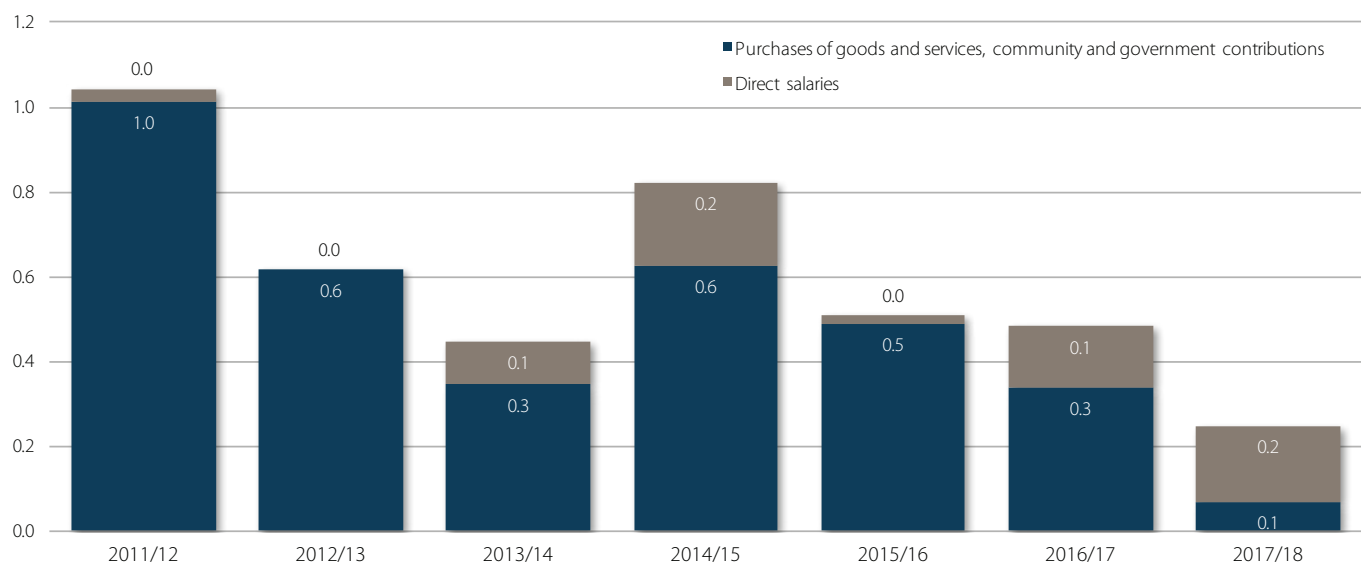


Over the period 2011/12 to 2017/18, the petroleum and gas sector in this region contributed:

- \$0.7 million in total wages and salaries, with an average salary of \$78,726; and
- \$3.5 million in purchases of goods and services from local businesses (including contractors), community contributions and local government payments.

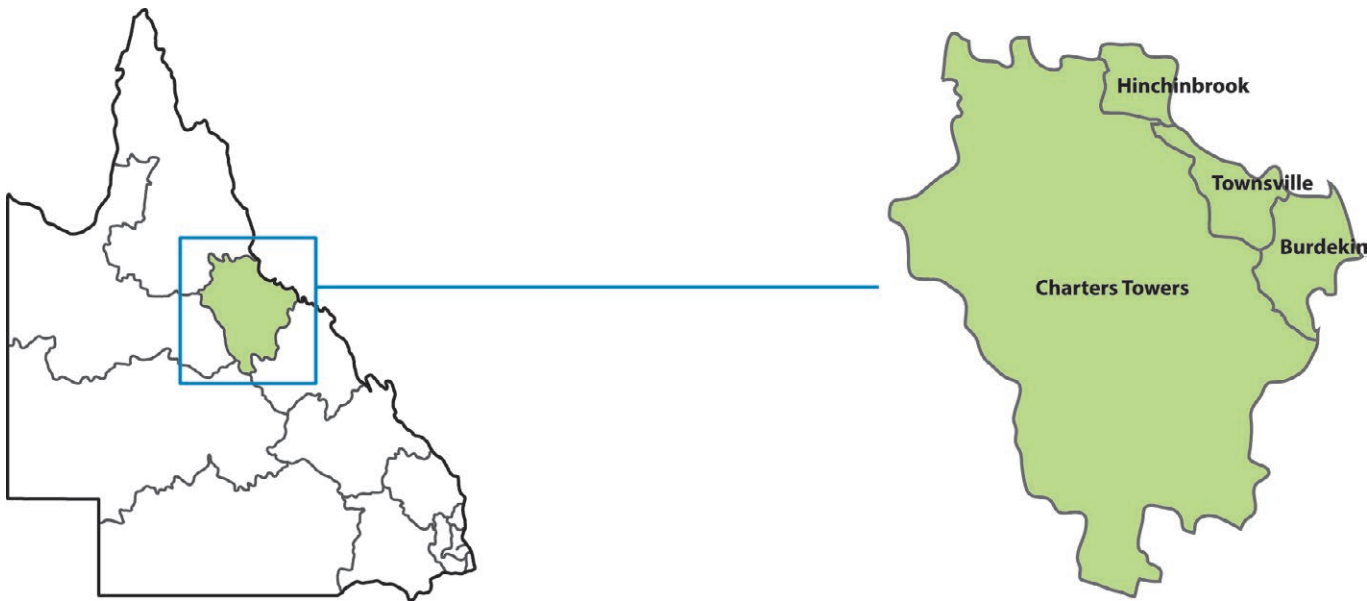
Direct Expenditure of Qld Petroleum & Gas Sector

North West (\$ million), 2011/12-2017/18





Northern

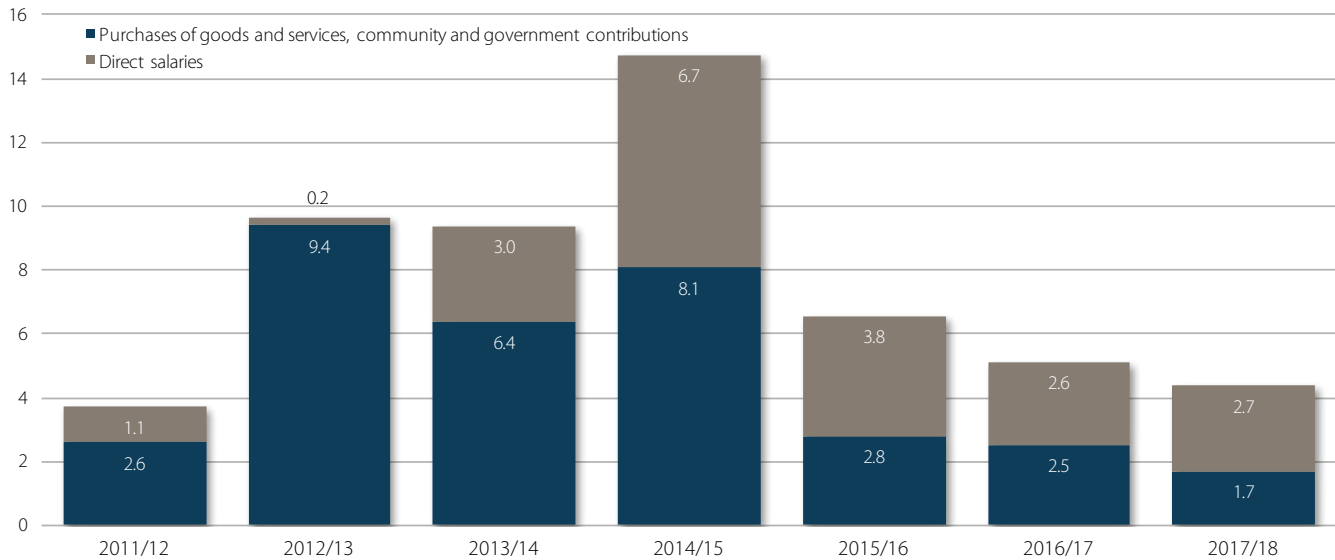


Over the period 2011/12 to 2017/18, the petroleum and gas sector in this region contributed:

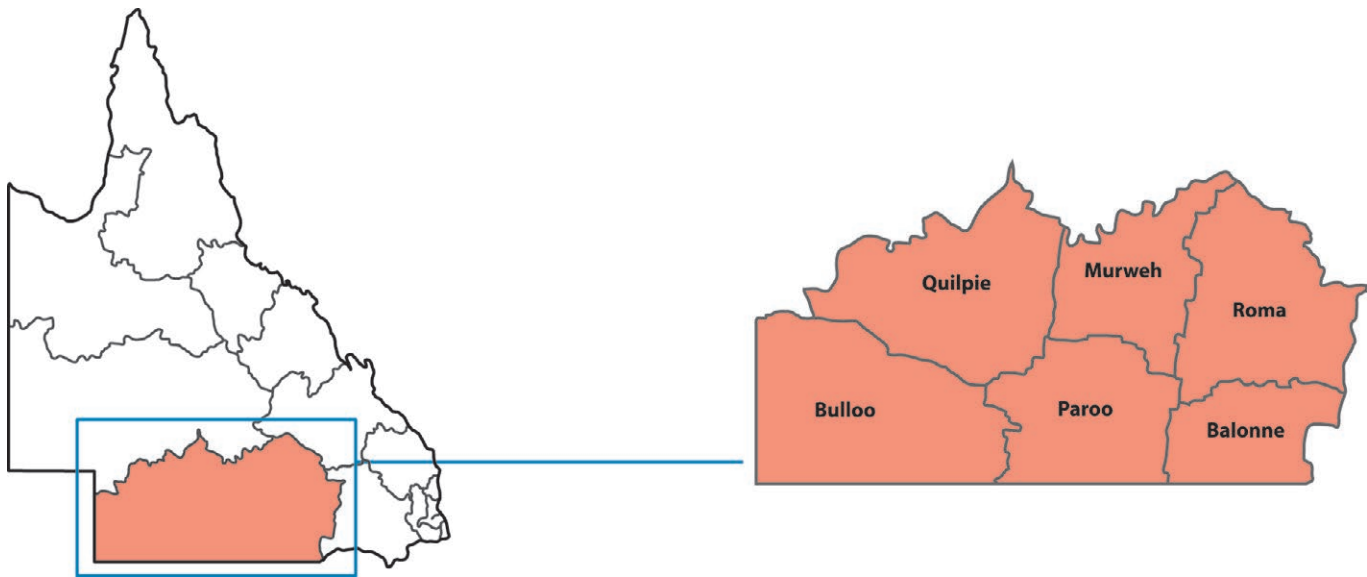
- \$20.0 million in total wages and salaries to 21 average direct fulltime employees, with an average salary of \$139,183; and
- \$33.5 million in purchases of goods and services from an annual average of 23 local businesses (including contractors), community contributions and local government payments.

Direct Expenditure of Qld Petroleum & Gas Sector

Northern (\$ million), 2011/12-2017/18



South West

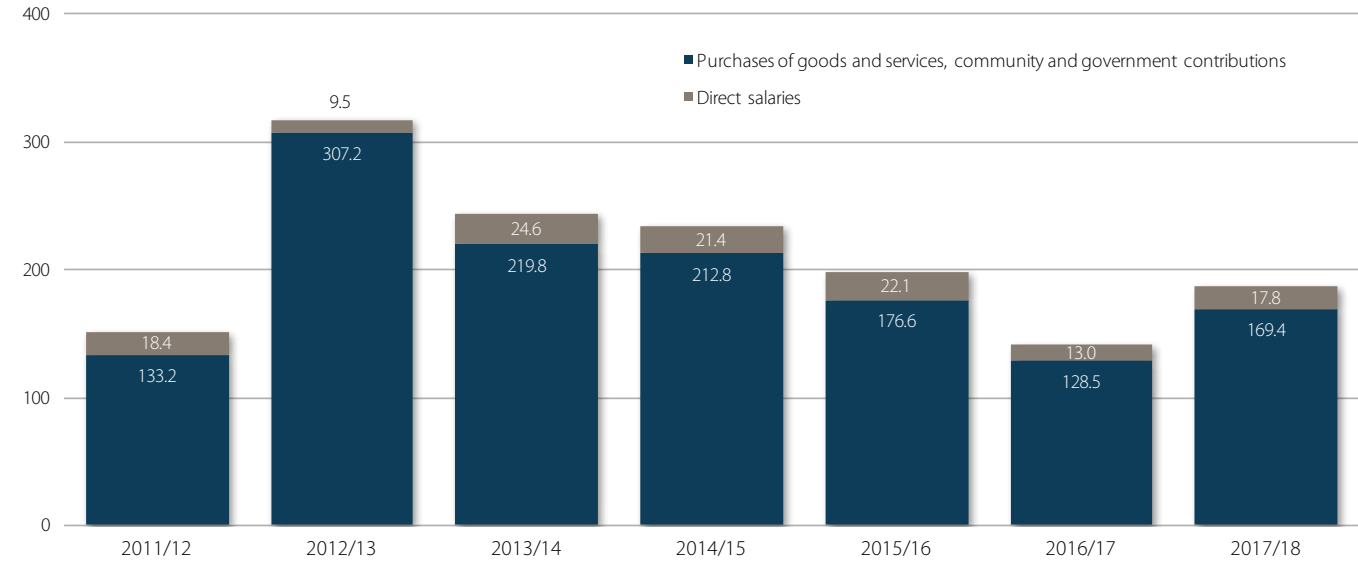


Over the period 2011/12 to 2017/18, the petroleum and gas sector in this region contributed:

- \$126.9 million in total wages and salaries to 144 average direct fulltime employees, with an average salary of \$126,236; and
- \$1.3 billion in purchases of goods and services from an annual average of 383 local businesses (including contractors), community contributions and local government payments.

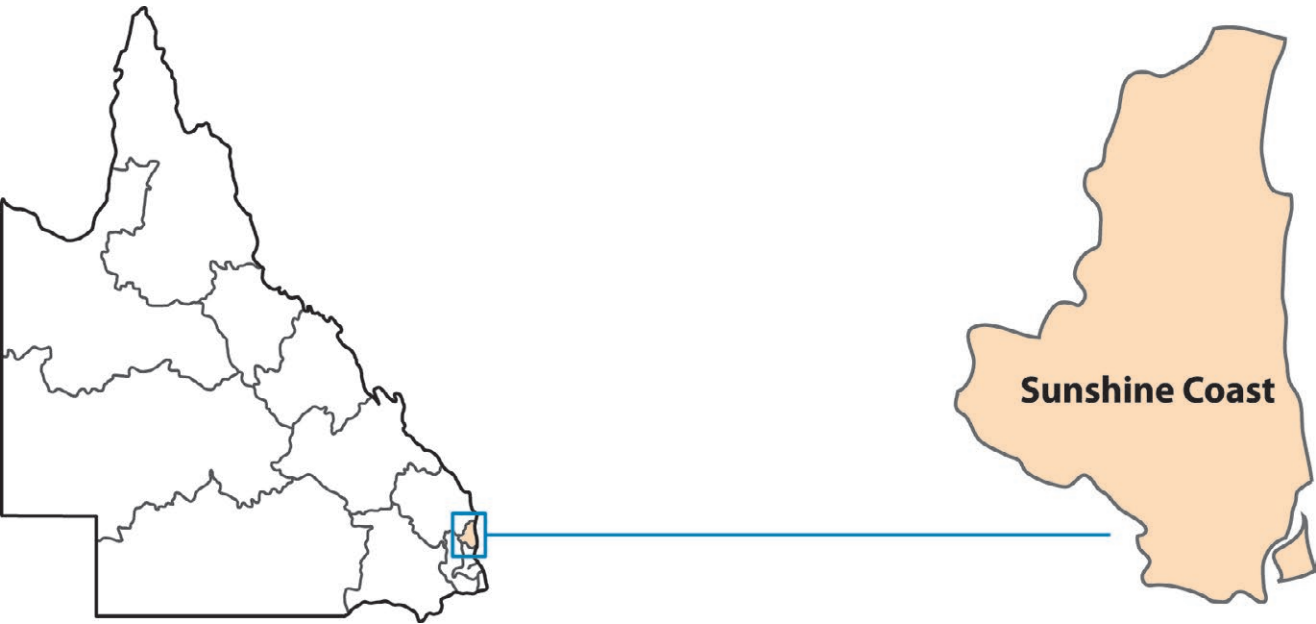
Direct Expenditure of Qld Petroleum & Gas Sector

South West (\$ million), 2011/12-2017/18





Sunshine Coast



Over the period 2011/12 to 2017/18, the petroleum and gas sector in this region contributed:

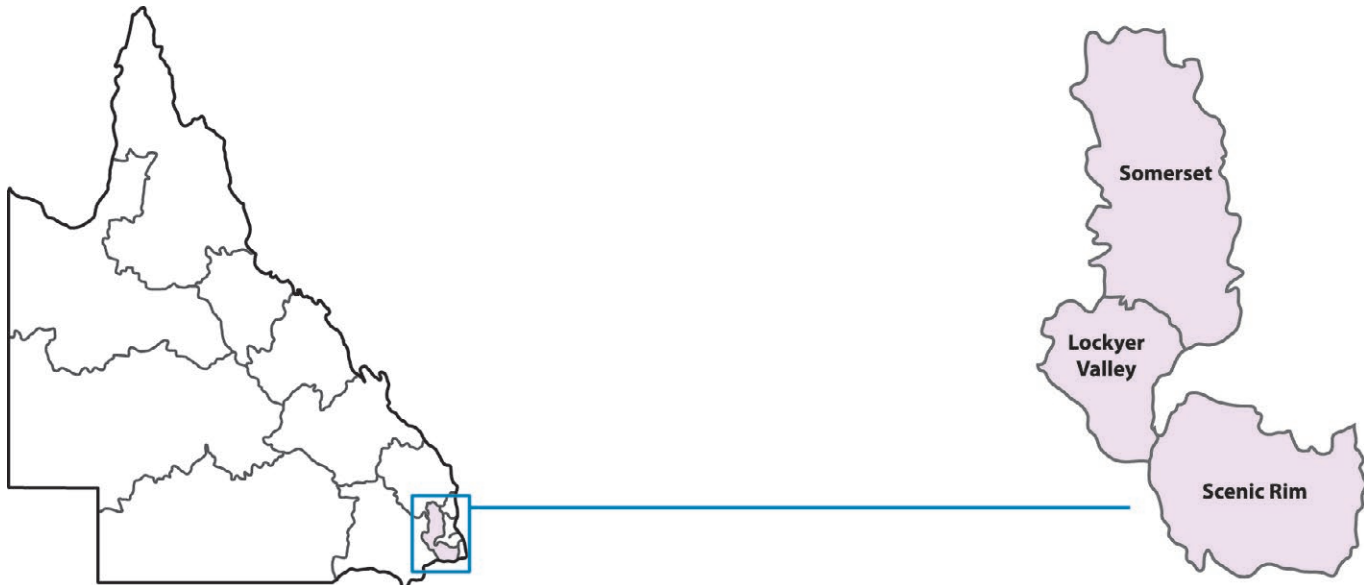
- \$191.0 million in total wages and salaries to 179 average direct fulltime employees, with an average salary of \$152,220; and
- \$430.2 million in purchases of goods and services from an annual average of 55 local businesses (including contractors), community contributions and local government payments.

Direct Expenditure of Qld Petroleum & Gas Sector

Sunshine Coast (\$ million), 2011/12-2017/18



West Moreton

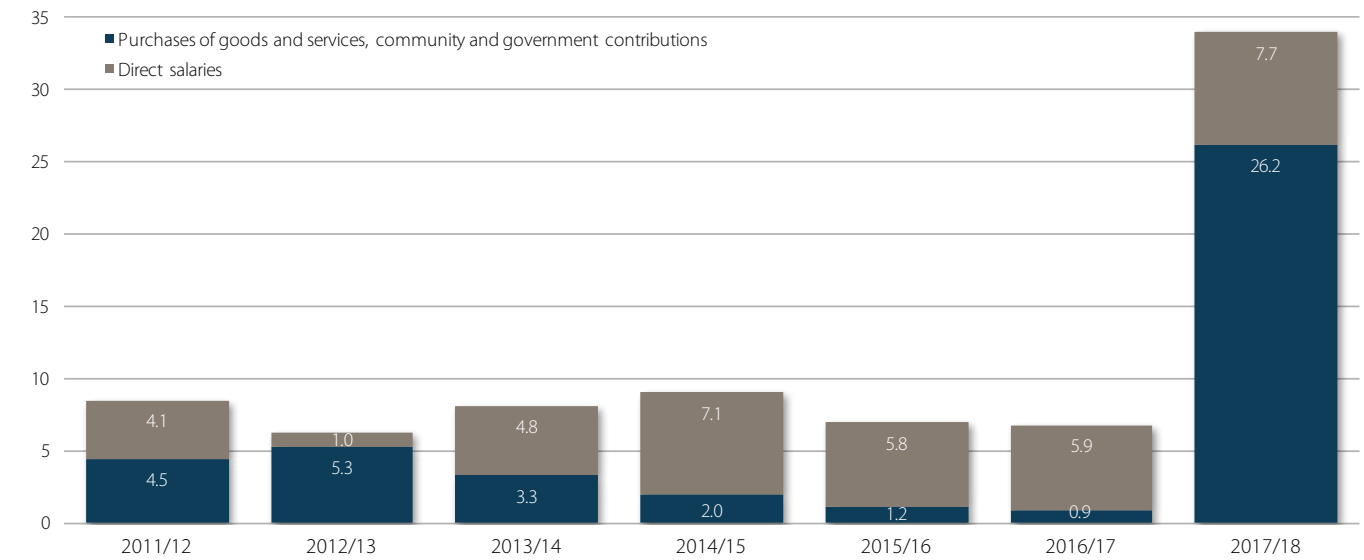


Over the period 2011/12 to 2017/18, the petroleum and gas sector in this region contributed:

- \$36.4 million in total wages and salaries to 35 average direct fulltime employees, with an average salary of \$147,114; and
- \$43.4 million in purchases of goods and services from local businesses (including contractors), community contributions and local government payments.

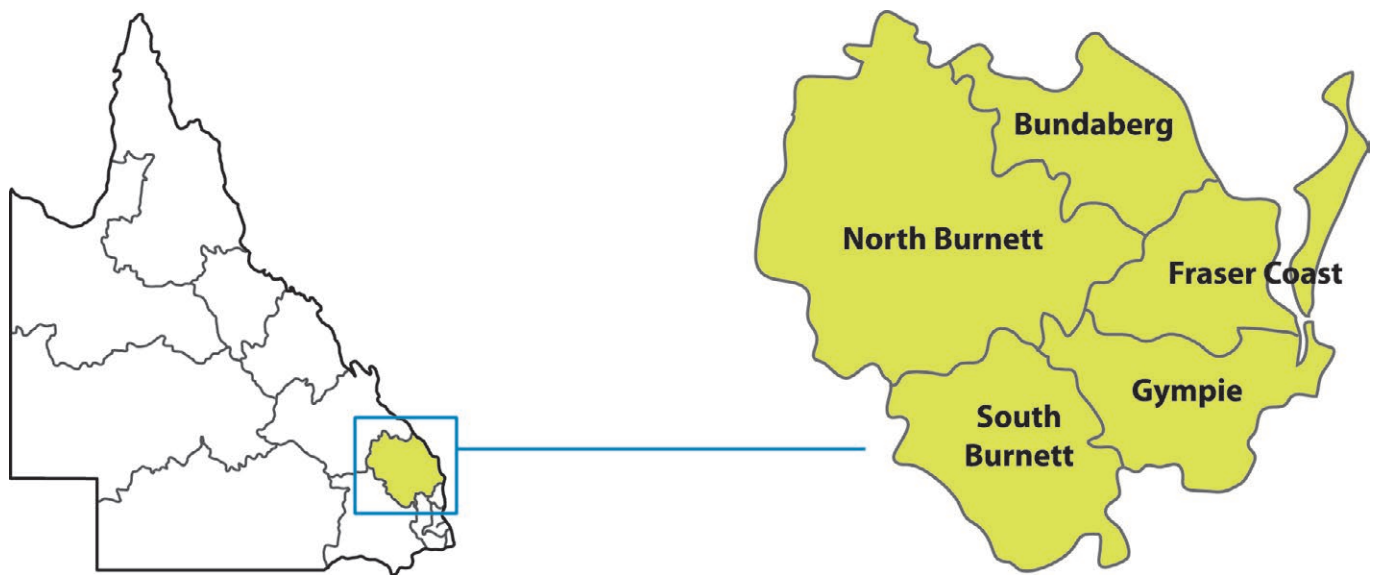
Direct Expenditure of Qld Petroleum & Gas Sector

West Moreton (\$ million), 2011/12-2017/18





Wide Bay-Burnett

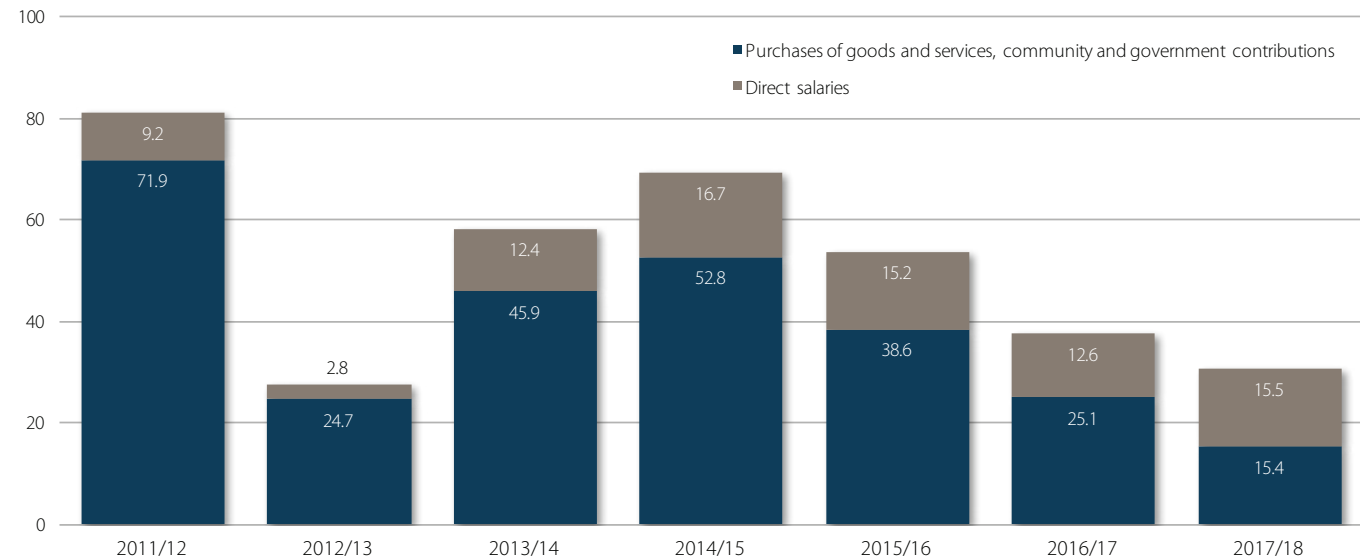


Over the period 2011/12 to 2017/18, the petroleum and gas sector in this region contributed:

- \$84.4 million in total wages and salaries to 81 average direct fulltime employees, with an average salary of \$148,305; and
- \$274.4 million in purchases of goods and services from an annual average of 38 local businesses (including contractors), community contributions and local government payments.

Direct Expenditure of Qld Petroleum & Gas Sector

Wide Bay-Burnett (\$ million), 2011/12-2017/18



CONCLUSION

This report identifies the direct impact of petroleum and gas sector companies by local and regional areas in Queensland between 2011/12 and 2017/18. The analysis identifies that Queensland petroleum and gas companies contributed approximately \$54.5 billion in direct spending to the state economy over the period 2011-18, comprised of:

- **\$4.9 billion in wages and salaries** to an average direct workforce (i.e. not including all contract workers who work on mine sites) of approximately **4,606 fulltime resident employees**, representing an average salary level across the sector of approximately \$150,617 per annum; and
- **\$49.7 billion** in purchases of goods and services from local businesses (including contract payments), community contributions and payments to local government (including rates, developer contributions and other payments) and state government (including royalties, stamp duty, payroll tax and land tax).

In addition, data collected in recent years as part of the expenditure survey indicates that the petroleum and gas sector made **\$322.2 million in total payments to local government** and **\$489.0 million in state government payments** over the past five years and supported an average of **3,304 local suppliers each year** over the last four years.

Expenditure from the petroleum and gas sector in Queensland has indirect impacts on the business environment in many areas, and generates substantial levels of production in the Brisbane, Fitzroy, Darling Downs and South West regions in particular.



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APPENDIX A: INDIRECT ECONOMIC IMPACTS

Methodology

Input-Output Modelling

For this study, input-output (I-O) modelling has been used to estimate the sum of direct, indirect and consumption-induced effects of the companies surveyed on different regions of Queensland. I-O techniques provide a solid approach for taking account of the inter-relationships between the various sectors of the economy in the short-term and hence are an appropriate tool for determining the direct, indirect and induced economic impact of economic stimuli.

The I-O technique was developed by Wassily Leontief in the 1930s to describe how impacts in one sector of an economy interacted with other sectors to generate economic changes, with matrix algebra used to perform the complex calculations. More advanced forms of I-O models are computable general equilibrium models, which are used for analysis of larger national economies, but are generally not as applicable for smaller areas. The standard I-O model approach is particularly useful for predicting the impacts of events or projects in an economy, or analysing local or regional level economies (Loveridge 2004).

Outside of the previous analyses of the impact of mining in Queensland on behalf of the Queensland Resources Council – and similar studies undertaken by Lawrence Consulting in New South Wales and Western Australia in recent years on behalf of both the New South Wales Minerals Council (NSWMC) and Chamber of Minerals and Energy of Western Australia (CMEWA) based on the same underlying methodology – there have been several studies applying input-output modelling techniques to analyse the contribution of resources industries to economic growth in different countries and regions. Previous modelling directly relevant to this study was carried out by ACIL Tasman in 2007, and reported by the State of Queensland (Department of Mines and Energy) (2007). In that report, the contribution of the mining and minerals processing sector to the Queensland economy, using 2004-05 data, was estimated with the use of I-O analysis and general equilibrium modelling. More recently, the Reserve Bank of Australia completed a study in 2013 that quantified the links from demand for Australia's natural resources to activity in other domestic industries using input-output tables (Rayner and Bishop, 2013).

Rubin and Solomon (1983) used economic base and regional multiplier analysis to estimate the impacts of coal liquefaction projects on 27 counties in Indiana and Kentucky in the United States. Stilwell et al. (2000) used the technique to estimate the contribution of the mining industry to South Africa over a 22-year period. Bangsund and Leistriz (2007) estimated the economic contribution of the petroleum industry to the state economy of North Dakota in the United States. Fannin et al. (2008) used community impact models to estimate the economic effects of oil and gas production from deepwater leases on growth on a regional area of Louisiana in the United States. Finally, Leaming (2010) estimated the economic impacts from the copper industry to the Arizona economy in 2009.

I-O models can be used to capture only the indirect impacts that occur through other industry sectors (Type I models), or the indirect plus the final consumption effects (Type II models), which have been adopted for the current study. Further, the I-O models used in this study were based on the ABS model of the Australian economy generated from general equilibrium models.

A concept underlying I-O modelling is that an initial economic shock or stimulus can have multiplier effects through a series of successive spending rounds. The size of the economic multiplier in a local or regional area can be summarised in the following way (Jensen and West 2002):

- The extent to which project operators purchase inputs from the local or regional economy. Examples of inputs include wages for labour supplied from the local or regional area, and purchases of goods and services. The more that a project operator sources from the local or regional economy, the more money that is directly injected into the economy; and



- The extent to which money spent in a local or regional economy is retained within that economy. If there is not much opportunity for people receiving income to spend it on goods and services in their local or regional area, then not as much money will be kept in the local or regional area. Larger and more diverse regional economies tend to be better at keeping expenditures in their economy and not 'losing' it to other regions.

To generate predictions, the economic contribution of an industry is applied to the relevant industry sectors of the input-output model of a regional economy. The stimulus from economic activity can be traced through the economy in several different ways:

- The first round effects, or direct effects, are those from the expenditure in purchasing goods and services from other industries;
- The second round effects are those from supplying industries increasing their purchases to meet the additional demand. The second and subsequent rounds of purchasing are termed the indirect effects; and
- The consumption-induced effects identify the increase in economic activity generated to service the additional employment (and population) created through the direct and indirect effects.

Key advantages of using input-output models are the fineness of detail available at a disaggregated industry level, the relative ease of application, particularly for sub-regional levels, and the ability to model effects in a timely manner (Loveridge 2004). However, care has to be taken in its application and interpretation of results. Key assumptions that underpin the application of I-O models are (Stilwell et al. 2000, Department of Mines and Energy 2007):

- The inputs purchased by each industry are a function of the level of output of that industry. The input function is generally assumed linear and homogenous of degree one (which implies constant returns to scale and no substitution between inputs);
- Each commodity (or group of commodities) is supplied by a single industry or sector of production. This implies that there is only one method used to produce each commodity and that each sector has only a single primary output;
- The total effect of carrying on several types of production is the sum of the separate effects. This rules out external economies and diseconomies and is known simply as the additivity assumption;
- The system is in equilibrium at given prices. This would not be the case in an economic system subject to external influences;
- In the static input-output model, there are no capacity constraints so that the supply of each good is perfectly elastic. Each industry can supply whatever quantity is demanded of it and there are no capital restrictions. This assumption would come into play depending upon the magnitude of the changes in quantities demanded, brought about through changes in taxation levels; and
- The input-output model is an optimisation model that allocates resources between sectors to their most efficient use.

Type II models involve additional assumptions about fixed relationships between income and consumption patterns. These factors mean that the results of I-O models should generally be treated as the upper bound of estimates, and that care has to be taken in interpreting the results of very large changes in demand or production.



Predictions from I-O models are summarised in terms of multipliers and changes in four key variables:

Output

The output impact measures the increase in gross sales throughout the whole economy by summing all the individual transactions resulting, directly and indirectly, from the economic stimulus.

Income

The income impact measures the additional amount of wages and salaries paid to employees of the industry under consideration and to other industries benefiting from the stimulus to the economy.

Employment

The employment impact measures the number of jobs created by the stimulus, both directly and indirectly.

Value Added

The value added or Gross Regional Product (GRP) impact measures only the net activity at each stage of production. GRP is defined as the addition of consumption, investment and government expenditure, plus exports of goods and services, minus imports of goods and services for a region. The GRP impacts are the preferred measure for the assessment and contribution of a stimulus to the economy.

I-O techniques provide a solid approach for taking account of the inter-relationships between the various sectors of the economy in the short-term – particularly at the small area and regional level – and hence are an appropriate tool for determining the direct, indirect and induced economic impacts of the Queensland petroleum and gas sector.

Construction of the Regional I-O Models

For the derivation of the regional I-O tables based on the historical Statistical Divisions (SDs) in Queensland, a variable interference non-survey technique was applied, involving a formalised non-survey method compilation. This allowed data on direct effects of the companies surveyed to be inserted at any stage of the compilation procedure. This approach is based primarily on the Generation of Regional Input-Output Tables (GRIT) technique as developed by Associate Professor Guy West and Professor Rod Jensen of the University of Queensland (Jensen *et.al.*, 1979), a widely used method of constructing local and regional input-output tables in Australia, America and Europe. The procedure utilises cross-industry location quotients (Flegg and Webber 2000) as well as superior data (including expenditure patterns of within the primary company data) for the regionalisation of the national direct requirements matrix (DRM) or at the elements of other final payments and demand, which are at the core of any I-O table.

In summary, the construction of the local and regional I-O models employed the following steps:

- Adjustment to the latest available national I-O table;
- Computation of the regional direct requirement matrix;
- Aggregation of regional sectors (if necessary); and
- Computation of the complete regional I-O table.

All the necessary data for the regionalisation procedure were collected from the Australian Bureau of Statistics as well as other reliable sources for secondary data such as regional household expenditure patterns, income and productivity measures. The latest available national I-O tables was 2015-16, which consisted of 114 sectors of economic activity, at the 4-digit level, compiled following the industry-technology assumption, product-by-product, with total flows and valued at basic values in current prices.



For estimating the regional I-O tables, and especially in the interpretation of results, relevant limitations of the I-O approach (static, linear production function, no substitution or scale economy effects, infinite elasticity of supply) were taken into consideration. Once the I-O models were generated, predictions of impact were estimated for each regional area of interest in Queensland using the available data on salary and business expenditure.

The predictions of the I-O models for each geographic level and area were estimated in two separate groups. The first group involved the economic impacts of expenditure on business goods and services (business suppliers), while the second involved economic expenditure of the labour force. Each stimulus group was modelled using expenditure coefficients and household consumption patterns applicable for each region, also taking into account the type of commodity (e.g. coal, gas, metals, etc.) and the nature of the expenditure (i.e. operating or capital expenditure). The outputs of the models can be classified into first round and indirect effects, representing industry impacts through the business chain, and final consumption effects, which represent the economic activity needed to support the increased workforce from direct, first round and indirect effects.

The data collection and the methodology applied in this study are notable in three key aspects:

- First, the data collected on actual spending by the minerals and energy sector allowed an assessment of impacts by spending in the economy in comparison to the more traditional approach of predicting economic impacts from total revenue changes;
- Second, the collection of primary data by local area allowed a much more accurate assessment of the direct impacts by geographic area than had previously been available; and
- Third, the application of the I-O modelling framework down to the LGA, SED and CED levels, when combined with the accuracy of the primary data, meant that relatively accurate models of local impacts from the Queensland minerals and energy sector could be generated.

The outcomes of the data collection and modelling approach meant that the assessment of direct, indirect and consumption effects could be expected to be more detailed and accurate at the LGA, SED and CED levels than could be achieved with standard applications of general equilibrium models.



Indirect and Total Impact

The I-O modelling conducted for this project has estimated the indirect (Type I) and consumption-induced (Type II) effects over the period 2011/12 to 2017/18 flowing from the total business expenditure, community and government contributions of \$49.7 billion and the employment expenditure of \$4.9 billion. These impacts have been modelled separately and then aggregated to identify the level of impacts on output, incomes, employment and industry value added in Queensland. Over the past seven years, the \$54.5 billion in direct spending by the petroleum and gas sector in Queensland supported additional supply chain and consumption-induced effects of an **78,209 average fulltime jobs** and **\$115.0 billion in aggregate spending** (\$41.6 billion in wages and salaries and \$73.4 billion in purchases of goods and services).

Table A1: Economic Impact of Queensland Petroleum & Gas Sector, 2011-18

	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18	Total
Value Added (\$M)								
Direct	4,640	11,751	13,339	10,603	6,170	4,157	3,870	54,530
% of GSP	1.5%	3.7%	4.2%	3.4%	2.0%	1.3%	1.1%	2.2%
Indirect	3,276	8,604	9,700	7,723	4,354	3,133	2,849	39,640
Total value added (Type I)	7,916	20,355	23,039	18,326	10,524	7,290	6,719	94,169
% of GSP	2.5%	6.4%	7.3%	5.8%	3.3%	2.3%	1.9%	3.9%
Consumption-induced	1,959	4,952	5,572	4,468	2,303	1,798	1,636	22,690
Total value added (Type II)	9,875	25,307	28,611	22,794	12,827	9,089	8,356	116,859
% of GSP	3.1%	8.0%	9.0%	7.2%	4.1%	2.9%	2.4%	4.8%

Employment (FTEs)								
Direct	5,220	2,628	6,109	5,268	4,727	4,156	4,137	4,606
% of state employment	0.2%	0.1%	0.3%	0.2%	0.2%	0.2%	0.2%	0.2%
Indirect	27,103	66,873	75,128	57,917	34,832	23,042	21,209	43,729
Total employment (Type I)	32,324	69,500	81,237	63,185	39,559	27,198	25,346	48,336
% of state employment	1.4%	3.0%	3.5%	2.7%	1.7%	1.2%	1.0%	2.0%
Consumption-induced	15,808	43,814	49,886	41,378	25,750	17,109	15,370	29,873
Total employment (Type II)	48,132	113,314	131,122	104,563	65,309	44,307	40,716	78,209
% of state employment	2.1%	4.8%	5.6%	4.5%	2.8%	1.9%	1.7%	3.2%

Business spend (incl. community contributions and govt payments) (\$M)								
Direct	3,988	11,391	12,549	9,648	5,425	3,523	3,149	49,673
Indirect	2,376	6,273	7,045	5,626	3,420	2,262	2,036	29,039
Total business spend (Type I)	6,364	17,664	19,594	15,274	8,845	5,785	5,185	78,712
Consumption-induced	3,818	9,664	10,872	8,731	4,623	3,509	3,187	44,403
Total business spend (Type II)	10,182	27,328	30,466	24,005	13,468	9,294	8,372	123,115

Wages & salaries (\$M)								
Direct	653	360	790	954	745	635	721	4,857
Indirect	2,531	6,265	6,969	5,329	2,251	2,017	1,852	27,215
Total wages & salaries (Type I)	3,184	6,625	7,759	6,283	2,996	2,651	2,573	32,071
Consumption-induced	1,094	3,078	3,510	2,965	1,366	1,226	1,097	14,336
Total wages & salaries (Type II)	4,278	9,704	11,268	9,249	4,362	3,877	3,670	46,407

Note: Consumption-induced impacts, i.e. the increase in economic activity generated to service the additional employment generated or sustained through the direct and indirect effects, are included in Type II impacts, but are excluded from Type I impacts.

The results of the I-O modelling allow forecasts to be made about the total size of impacts from the Queensland petroleum and gas sector on the economy. For each key measure, the total impact on the economy is the sum of the direct effects from industry, the indirect effects through the business chain, and the final consumption-induced effects. The total economic impact (i.e. direct, indirect and induced, or Type II impact) from the petroleum and gas sector to the Queensland economy over the period 2011/12 to 2017/18 amounted to:



- \$128.0 billion in output/turnover (or purchases from supplying businesses);
- \$116.9 billion in value added (contribution to gross state product);
- \$46.4 billion in income (wages and salaries); and
- An average of 78,209 full-time equivalent jobs.

Estimates of the contribution to Gross State Product (GSP) require an estimate of the initial contribution of the industry in terms of direct value added – defined as compensation of employees plus gross operating surplus plus other taxes less subsidies on production – plus the value added effects generated through the business chain and consumption effects. A precise measure of direct value added for the petroleum and gas sector is not available from the data; an estimated value added of \$54.5 billion – equivalent to the sum of input and labour costs, or total direct spending – has instead been adopted.

When business supply and employment effects are considered, the **Queensland petroleum and gas sector generated approximately \$116.9 billion in value added** (\$54.5 billion in direct effects, and \$62.3 billion in supply chain and consumption effects) between 2011/12 and 2017/18, and was **responsible for supporting an average of approximately 78,209 jobs** (4,606 in direct employment and 73,603 in additional employment). Consequently, the petroleum and gas sector **contributed an average of 4.8% of Gross State Product** (based on the figure of \$349.0 billion in 2017/18) **and 3.2% of total employment** (based on the figure of 2,431,584 persons) in Queensland over the past seven years. Under the more conservative Type I scenario (i.e. excluding consumption-induced effects), direct spending by the petroleum and gas sector companies surveyed and flow-on impacts contributed an average of 3.9% to GSP and 2.0% of total state employment.

Regional Impact

The economic modelling conducted for this project has estimated the indirect and consumption-induced effects flowing from the two key direct impacts on the economy, i.e. those generated by business supply chain expenditure in each region and those generated by consumption-induced spending in each region. These impacts have been modelled separately and then aggregated to identify the level of impacts on output, incomes, employment and industry value added for each region.

Table A2: Type II Indirect and Consumption-Induced Impacts of Qld Petroleum & Gas Sector by Region, 2011-18				
Region	Indirect full-time employees (FTEs)	Associated salaries (\$M)	Supply of goods and services (\$M)	Total indirect value added (\$M)
Brisbane	42,690	24,198.1	44,408.3	36,846.5
Central West	61	27.2	51.6	44.8
Darling Downs	9,678	4,566.7	7,541.5	7,412.1
Far North	118	48.7	84.6	84.0
Fitzroy	15,204	9,555.6	15,869.4	13,127.9
Gold Coast	1,131	644.1	1,172.5	974.2
Mackay	939	571.3	811.3	651.0
North West	<10	2.1	3.6	3.6
Northern	70	28.5	50.2	49.7
South West	1,835	855.0	1,426.4	1,404.9
Sunshine Coast	809	455.6	828.4	687.9
West Moreton	98	54.1	99.2	82.2
Wide Bay-Burnett	473	264.3	486.7	403.5
Undefined	492	279.2	608.2	556.6
Total Queensland	73,603	41,550.6	73,441.9	62,329.1



Total Petroleum & Gas Sector Value Added by Region

Queensland (\$ million), 2011/12-2017/18

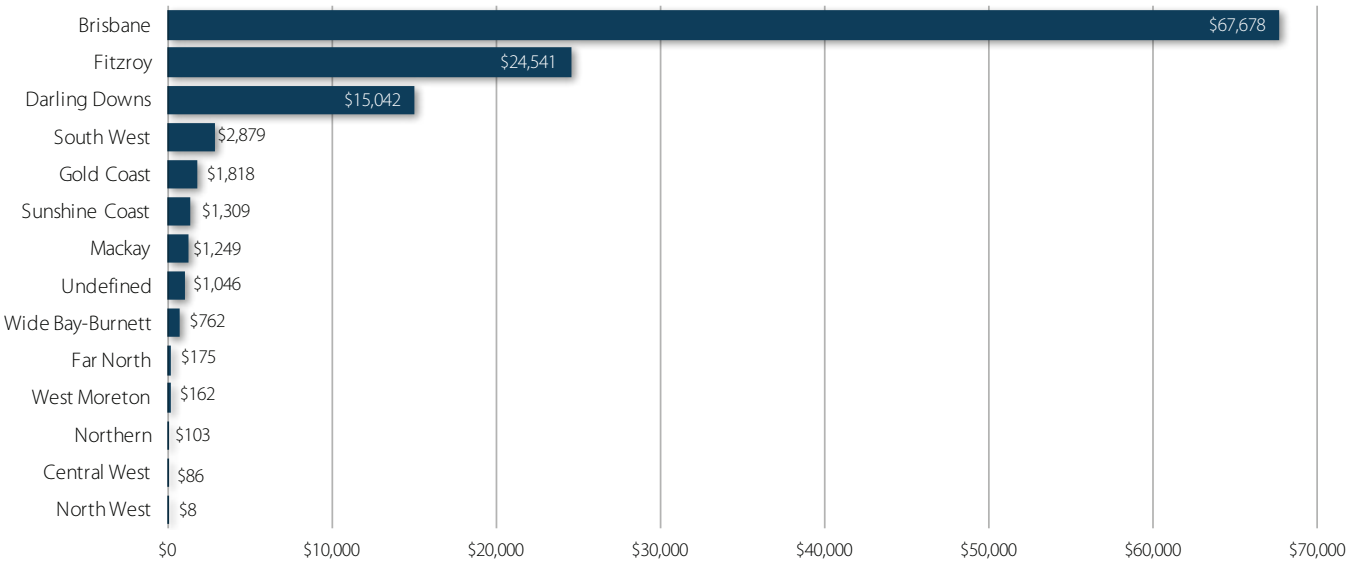


Table A3 shows that the petroleum and gas sector has the highest overall impact in the Brisbane region, with total value added of \$67.7 billion over the period 2011/12 to 2017/18, whilst the sector contributed an average of 5.9% per annum to gross regional product, based on GRP estimates for 2017/18. The impact in Brisbane was significantly higher than that of other resource-based regional economies, namely the Fitzroy region (\$24.5 billion in total value added) and Darling Downs (\$15.0 billion). The South West region had the highest average annual share of GRP contributed by the petroleum and gas sector (21.0%), followed by the Fitzroy (17.0%) and Darling Downs (12.8%) regions.

Table A3: Total Estimated Impact of Qld Petroleum Sector by Region, 2011-18 (Type II Impact)				
Region	Total estimated value added (\$M)	Total value added as % of GRP	Avg. direct and indirect and induced employees (FTEs)	% of total employment
Brisbane	67,678.1	5.9%	45,590	3.8%
Central West	86.5	1.7%	63	1.2%
Darling Downs	15,041.5	12.8%	10,229	8.7%
Far North	175.1	0.1%	134	0.1%
Fitzroy	24,541.2	17.0%	15,600	14.5%
Gold Coast	1,817.8	0.7%	1,258	0.4%
Mackay	1,249.0	0.7%	1,093	1.1%
North West	7.7	0.0%	<10	0.0%
Northern	103.3	0.1%	90	0.1%
South West	2,879.4	21.0%	1,978	15.4%
Sunshine Coast	1,309.1	1.0%	988	0.6%
West Moreton	162.0	0.5%	133	0.3%
Wide Bay-Burnett	762.3	0.8%	554	0.5%
Total Queensland	116,858.6	4.8%	78,209	3.2%

With regard to employment, the petroleum and gas sector again had the greatest impact on jobs in the Brisbane region, supporting an annual average of 45,590 FTEs, or 3.8% of the total regional workforce, followed by the Fitzroy (15,600 FTEs, or 14.5%) and Darling Downs (10,29 FTEs, or 8.7%) regions.



Average Annual Petroleum & Gas Sector Employment Supported by Region

Queensland (FTEs), 2011/12-2017/18

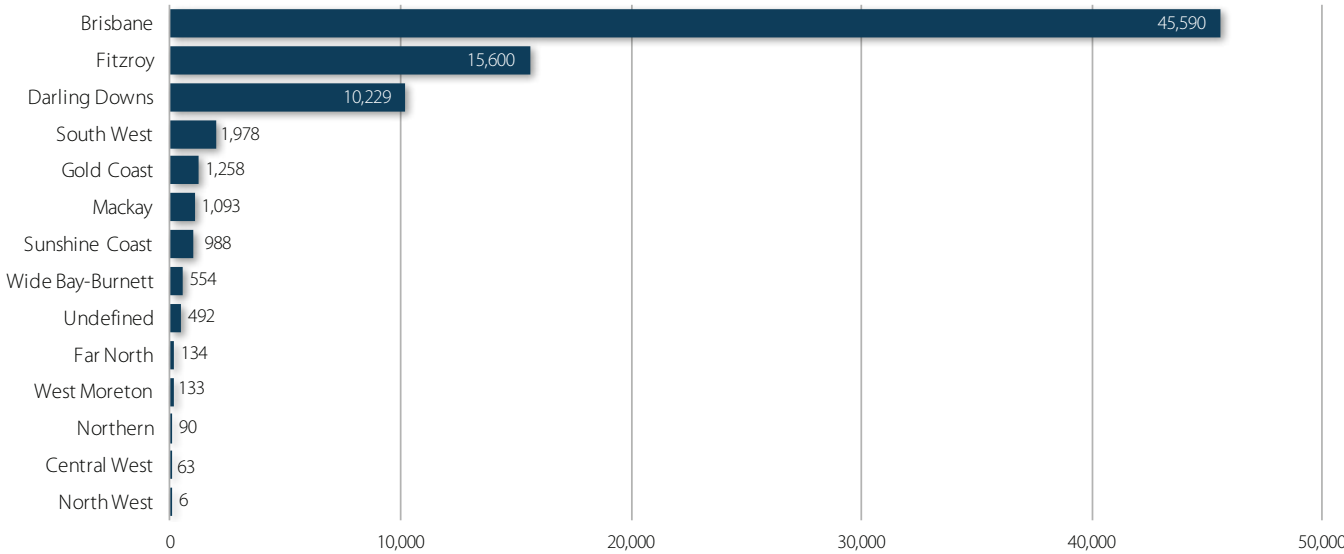
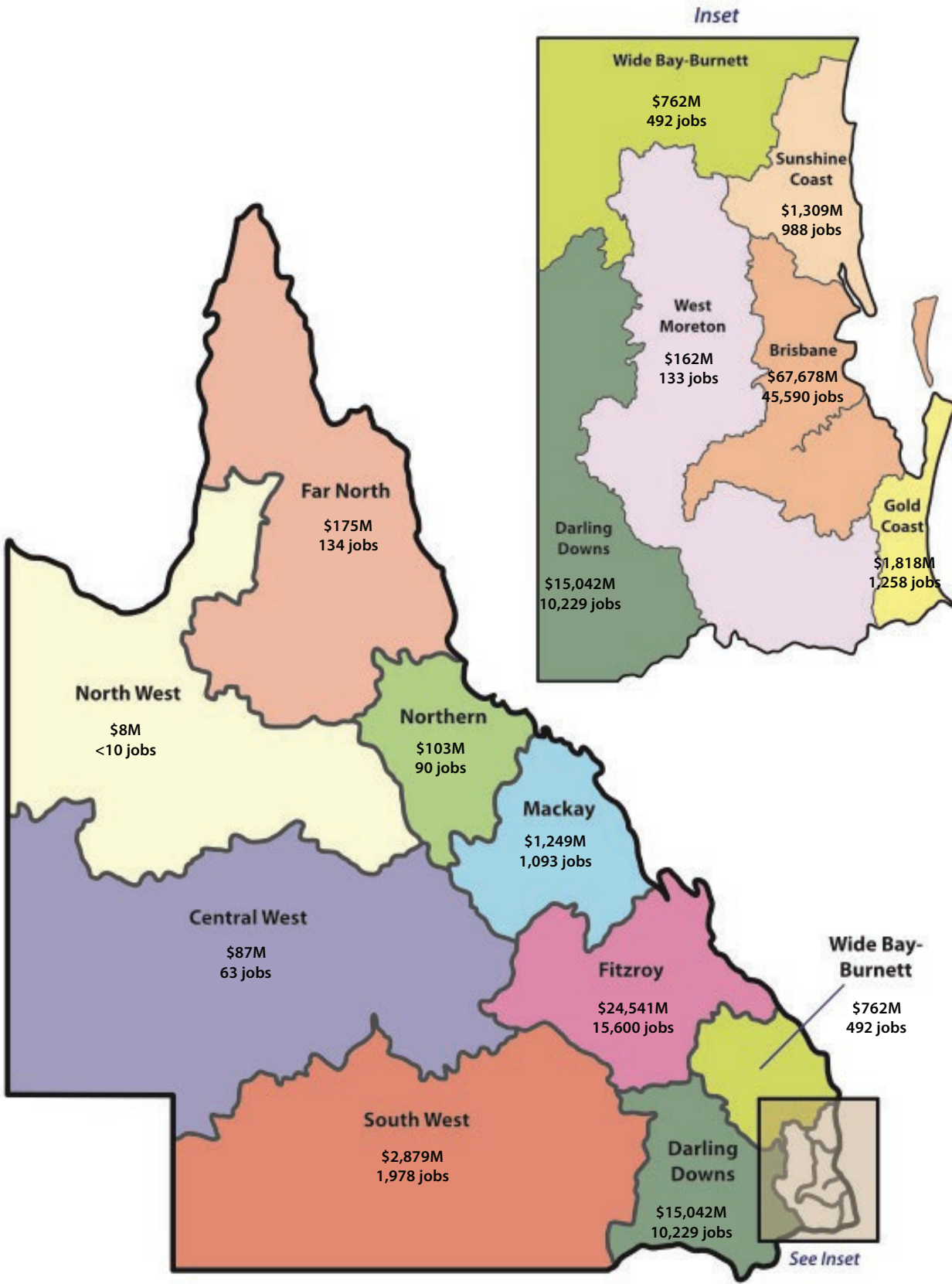


Figure A1: Total Sector-Induced Value Added and Average Employment by Region, 2011-18





APPENDIX B: ECONOMIC IMPACTS BY LGA

Table B1: Estimated Total Economic Impacts of QLD Petroleum & Gas Sector by LGA, 2011-18^(a)

Local government area	Direct impact			Total impact (Type II)			
	Average residing employees (FTEs)	Associated salaries (\$M)	Business purchases, community and local govt payments (\$M)	Total direct spending (\$M)	No. of businesses directly supported (avg.) ^(b)	Value added (\$M)	Average total employees (FTEs)
Balonne	<10	3.8	0.2	4.0	<10	6.0	<10
Banana	16	15.4	159.5	175.0	144	365.8	246
Brisbane	2,371	2,593.7	25,997.5	28,591.2	1,541	62,338.3	41,389
Bulloo	<10	0.1	17.8	17.8	<10	35.3	23
Bundaberg	21	22.3	33.2	55.4	13	113.7	90
Cairns	10	9.2	72.4	81.7	<10	157.1	116
Central Highlands	<10	3.3	0.0	3.3	<10	5.7	<10
Fraser Coast	<10	4.2	68.9	73.1	22	154.0	101
Gladstone	18	19.5	24.8	44.3	<10	90.0	73
Gold Coast	356	418.7	10,443.9	10,862.6	190	23,405.5	14,870
Goondiwindi	128	131.0	712.6	843.6	74	1,817.8	1,258
Gympie	<10	6.2	0.8	7.0	<10	12.3	14
Ipswich	21	23.2	148.9	172.1	<10	367.2	249
Isaac	75	71.2	229.7	300.9	33	639.1	472
Livingstone	128	109.3	61.1	170.4	12	299.5	311
Lockyer Valley	<10	5.6	17.8	23.5	12	48.7	37
Logan	13	13.9	8.9	22.8	<10	44.0	39
Longreach	85	80.3	268.6	348.9	67	743.5	546
Mackay	<10	0.8	38.3	39.1	<10	81.0	58
Maranoa	20	17.0	404.0	420.9	20	903.9	724
Mareeba	113	98.0	1,147.3	1,245.3	283	2,410.0	1,599
Moreton Bay	22	21.4	177.6	199.0	96	369.3	295
Murweh	269	283.4	1,026.0	1,309.4	77	2,791.4	2,003
Noosa	<10	1.9	5.5	7.4	<10	13.7	10
North Burnett	21	24.0	30.9	54.9	<10	113.3	91
Redland	<10	1.1	32.0	33.0	<10	72.5	46
Rockhampton	99	118.9	162.4	281.3	43	581.6	456
Scenic Rim	12	9.6	269.5	279.1	59	597.3	386
Somerset	13	13.6	27.9	41.5	<10	85.5	64
South Burnett	<10	8.9	6.7	15.6	<10	29.8	26
Southern Downs	19	18.2	34.5	52.7	<10	108.1	84
Sunshine Coast	12	11.0	44.0	55.0	<10	106.5	80
Tablelands	158	167.0	399.3	566.3	47	1,195.8	897
Toowoomba	109	105.9	4,190.2	4,296.1	139	8,472.7	5,570
Townsville	17	16.6	32.7	49.3	21	95.1	81
Western Downs	424	392.2	2,879.1	3,271.3	331	6,396.0	4,491
Whitsunday	<10	6.2	0.5	6.7	<10	12.6	14

Note: (a) Excludes LGAs with total direct spend of less than \$3 million. (b) Average over last four years, only for those companies that provided supplier details.



APPENDIX C: ECONOMIC IMPACTS BY SED

Table C1: Estimated Total Economic Impacts of QLD Petroleum & Gas Sector by SED, 2012-18

State electoral division	Direct impact			Total impact (Type II)			
	Average residing employees (FTEs)	Associated salaries (\$M)	Business purchases, community and local govt payments (\$M)	Total direct spending (\$M)	No. of businesses directly supported (avg.) ^(a)	Value added (\$M)	Average total employees (FTEs)
Algerier	27	23.4	116.4	139.9	37	302.0	248
Aspley	52	47.9	82.9	130.8	18	276.5	254
Bancroft	32	29.8	7.0	36.8	3	73.3	85
Barron River	4	3.8	11.4	15.3	2	29.3	27
Bonney	9	8.4	9.8	18.3	8	37.5	36
Broadwater	10	8.7	4.9	13.6	5	27.1	29
Buderim	26	22.8	47.4	70.1	8	147.0	133
Bulimba	165	181.7	716.6	898.3	60	1,930.5	1,579
Bundaberg	10	9.8	12.7	22.5	7	46.4	43
Bundamba	19	14.2	84.9	99.1	11	214.3	175
Burdekin	109	79.1	57.1	136.2	14	263.0	314
Burleigh	15	13.9	202.4	216.3	7	472.6	359
Burnett	14	12.1	9.6	21.7	7	44.3	46
Cairns	4	2.8	46.3	49.1	5	94.3	78
Callide	257	224.7	1,873.2	2,097.9	379	4,566.3	3,560
Caloundra	32	29.0	8.2	37.1	4	72.4	84
Capalaba	33	35.9	106.2	142.1	22	304.7	255
Chatsworth	81	78.9	91.6	170.5	18	354.9	341
Clayfield	121	121.7	2,979.4	3,101.1	109	6,802.8	5,083
Condamine	37	32.2	469.2	501.4	29	987.2	781
Cook	2	1.9	1.8	3.7	1	7.1	8
Coomera	16	12.9	69.6	82.5	11	177.2	145
Cooper	181	213.2	2,071.3	2,284.5	61	4,986.7	3,811
Currumbin	15	13.1	170.9	184.0	4	401.7	308
Everton	68	68.5	75.9	144.4	13	300.6	288
Ferny Grove	77	76.3	18.9	95.2	9	189.8	216
Gaven	8	7.6	7.7	15.4	5	31.3	31
Gladstone	344	352.8	6,009.2	6,362.0	167	13,701.6	10,288
Glass House	28	24.1	29.5	53.6	2	109.9	107
Greenslopes	84	77.3	48.5	125.8	14	257.1	272
Gregory	6	4.1	85.7	89.8	22	181.7	151
Gympie	22	21.5	153.7	175.2	8	377.6	299
Hervey Bay	9	9.5	5.7	15.2	2	30.4	31
Hill	4	4.4	0.3	4.7	2	8.9	12
Hinchinbrook	4	3.9	2.2	6.1	2	11.7	14
Inala	29	23.4	463.7	487.1	20	1,068.6	808
Ipswich	14	11.5	24.3	35.8	5	75.9	70
Ipswich West	18	15.7	22.8	38.5	5	80.8	78
Jordan	33	27.4	87.8	115.2	13	246.4	213
Kawana	26	25.9	43.2	69.1	11	144.1	130
Keppel	8	6.7	60.1	66.8	18	140.6	113
Kurwongbah	30	25.4	112.4	137.9	19	297.3	247
Lockyer	18	16.4	8.0	24.4	9	48.4	53
Logan	14	11.8	14.9	26.7	8	55.7	55
Lytton	48	49.2	144.1	193.3	33	412.1	349

**Table C1: Estimated Total Economic Impacts of QLD Petroleum & Gas Sector by SED, 2012-18**

State electoral division	Direct impact					Total impact (Type II)	
	Average residing employees (FTEs)	Associated salaries (\$M)	Business purchases, community and local govt payments (\$M)	Total direct spending (\$M)	No. of businesses directly supported (avg.) ^(a)	Value added (\$M)	Average total employees (FTEs)
Macalister	12	8.9	41.9	50.8	15	109.9	92
Mackay	12	8.3	251.3	259.6	12	557.7	519
Maiwar	166	178.6	627.9	806.4	46	1,731.1	1,429
Mansfield	49	44.0	28.0	72.0	12	147.2	158
Maroochydore	19	16.5	116.5	133.1	10	288.7	228
Maryborough	9	7.3	4.6	11.9	5	23.8	25
McConnel	540	457.6	14,417.2	14,874.8	824	32,691.8	24,451
Mermaid Beach	12	11.0	23.6	34.6	5	72.9	65
Miller	82	79.1	266.7	345.8	19	741.0	623
Mirani	7	5.3	62.6	67.8	11	145.1	138
Moggill	112	133.9	32.3	166.2	8	331.2	354
Morayfield	12	10.8	154.5	165.3	4	359.0	276
Mount Ommaney	86	96.2	478.9	575.1	50	1,243.3	993
Mudgeeraba	13	12.1	90.4	102.6	8	222.1	175
Mulgrave	4	2.4	0.9	3.2	0	6.3	9
Mundingburra	3	2.2	6.1	8.4	7	16.1	16
Murrumba	30	23.8	0.8	24.6	2	47.9	65
Nanango	27	21.4	16.4	37.8	7	73.4	83
Nicklin	22	20.8	30.2	51.0	5	105.9	99
Ninderry	28	26.7	114.6	141.3	10	303.6	248
Noosa	21	20.0	30.0	50.0	6	103.9	95
Nudgee	70	57.9	957.6	1,015.5	47	2,204.5	1,691
Oodgeroo	36	39.7	37.7	77.4	16	159.9	152
Pine Rivers	49	50.8	528.4	579.2	33	1,265.2	971
Pumicestone	21	17.7	91.7	109.4	2	234.9	193
Redcliffe	31	25.9	17.5	43.5	5	89.1	96
Redlands	27	27.1	3.7	30.8	3	60.7	71
Rockhampton	8	5.4	200.4	205.8	48	441.2	330
Sandgate	50	43.7	20.8	64.5	3	130.9	146
Scenic Rim	16	15.6	27.9	43.5	5	91.0	82
South Brisbane	130	123.9	2,980.2	3,104.1	64	6,822.6	5,095
Southern Downs	19	15.1	56.0	71.1	11	139.6	125
Southport	9	8.2	11.3	19.5	8	40.4	38
Springwood	33	29.4	64.0	93.4	12	198.5	179
Stafford	82	76.4	44.4	120.8	16	246.2	262
Stretton	33	29.9	317.9	347.8	9	756.2	587
Surfers Paradise	9	8.5	10.4	18.9	2	39.0	37
Theodore	14	12.8	15.9	28.8	10	59.1	57
Thuringowa	6	5.2	1.2	6.4	1	12.3	16
Toohey	33	27.7	571.8	599.5	62	1,313.4	994
Toowoomba North	32	28.1	1,407.9	1,436.0	47	2,830.9	2,162
Toowoomba South	25	20.0	1,901.9	1,921.9	60	3,789.9	2,875
Townsville	6	4.6	20.6	25.3	11	48.8	44
Traeger	3	1.7	2.6	4.3	3	8.0	9
Warrego	302	230.5	2,908.2	3,138.7	507	6,141.6	4,872
Waterford	15	12.4	71.5	83.9	21	181.8	148
Whitsunday	10	9.0	86.4	95.4	6	204.2	196
Woodridge	8	5.4	60.2	65.6	10	143.1	113

Note: (a) Average over last four years, only for those companies that provided supplier details.



APPENDIX D: ECONOMIC IMPACTS BY CED

Table D1: Estimated Total Economic Impacts of QLD Petroleum & Gas Sector by CED, 2012-18

Commonwealth electoral division	Direct impact					Total impact (Type II)	
	Average residing employees (FTEs)	Associated salaries (\$M)	Business purchases, community and local govt payments (\$M)	Total direct spending (\$M)	No. of businesses directly supported (avg.) ^(a)	Value added (\$M)	Average total employees (FTEs)
Blair	48	39.1	81.9	121.0	16	256.3	235
Bonner	176	169.2	547.1	716.4	77	1,532.0	1,297
Bowman	100	107.6	156.9	264.5	42	555.3	504
Brisbane	859	801.7	16,203.7	17,005.4	950	37,285.5	28,127
Capricornia	124	89.3	353.8	443.0	71	939.1	962
Dawson	27	21.7	353.5	375.2	22	725.8	593
Dickson	142	139.1	669.6	808.7	49	1,748.6	1,416
Fadden	36	31.6	62.9	94.4	27	199.5	181
Fairfax	78	70.7	285.6	356.3	29	768.7	638
Fisher	88	81.3	68.4	149.7	18	308.8	313
Flynn	426	428.1	8,715.1	9,143.1	385	19,699.2	14,717
Forde	45	36.4	112.5	148.9	36	318.9	277
Griffith	390	393.5	3,527.5	3,921.1	127	8,552.2	6,622
Groom	89	76.5	3,999.9	4,076.4	135	8,039.0	6,136
Herbert	17	14.3	27.7	42.0	17	81.0	81
Hinkler	29	28.5	26.2	54.7	14	113.3	112
Kennedy	10	8.2	5.2	13.4	7	25.8	31
Leichhardt	12	9.9	58.5	68.4	8	131.4	116
Lilley	193	167.2	1,607.0	1,774.2	123	3,843.7	3,014
Longman	64	52.9	300.2	353.1	20	759.7	621
Maranoa	535	427.2	4,006.2	4,433.4	727	8,736.6	7,090
McPherson	45	41.3	490.1	531.4	20	1,161.4	893
Moncrieff	30	27.0	25.0	52.0	16	107.7	109
Moreton	165	165.3	1,275.1	1,440.5	116	3,128.7	2,453
Oxley	126	114.8	1,033.3	1,148.1	91	2,501.6	1,951
Petrie	114	101.8	62.2	164.0	16	335.2	359
Rankin	72	58.4	179.9	238.3	36	510.3	445
Ryan	363	405.3	705.0	1,110.3	63	2,341.6	2,073
Wide Bay	58	53.8	200.7	254.5	21	545.4	457
Wright	48	43.3	53.5	96.8	22	202.2	195

Note: (a) Average over last four years, only for those companies that provided supplier details.

