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*The economic impacts of unconventional gas in
Queensland and implications for Northern Territory
policy makers.*

Discussion paper

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Summary

The gas industry frequently claims that unconventional gas development has brought an economic and jobs boom to Queensland, and promises the same for the Northern Territory. Research into what has actually happened in Queensland paints a far less positive picture. Territorians should carefully examine industry claims about the economic and jobs impacts of unconventional gas development in the Northern Territory.

In contrast to the economic benefits initially promised by industry, recent gas industry-funded studies of the economic and social impacts of gas development in Queensland’s unconventional gas fields have found:

- Local business stakeholders reported a deterioration in:
 - Financial capital
 - Local infrastructure
 - Local skills
 - Social cohesion
 - The local environment
- Unconventional gas has affected community wellbeing:
 - Fewer than one in four local people approved of the unconventional gas industry, with less than 6% believing it would “lead to something better”. (See figures below)
- Unconventional gas creates few additional jobs:
 - Spillover jobs outside the gas industry were negligible. There were virtually no spillover jobs created in local retail or manufacturing.
 - Gas jobs will be reduced by 80% at the end of the construction period.
- For every 10 unconventional gas jobs created, eighteen agricultural jobs were lost.

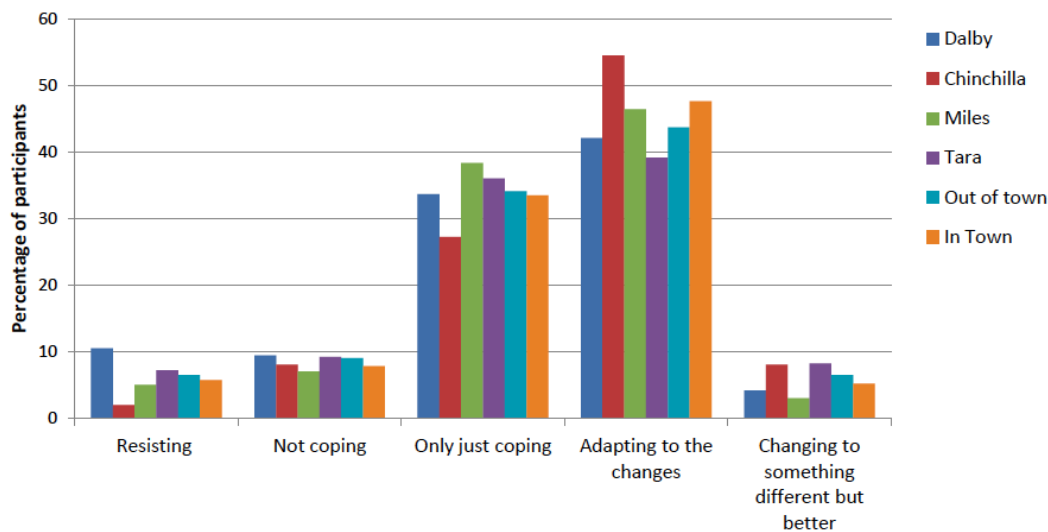
Figure 1: The impact of unconventional gas development on local businesses

How did local business stakeholders in Queensland’s Darling Downs perceive the impact of unconventional gas and mining on their region?

Source: CSRM University of Queensland

Financial capital	Worse
Infrastructure	Worse
Labour force skills	Worse
Social networks	Worse
Environment	Worse

Figure 2: Perceptions community responses to CSG development in the area: Percentages.



Source: Walton et al (2014) figure 19 p 21.

Benefits to the wider economy have also been less than anticipated. The industry emphasises the high *value* of the gas it exports, but that value largely flows to the gas companies rather than to the Australian community. As the Reserve Bank of Australia concluded:

The effect on Australian living standards will be less noticeable than [the increase in gas production] given the low employment intensity of LNG production, the high level of foreign ownership of the LNG industry and, in the near term, the use of deductions on taxation payments.¹

At the same time, negative macro-economic impacts including exchange rate and interest rate increases and labour market impacts have displaced tourism, manufacturing and agricultural businesses and employment. The increase in domestic gas prices as a result of LNG exports linking Australia to global gas prices have caused very significant cost increases to Australian manufacturing.

¹ Cassidy and Kosev (2015) *Australia and the Global LNG Market*, RBA.

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Introduction

Unconventional gas development inevitably causes significant negative social and economic impacts. A recent University of Queensland report noted that with respect to the “rapid change with development of an extensive coal seam gas industry and some large open cut coal mines” in southeast Queensland:

The effects of these multiple industries on each other, on environmental assets, infrastructure and economic and social systems entail many risks. Infrastructure shortfalls, a twospeed economy, widening social divisions, threatened livelihoods and stress in the face of rapid and far-reaching change associated with a new industry are evident in the words of those experiencing the impacts that provide the data reported in the paper.²

When seeking development approval, oil and gas companies justify the environmental and social impacts of their projects on the grounds that the projects will provide employment and other economic benefits that will result in net benefit to the wider community.

The huge profits at stake encourage companies to exaggerate these benefits of their projects and downplay their negative effects. These claims of employment and other economic benefits are made during the formal approval processes, public relations activities, and lobbying of policy makers.

Exaggeration has become routine for many resource companies, often reaching comic proportions. Notoriously, Rio Tinto claimed the Warkworth coal mine expansion in NSW would create 44,000 additional jobs despite the expansion only requiring 130 additional workers.³ The NSW Land and Environment Court rejected the company’s claims and overturned the approval, a decision that was upheld by the Supreme Court of NSW.

² Everingham et al 2016 Energy from the foodbowl: Associated land-use conflicts, risks and wicked problems.

³ Martin P (April 2013) [Really Rio? The judge who put its claims about jobs to the test](http://www.petermartin.com.au/2013/04/really-rio-judge-who-asked-gentle.html) <http://www.petermartin.com.au/2013/04/really-rio-judge-who-asked-gentle.html> Accessed 17/8/16

Similarly, the proponents of the proposed Carmichael coal mine in Queensland's Galilee Basin claimed that the project would create 10,000 jobs. When challenged in court the company's own economic expert reduced this figure to 1,476 jobs.⁴

The main gas industry lobby group in Australia, the Australian Petroleum Production and Exploration Association (APPEA) recently claimed that shale gas development in the Northern Territory could result in a long-term employment boost of 6,300 full time positions in the NT and additional revenues to the NT Government of up to \$460 million a year.⁵

This claim is extraordinary because the employment number is more than twice the 3000 unconventional gas operational workforce employed in Queensland and more than twice the royalty projections of \$271 million for Queensland when the LNG trains are running at full capacity in 2020. Queensland is experiencing an unprecedented 1,500 PJ expansion gas development, equivalent to triple Australia's total domestic gas use, while the Northern territory is remote from export and domestic markets, has no proven shale gas reserves, and faces falling demand in Australian and overseas markets.

The APPEA claims are based on so called "Success" and "Aspirational" scenarios from a report APPEA commissioned from Deloitte Access Economics.⁶ The authors themselves have little faith in the reality of these claims, stating:

Both scenarios utilise assumptions from a 'high consumption' planning scenario developed by the Australian Energy Market Operator (AEMO). As such, they do not necessarily represent expected outcomes. Rather, they are intended to reflect economic benefits that may accrue if the underlying 'upper-bound' assumptions materialise.

AEMO describes the "high consumption" scenario as a "stretch scenario" designed to provide "outlying views" of the future. With even major gas exporters (including APPEA members) pointing to a global glut in LNG, domestic gas demand projections being repeatedly downgraded, and subdued global growth, these assumptions appear

⁴ Branco J (April 2015) Adani Carmichael mine to create 1464 jobs, not 10,000. Brisbane Times. <http://www.brisbanetimes.com.au/queensland/adani-carmichael-mine-to-create-1464-jobs-not-10000-20150427-1mumbg.html> Accessed 17/8/16

⁵ Robert M (January 2016) Gas is a great economic driver in the Northern Territory APPEA <http://www.appea.com.au/2016/01/gas-is-a-great-driver-of-financial-opportunity-in-the-northern-territory/> Accessed 17/8/16

⁶ APPEA 2015, Economic impact of shale and tight gas development in the NT

heroic. It is particularly surprising that the report did not even consider the more realistic medium or low growth scenarios.

The DAE/APPEA report is also based on completely unrealistic assumptions of extraction costs of Northern Territory unconventional gas. The report assumes gas can be attracted for \$2.61 GJ.⁷ This assumption is based on nothing except subtracting the processing and pipeline costs from the estimated break even costs.

In fact, shale gas extraction costs have been estimate by the Australian Council of Learned Academics (ACOLA), in the most detailed and credible assessment to date, at \$5–7 GJ.⁸

There can be serious consequences if policy makers accept industry claims uncritically.

Many of these projects have significant environmental and social impacts. When policy makers uncritically accept the economic claims of resource companies and industry lobby groups, it can override environment and social concerns. This can lead to serious negative impacts on the environment and local communities from projects that provide little benefit to the wider population.

The huge unconventional gas projects approved in Queensland in 2010 are a case in point. The economic claims of the proponents were not sufficiently scrutinised by the Queensland and Australian governments. Recent research examined in this paper clearly shows that few of the promised benefits have materialised. Existing businesses and industries have been badly affected. Long-term jobs in existing industries have been sacrificed for short-term gas construction jobs.

CSIRO surveys found that only 6% of local people living in gas field areas think that the industry has improved their lives – as many as are actively resisting it. As well as active resisters, a further 42% say that they are “not coping” or “only just coping” with the changes the industry has made to their lives.

Royalty payments to the people of Queensland are a small fraction of the estimates made when the projects were approved, with the Queensland Treasury admitting that these estimates were “overcooked”.

⁷ Deloitte Access Economics (2015) *Economic impact of shale and tight gas development in the NT*, technical appendices, https://www.appea.com.au/wp-content/uploads/2015/08/APPEA_Deloitte-NT_Unconv_gas_FINAL-140715.pdf

⁸ ACOLA (2013) *Engineering energy: Unconventional gas production*, <https://www.acola.org.au/PDF/SAF06FINAL/Final%20Report%20Engineering%20Energy%20June%202013.pdf>

Flow on economic activity has failed to materialise because companies have bypassed local industry and suppliers in favour of global supply chains. Local businesses invested in plant and equipment on the promise of gas field-related work only to be bypassed for global contractors. Local developers built entire suburbs to house workers and their families that now lie empty, with workers remaining in “temporary” workers camps.

The Northern Territory government has issued unconventional gas licenses for almost the entire territory. Speculative gas interests have a strong incentive to increase the value of their licenses by gaining environmental approvals and government promises to subsidise infrastructure.

Northern Territory policy makers can learn from the experience in Queensland. The economic claims of the unconventional gas industry must be subject to scrutiny and due diligence. Projects should only proceed if they provide a net benefit to the Northern Territory community, not just quick profits for gas companies.

1. The impacts of unconventional gas developments on local businesses

While some people and businesses benefit from unconventional gas development, many other businesses and industries can be negatively impacted and jobs in other sectors are often lost as a result.

The most advanced unconventional gas development in Australia is in Queensland's Darling Downs. The gas industry has often pointed to this region as an example of the economic benefits that unconventional gas provides local communities.⁹ The research tells a more complicated story.

The most detailed examination of the economic impacts of unconventional gas development in the Darling Downs is a study carried out between 2008 and 2013 by the resource industry-funded Sustainable Minerals Institute (SMI) at the University of Queensland.¹⁰

This study surveyed stakeholders from different sectors in the local community, including the local business community, agriculture, local government, advocacy groups and environmental consultants, as well as the mining and unconventional gas industries.

The survey asked stakeholders to assess the effect of unconventional gas and mining in the region over a five-year period on the following key indicators:

1. **Financial capital:** Available revenue streams and economic resources.
2. **Built capital:** The physical infrastructure such as buildings, transport and equipment.
3. **Social capital:** The degree to which people know each other and collaborate and the level of trust people have in local organisations and institutions.

⁹ Natural Coal Seam Gas, Regional Development, APPEA
<http://www.naturalcsg.com.au/benefits/regional-development/>

¹⁰ Everingham, J, Collins, N, Rodriguez, D, Cavaye, J, Vink, S, Rifkin, W & Baumgartl, T (2013) *Energy resources from the food bowl: an uneasy co-existence. Identifying and managing cumulative impacts of mining and agriculture. Project report*, CSRM, The University of Queensland: Brisbane.

4. **Human capital:** Assets such as skills, knowledge, abilities and good health possessed by individuals that enable them to work, earn a living, contribute to society and thereby build other forms of capital.
5. **Natural capital:** Key natural resources, such as water, land, clean air, wildlife and forests that people can access for lifestyle or livelihood purposes.

All stakeholder groups other than those representing mining and unconventional gas believed that the development of mining and unconventional gas had a negative impact on all or most types of capital. Even the mining and unconventional gas industries thought that local infrastructure had deteriorated as a result of mining and unconventional gas development in the region.

Figure 3: Stakeholder responses assessing the change in different types of capital over the last 5 years as a result of interaction between gas and other industries

	Financial capital	Human capital	Built capital	Social capital	Natural capital
Gas	Better	Better	Worse	Better	Better
Mining	Better	Better	Worse	Better	Better
Agriculture	Worse	Worse	Worse	Worse	Worse
Local business	Worse	Worse	Worse	Worse	Worse
Local government	Worse	Better	Worse	Same	Same
Community	Worse	Better	Worse	Worse	Worse
Advocacy	Worse	Worse	Worse	Worse	Worse

Far from mining and unconventional gas providing economic benefits, local businesses felt that overall it had reduced financial capital, human capital, infrastructure, social capital and natural capital.

Local businesses have to compete with inflated gas industry wages in order to recruit and retain staff and they experience increased rent and competition for services (particularly trade and mechanical repairs). There are also disruptions to farmers from

the rollout of access roads, pipelines, water treatment plants and other infrastructure. Big increases in truck traffic tend to disrupt other forms of transport and damage roads.

Some businesses do benefit. Motels, bars and fast food chains experience a burst of demand during the brief construction phase, but may struggle afterwards. Waste disposal companies can profit from storing, transporting and treating the millions of litres of toxic “produced” or “flow-back” water and salt from the extraction process.

The CSRSM report includes statements from stakeholders discussing the effect of the gas and mining boom in the region on existing local businesses:

Obviously if you’ve got a major engineering or earth moving business, you attract business, you’re doing incredibly well, or a motel.

But, if you work in town at a local shop, or the council, you’re doing incredibly poorly, because your rents have gone through the roof and suddenly you’re flat out paying to be able to live in town. For us, we’re seeing increased costs.

All our professional services are \$100 an hour plus, whereas they used to be [in the] 40s and 50s. Freight is dearer. We can’t get labour. We’re relying on backpackers a lot more because we just can’t get permanent staff. So, it’s quite an added cost to one sector of the community, while the other sector booms.¹¹

Having to compete with inflated resource industry wages was also of great concern:

What they’re paying for wages [in some towns] is two and half times what the wage should be – just to hold men. That’s forcing consumer goods up, to try to cover the costs of those wages... So it’s all spinning down the line... [For example] from a hardware perspective, anyone doing renovations to their home, even just the little bits are all getting more expensive because these guys are trying to cover the increase in wages that they’ve had to pay to retain men. And the [resources] companies are walking into businesses and offering staff – mainly mechanics... huge wages.¹²

Other stakeholders described the corrosion of social capital:

[I]n regards to a divide between people, not just landholders versus townies, but for instance I’ve got a lot of friends who used to work in agriculture and

¹¹ Everingham et al, p 38.

¹² Everingham et al, p 39.

now work for gas companies – a lot of them. And some family members don't speak to them anymore because they're still on the land...

But even in towns now... once you would go to the local pub in Dalby, it was all full of farmers and that sort of thing and now you've got guys in their high vis' and after a few rums things are getting... they do, it's starting to get quite ugly. There's quite a bit of animosity going on. And agricultural communities have never been like that – they're not. And now that's building up pretty much.¹³

It is clear from interviews with businesses in unconventional gas development areas that the industry brings substantial costs. The CSRM study showed that business stakeholders perceived the costs as outweighing the benefits. Territory business organisations and policy makers should be aware of how this has played out in Queensland when considering the expansion of the gas industry in the NT.

Negative impacts on local businesses also affect communities at the social level. The next section examines the social impacts in more detail.

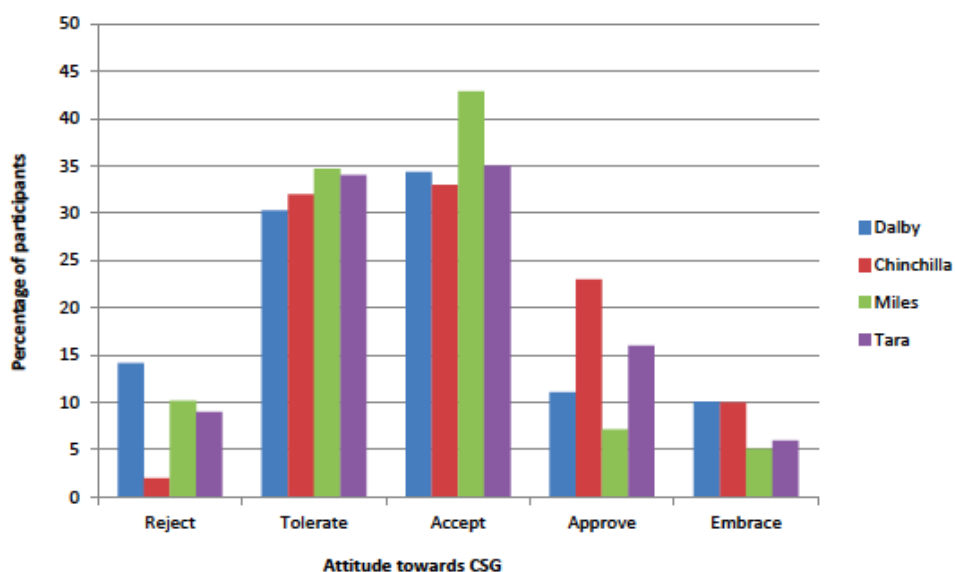
¹³ Everingham et al, p 51.

2. Impacts on local communities

Unconventional gas development in Queensland's Darling Downs distresses local communities. Detailed surveys have shown that few people approve of the industry and even fewer believe that it will improve conditions.

A recent CSIRO survey of the Western Darling Downs found that almost half the local population was “only just coping” with, “not coping” with or actively resisting the changes to their communities caused by unconventional gas development (see figure below). This study was undertaken by researchers funded by the largest unconventional gas companies in Queensland, including Australia Pacific LNG and QGC.¹⁴

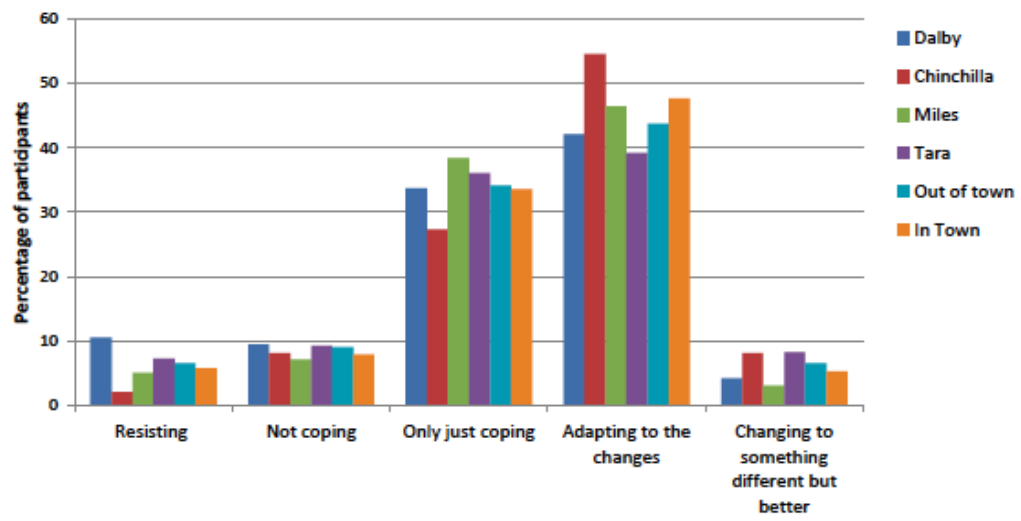
Figure 4: Attitudes towards unconventional gas in the region by subregions



Less than a quarter of people surveyed approved of the unconventional gas industry. Only 6% of people felt the community was improving as a result of the industry, while many were struggling to cope with the changes the industry had brought (see figure below).

¹⁴ Walton, A, McCrear, R & Leonard, R (2014). *CSIRO survey of community wellbeing and responding to change: Western Downs region in Queensland*, CSIRO Technical report: CSIRO, Australia.

Figure 5: Community responses to unconventional gas development in the Western Downs, Queensland

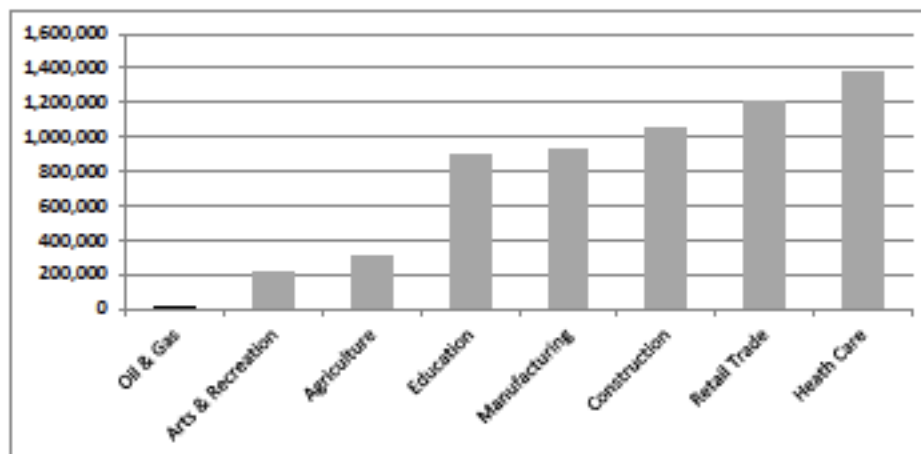


3. Unconventional gas is a small employer

According to the Australian Bureau of Statistics, in May 2015 the entire oil and gas industry in Australia employed 27,500 Australian workers, or less than a quarter of 1% of the workforce.¹⁵

By way of comparison, the total employment provided by the oil and gas industry is considerably less than the retail hardware store Bunnings's, which employs 33,000.¹⁶

Figure 6: Employment in Australia by selected industry (2014)



Source: ABS (2014).

In Queensland the oil and gas industry employed 4,500 people as of February 2016, less than one fifth of 1% of the Queensland workforce of 2.4 million.¹⁷

This number is likely to continue to decline significantly. The vast majority of gas jobs are during the construction phase. As the construction phase winds up, the

¹⁵ ABS (2013a). 6291.0.55.003 *Labour Force, Australia, Detailed, Quarterly, September 2015*, Australian Bureau of Statistics, accessed 11/11/15, <http://www.abs.gov.au/ausstats/abs@.nsf/mf/6202.0>

¹⁶ Bunnings (2013). *About Us: Who we are*, Bunnings, viewed 21 November 2013, <http://www.bunnings.com.au/about-us>.

¹⁷ ABS 2016 Employed person by industry subdivision table EQ06.

unconventional gas companies operating in Queensland are cutting their workforces by around 80%.¹⁸

Territorians seeking employment for any unconventional project in the Northern Territory will have to compete with experienced workers from interstate. The gas industry requires experienced, skilled workers. With the wind-down of the CSG construction boom in Queensland, there is a large pool of highly-qualified workers who are more likely to fill positions than unskilled Territorians with no experience in gas field construction and operation.

Experience in Queensland has shown that construction workforces are largely male non-residential workers living in workers camps on the outskirts of towns. These workers are often referred to as fly-in, fly-out (FIFO) or drive-in, drive-out (DIDO).

When local people are employed on these projects, they are unlikely to be previously unemployed people. The gas industry prefers to employ skilled workers, often drawn from local manufacturing and agriculture businesses.

As explained above in section 1, these local businesses often choose not to replace these skilled staff due to high labour costs resulting from having to compete with gas industry wages, and the risk of losing staff to the industry once they have been trained.

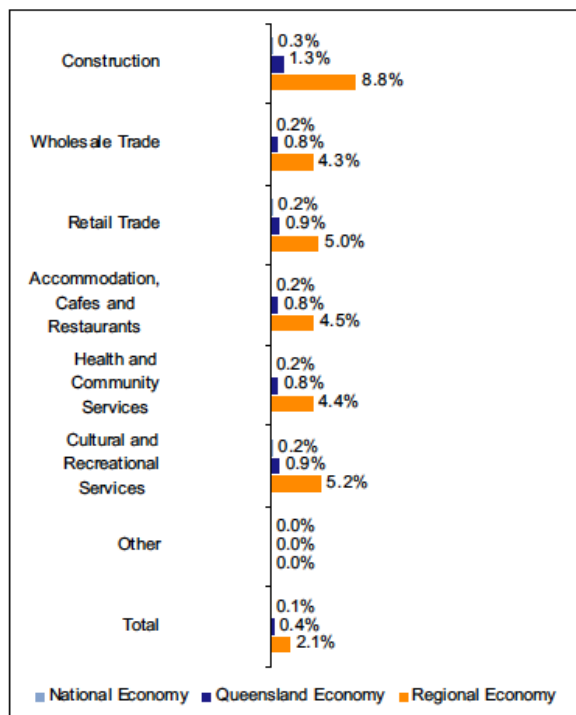
¹⁸ Bureau of Resource and Energy Economics, *Resource and Energy Major Projects 2013*.

4. Jobs: promise versus reality

As discussed in section 3, unconventional gas extraction employs relatively few people. These jobs are mostly short term and largely non-residential workers. The industry claims that the flow on effects result in people being employed elsewhere in the community. However, recent research shows that flow on jobs have largely failed to eventuate.

For example, the original Economic Impact Statement submitted to gain approval for the largest unconventional gas project in Queensland, Australia Pacific LNG (APLNG), claimed that the construction phase of the project would increase regional employment in the retail trade by 5 per cent, and in a range of regional service sectors by between 4.5 and 5.2 per cent.¹⁹

Figure 7: Australia Pacific LNG direct and indirect employment by industry



Source: KPMG, *APLNG EIS Economic Impact Assessment report*, chart 5.3, p 29.

¹⁹ KPMG, *APLNG EIS Economic Impact Assessment report*, Chart 5.3 p29.

The reality was very different. At the height of the construction boom in 2013, a study was undertaken by the Gas Industry Social and Environmental Research Alliance (GISERA) into the local economic impacts of the unconventional gas boom.

The study examined the actual economic impacts of unconventional gas development in Queensland's gas fields. While the study found higher income growth in CSG regions during the construction boom compared to other regions, it found that there was virtually no flow on employment to non-mining businesses. In the words of the authors, "job spillovers into non-mining employment are negligible"

As we can see in the figure below, the study found that while there was an increase in short term construction related jobs (construction and professional services), there were virtually no additional jobs in retail or manufacturing as a result of unconventional gas development.²⁰

Figure 8: Unconventional gas employment spillovers in different sectors of Queensland's Darling Downs economy

	Elasticity	Additional job for each new CSG job
Local goods sector		
Construction	0.832 (0.426) *	1.412
Professional services	0.704 (0.259) **	0.412
Retail trade	0.011 (0.140)	0.024
Services [†]	-0.205 (0.230)	-0.732
Traded sector		
Manufacturing	0.068 (0.199)	0.160

Notes: Elasticity values are 2SLS estimations for coefficient ψ in equation (2). The number of CSG wells in an SLA is used as instrument for the log change of mining employment. Values estimated using sample 3 (n = 48). F-stat first-stage = 10.74. Robust clustered std. errors at LGA levels in parentheses. *p < .10. **p < .05. [†]Services sector include employment in accommodation, rental agencies, transport and 'other services'.

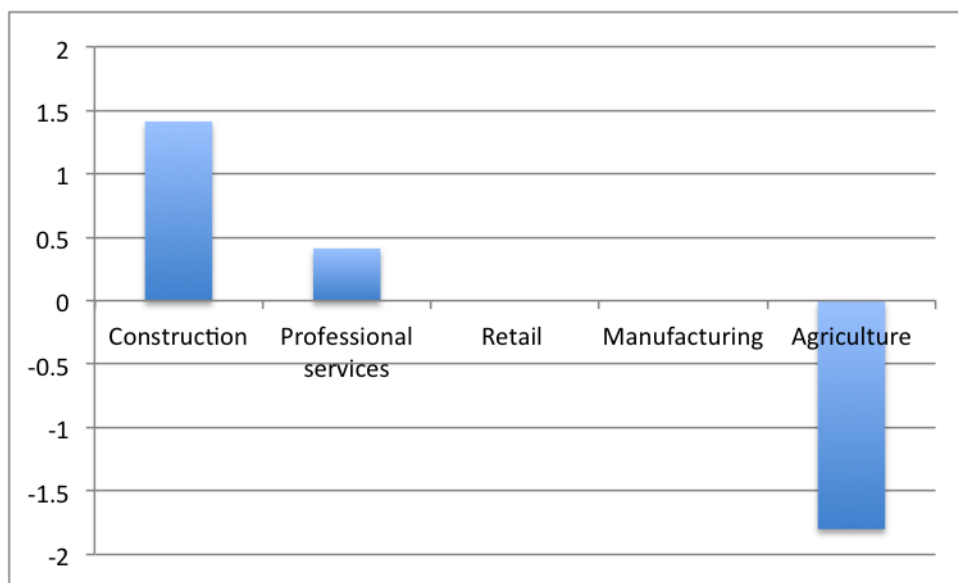
Source: Flemming and Measham (2013)

A subsequent study by the same authors found that for every ten people employed in CSG, eighteen agricultural jobs were lost.²¹

²⁰ Fleming, D & Measham, T (2013) *Local economic impacts of an unconventional energy boom: the coal seam gas industry in Australia. Report to the Gas Industry Social and Environmental Research Alliance (GISERA)*. June 2013. CSIRO, Canberra.

²¹ Flemming, D & Measham, T (2015a) "Local economic impacts of an unconventional energy boom; The coal seam gas industry in Australia", *The Australian Journal of Agricultural and Resource Economics* 59(1) pp 78-94

Figure 9: Spillover job impacts per CSG job



Source: Flemming and Measham (2013 and 2015a).

In other words, the unconventional gas boom had virtually no employment benefits outside of the gas industry itself. In the words of the authors, “job spillovers into non-mining employment are negligible”. It also shows that agricultural jobs were lost and that the employment gains were almost entirely in short term construction jobs and professional services jobs (largely related to the construction phase).

The Queensland unconventional gas boom is one of the largest and most rapid resource expansions ever seen, and yet it led to virtually no increase in employment in local retail or manufacturing, and a significant loss of agricultural jobs.

The lack of any increase in retail employment in local communities is largely a result of the predominance of non-resident workers living in self-contained workers camps. These employees work long shifts that limit opportunities to spend their income in the local community.

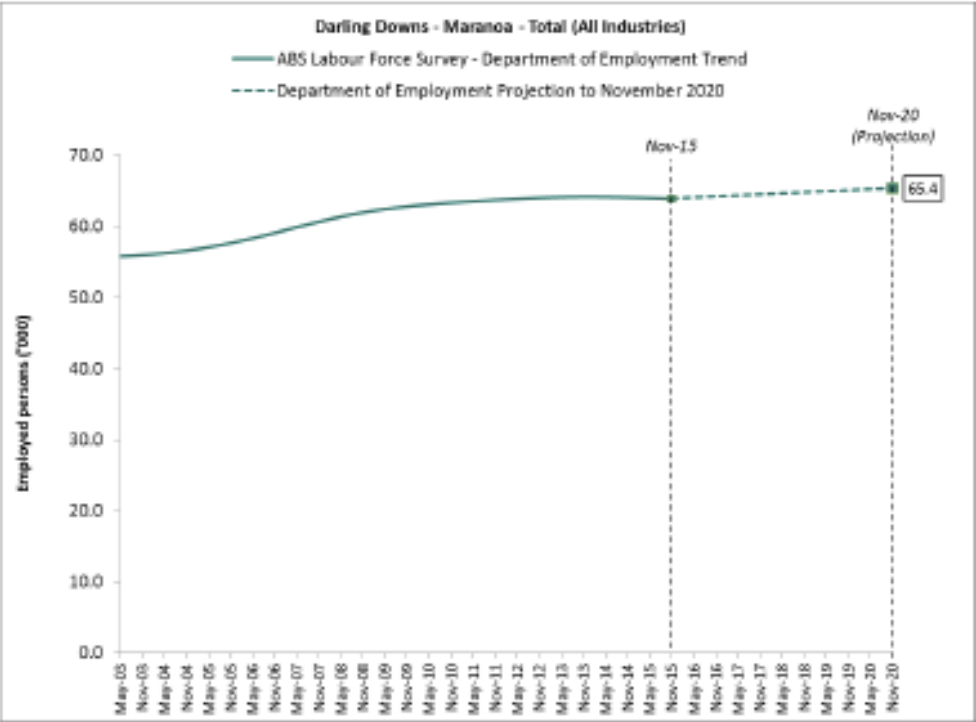
OVERALL EMPLOYMENT IMPACTS OF CSG DEVELOPMENT ON JOBS IN THE DARLING DOWNS

The lack of spillover jobs in local areas is demonstrated by the Australian Bureau of statistics employment data for the Darling Downs Maranoa region during the CSG construction boom.

The Darlings Downs Maranoa region has the greatest concentration of CSG development in Queensland to date. Despite this overall employment in the region

remained flat over the CSG construction boom period with no evidence of a jobs boom in the region.

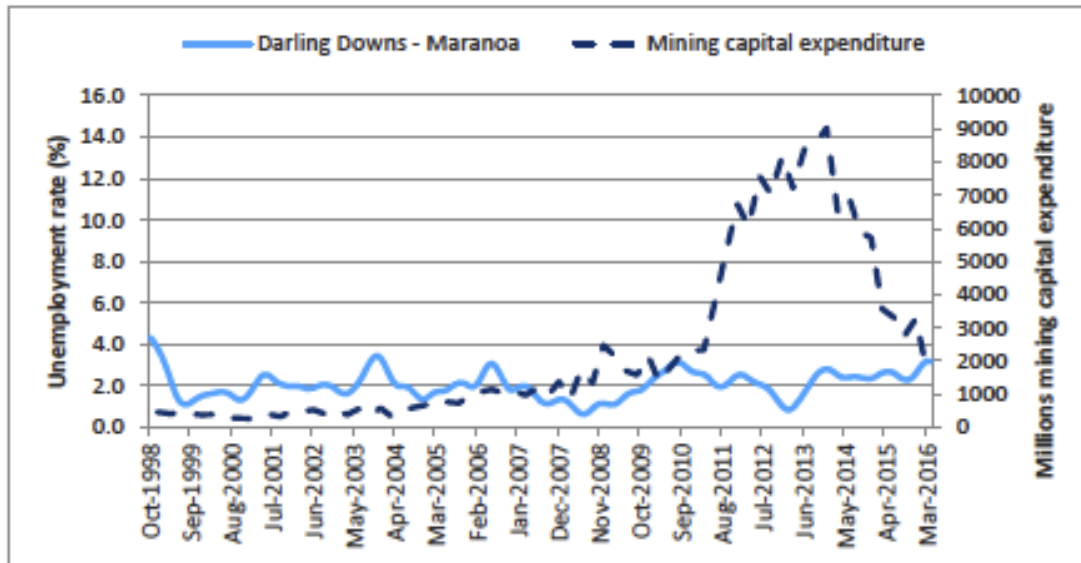
Figure 10: Total employment, historical and projected – Darling Downs-Maranoa



LMIP (2016) Regional Employment Projections

Nor does CSG development appear to have led to any significant reduction in unemployment. Fluctuations in unemployment remain similar to fluctuations in the decade prior to the commencement of CSG development.

Figure 11: Unemployment rate – Darling Downs-Maranoa

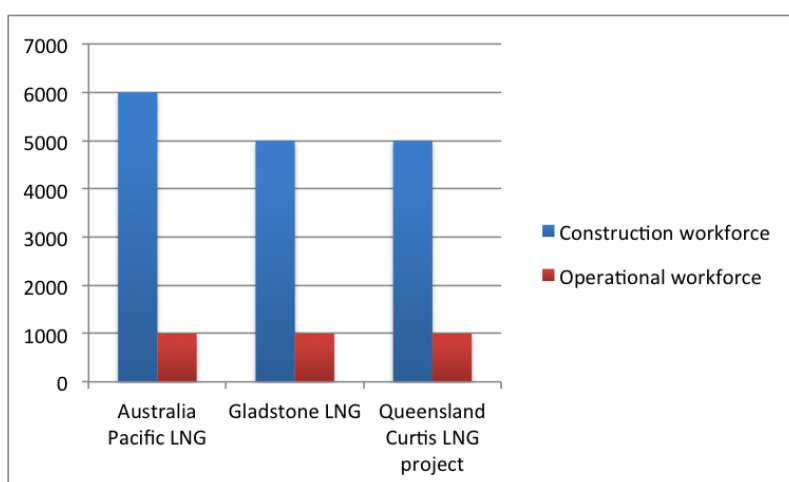


Source: Trend, Conus (2016) *QLD Regions Jobs Data – Conus Trend* (derived from ABS original); Current prices, ABS Cat no. 5625.0 Private New Capital Expenditure and Expected Expenditure.

5. Boom and bust

According to the Office of the Chief Economist of Australia, the three unconventional gas projects in Queensland employed 16,000 people during their brief construction phase.²² The companies estimate that the workforce will be reduced by over 80% to 3,000 employees as the projects enter their operational phase.²³ This will represent less than 0.13% of Queensland's total workforce of over 2.3 million.²⁴

Figure 12: Queensland unconventional gas operation and construction employment



Source: Office of the Chief Economist of Australia (2015).

The construction workforces may have been considerably smaller than reported by the Office of the Chief Economist. The office based the numbers on “fact sheets provided by the companies”.²⁵ APLNG, the largest of Queensland's LNG projects says in its Economic Impact Assessment that “over the 11-year construction phase, there will be an approximate average of 3,300 people working on the Australia Pacific LNG project each year. Employment will peak from 2012 to 2014 inclusive”. This is a little over half the number reported by the Office of the Chief Economist but would still represent

²² The length of the construction period varies between the projects. In the case of Gladstone LNG, the construction period was 4 years. URS (2009) *GLNG Economic Impact Statement*.

²³ Office of the Chief Economist, *Resources and Energy Major Projects list April 2015*, accessed 11 November 2015, <http://www.industry.gov.au/Office-of-the-Chief-Economist/Publications/Pages/Resources-and-energy-major-projects.aspx>

²⁴ ABS Labour Force Statistics.

²⁵ Correspondence with the Office of the Chief Economist.

more than a two-thirds reduction in the workforce between the construction and operational phase.

Any unconventional gas project in the Northern Territory would employ far fewer workers than in Queensland.

A large proportion of both the construction and operational workforce in Queensland worked on assembling the LNG terminals at Gladstone. Additional LNG terminals will not be required in the Northern Territory, as the gas will be exported via the Queensland terminals.

There is also likely to be a large pool of experienced gas workers in Western Australia and Queensland who are well placed to fill Northern Territory unconventional gas jobs. The three Queensland LNG terminals, the Northern Territory Inpex Ichthys project and several Western Australian LNG terminals and offshore gas fields were all built simultaneously. The decision to allow all these projects to be built simultaneously created an acute skills shortage at the time. With the wind down of the construction phase of these projects there is an abundance of interstate skilled gas construction workers who will be far better placed to work on any gas projects in the NT than unemployed NT residents who lack these skills.

To the extent that NT residents are employed, they are likely to be skilled workers already employed in other industries, particularly manufacturing and agriculture. This effect drives up costs for other industries as they are forced to compete with the oil and gas industry for skilled workers.

6. Impacts on manufacturing

The rapid expansion of unconventional gas projects has damaged Australia's manufacturing industry through its labour market impacts and effect on gas prices.

Economic modelling by the Queensland unconventional gas company Arrow LNG for its Economic Impact Assessment found that this project would displace \$441.5 million worth of manufacturing output and 1,000 manufacturing jobs in Queensland.²⁶

Arrow LNG is just one of the four large unconventional gas projects in Queensland. The full employment impacts of this single project can be seen in the figure below.

While the modelling suggests that the project would create a considerable number of short term construction jobs, these jobs come at the expense of long term jobs in other sectors, particularly manufacturing.

Once extinguished, manufacturing activity is difficult to rebuild. Plants and equipment require a large upfront investment, but only deliver returns over the long term. If a region is likely to experience further disruption from large resource projects, investors are unlikely to have confidence in manufacturing.

Figure 13: Average Annual Impact on Employment by Industry in Queensland of Arrow LNG project

Industry	Change in Employment (FTEs)			
	2013-14 to 2016-17 (Phase 1 Construction)	2018-19 to 2021-22 (Phase 1 Steady State Operation)	2022-23 to 2024-25 (Phase 2 Construction) ^(a)	2026-27 to 2029-30 (Phase 2 Steady State Operation) ^(a)
Queensland				
Agriculture	-59	-24	-66	-42
Mining	-65	-28	-69	-50
Manufacturing	-1,089	-25	-804	-200
Electricity and water	-10	25	39	55
Construction	1,833	127	1,325	257
Trade	221	58	255	130
Transport and storage	-246	-27	-186	-37
Business, finance and insurance services	-132	83	119	166
Public administration, defence, health and education	29	-6	-45	-19
Recreation and other services	22	-4	1	-8
Ownership of dwellings	6	0	3	0
Total Change in Employment in Queensland	511	180	571	251

Note: (a) It should be noted that operation of Phase 1 (trains 1 and 2) is ongoing during these time periods.
Source: Prime Research (unpublished).

Source: AEC Group (2011) Arrow LNG Economic Impact Assessment, table 5.3 p 43.

²⁶ Grudnoff (2015) *An analysis of the economic impacts of Arrow Energy's Gladstone LNG Plant*.

GAS PRICES

As well as higher labour costs, unconventional gas projects have significantly increased the cost of gas for Australian manufacturers.

CSG exporters made it clear to their investors that linkage to international markets would increase gas prices in Australia, thus increasing the value of gas these companies sold to Australian customers.

However, at the same time they omitted or downplayed this impact in their applications to governments to gain approval for their projects

For example, in their Economic Impact Assessment of 2010, GLNG noted that “a relatively mild increase in gas prices associated with the QCLNG Project may occur in the eastern Australian market”.²⁷

At the same time Santos, the lead GLNG joint venture partner, told its investors that that the linkage of Australian gas prices to global prices as a result of unconventional gas LNG exports would “transform” its asset base by exposing all but legacy domestic gas contracts to oil price rises. In other words, the gas that they had been selling to Australian customers would now be linked to Asian prices, which at the time were relatively high. Increasing the price they were able to sell gas to Australian customers for, particularly manufacturers, was central to their commercial strategy, not an unintended by-product of it. The Santos 2011 Annual Report lists “Increasing exposure to oil-links prices as one of the three pillars of its corporate strategy.

²⁷ *GLNG Economic Impact Statement*, volume 8 chapter 10, p 12.

Figure 14: Santos “Vision and Strategy”

VISION AND STRATEGY

Santos’ vision is to be a leading energy company in Australia and Asia, and the company has a robust strategy to achieve this by:

Continuing to be a leading Australian domestic producer.

- Strong 50-year track record of safe, sustainable operations.
- Presence in every major Australian hydrocarbon basin, with oil, conventional gas and unconventional gas assets.
- Increasing exposure to oil-linked gas prices.

Source: Santos (2011) *Annual Report 2011*, p 2.

In fact, linking Australian domestic gas prices to higher Asian prices has more than doubled the wholesale gas price.

The recent collapse in the oil price, and subsequently Asian “oil linked” gas prices, has not caused a commensurate reduction in the price of gas being offered to manufacturers. This has led to claims of “cartel like behaviour”.²⁸ The ACCC’s 2015 inquiry into the East Coast gas market is investigating “the existence of, or potential for, anti-competitive behaviour and the impact of such behaviour on purchasers of gas”.²⁹ While not finding evidence of collusion between companies on domestic gas prices, it found that the exercise of “market power” by the gas suppliers was a key reason for prices remaining high.

Economic modelling by Deloitte Access Consulting shows that east coast gas price rises caused by unconventional gas exports have created an \$81 billion windfall for the gas

²⁸ West, M (October 2015) “East coast gas market has all the hallmarks of a cartel”, accessed 11 November 2015, <http://www.smh.com.au/business/comment-and-analysis/east-coast-gas-market-has-all-the-hallmarks-of-a-cartel-20151011-gk6b4i.html>

²⁹ ACCC Project Overview, *East Coast Gas Inquiry*, accessed 11 November 2015, <https://www.accc.gov.au/regulated-infrastructure/energy/east-coast-gas-inquiry-2015>

industry (mostly global oil and gas majors), but will cost the manufacturing industry \$118 billion (see figure below).³⁰

Figure 15: Industry output impacts for Australia as a result of gas price increases

Table i: Industry output impacts for Australia for the years 2015, 2018 and 2021 and cumulative Net Present Value (NPV) of output impacts over 2014 - 2021

	Value of difference from baseline			% difference			NPV
	2015	2018	2021	2015	2018	2021	Cumulative impact over 2014-2021
SKM scenario							
<i>Output (\$ million)</i>							
Manufacturing	-23,199	-22,259	-30,386	-3.97	-3.48	-4.38	-118,069
Gas	8,922	17,672	24,225	47.81	65.63	57.07	80,746
Mining	-7,226	-6,031	-9,679	-3.55	-2.69	-3.96	-33,804
Agriculture	-1,110	-798	-1,430	-1.98	-1.32	-2.21	-4,705
Electricity and Water	-1,962	-1,989	-2,204	-3.36	-3.09	-3.12	-10,269
Construction and Trade	18,049	2,443	13,265	2.80	0.34	1.69	38,519
Transport	-2,328	-1,988	-3,288	-1.68	-1.31	-2.00	-11,044
Commercial & Services	3,015	-897	649	0.26	-0.07	0.05	1,695

Source: Deloitte Access Economics

Note: The discount rate of 7% was used to calculate the NPV figure.

Source: Deloitte Access Economics (2014).

³⁰ Deloitte Access Economics (2014) *Gas market transformations—Economic consequences for the manufacturing sector*, Table 1, p 3.

7. Big numbers, small benefits

Gas companies often cite their contribution to economic activity (Gross State Product, GSP, or Gross Domestic Product, GDP) as a measure of the economic benefits of their projects.

GSP and GDP are the state and national measures of economic output. These include the Net Present Value (NPV) of goods and services provided by different industries, including the oil and gas industry.

The value of the gas sold by the gas industry goes to the gas companies that sell the gas. For example, a Korean power company can buy Northern Territory gas from a Japanese gas company that is licensed to extract the gas (like Inpex), and while the value of the gas sold is counted as GDP or GSP, the money will be transferred from the Korean power company to the Japanese gas company and not reach Australian shores.

The main ways that the people of the Northern Territory, or residents of other states and Australia as whole, can benefit from this transaction are taxes and royalties, employment of local people and the flow on business to Australian businesses.

As such, the GSP or GDP numbers themselves say little about the benefits that flow to Australians or Territorians. These will depend on the amount of tax and royalties the companies pay, how much of their expenditure on goods and services flows to Australian businesses and whether the profits accrue to Australian companies or foreign owned companies.

The oil and gas industry operating in Australia is over 80% foreign owned,³¹ which means that over 80% of the profits go directly off shore. It imports almost all of its equipment and pays very low rates of tax.

The construction of the three huge LNG export and processing facilities at Gladstone in Queensland illustrate the industry's preference for sourcing materials and equipment from overseas.

All three export terminals were built by the global oil and gas engineering company Bechtel. On their website, Bechtel promote their "efficiency" in not employing Australians. The website page shown in the figure below describes all three of the Gladstone LNG Processing plants and export terminals as being designed by Bechtel

³¹ Calculations by The Australia Institute based on published 2P reserves and production.

engineers in Houston, Delhi and Shanghai, to be built in the Philippines, Indonesia and Thailand. The terminals were then floated over to Australia to be assembled.³²

Figure 16: Bechtel description of design and construction process for their Curtis Island LNG terminals in Queensland



Source: Bechtel Website.

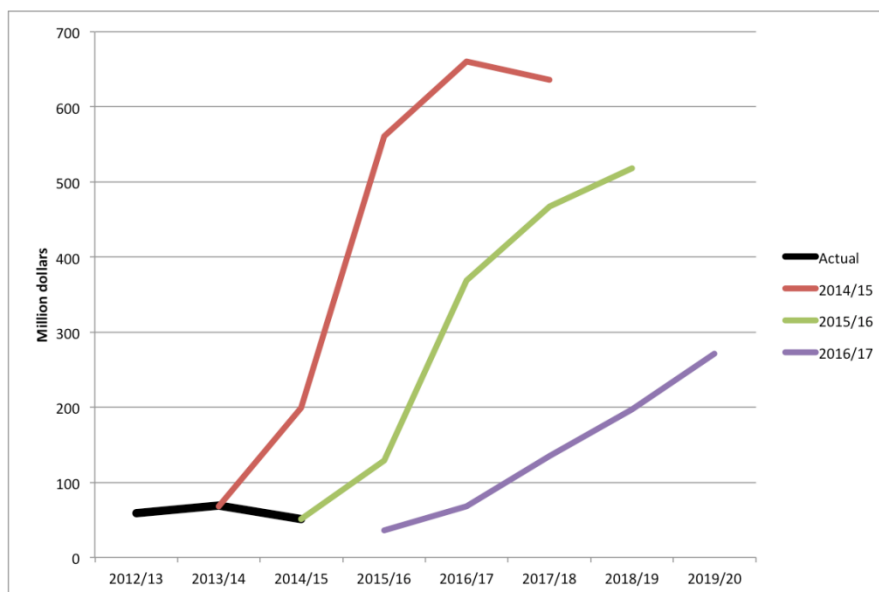
The Queensland LNG projects were approved without an estimate of royalty payments to the state government. Subsequent Queensland Treasury estimates of gas royalties have been slashed to around one third over the past five years (see figure). Treasury acknowledges that original estimates were “overcooked”.³³ APLNG is now challenging the Queensland Government’s royalties rulings.³⁴

³² Bechtel website, accessed 10 November 2015 <http://www.bechtel.com/projects/curtis-island-lng/>

³³ Ludlow, M (February 2016) “Queensland faces LNG royalties crunch”, *The Australian*, accessed 1 April 2016, <http://www.afr.com/business/energy/gas/queensland-faces-lng-royalties-crunch-20160207-gmnle0>

³⁴ Ludlow (February 2016)

Figure 17: Queensland Treasury royalty projections actual vs projected 2012–2015



Source: Queensland Budget Papers 2012–2015.

Corporations operating in Australia are required to pay company tax to the Commonwealth Government. The current company tax rate is 30%, however all taxpayers are entitled to a number of deductions.

In 2015 the Australian Tax Office published the amount of corporate tax paid Australia’s largest companies. The very low amounts paid by many of these companies elicited a strong response from many sectors of the community.

The oil and gas industry was one of the industries singled out for particular criticism. The very low amounts of corporate tax paid by these companies are partly the result of creative transactions that reduce the amount of taxable income earned in Australia.

The low amounts paid by Origin (3.6% of total income), Shell (0.35%) and Santos (0.07%) have been partly attributed to practices such as transfer pricing.³⁵

The big numbers for capital value or change in GDP tell us little about the benefit of gas exports to the wider Australian economy and community. As the Reserve Bank of Australia concluded in a recent paper on Australian LNG, while Australian production of LNG is expected to ramp up substantially over the next few years:

³⁵ Ludlow, M (April 2016) “Origin LNG consortium used 'transfer pricing' to cut taxes”, *Australian Financial Review*, <http://www.afr.com/news/politics/origin-lng-consortium-used-transfer-pricing-to-cut-taxes-20160426-gofb0q>

The effect on Australian living standards will be less noticeable than this given the low employment intensity of LNG production, the high level of foreign ownership of the LNG industry and, in the near term, the use of deductions on taxation payments.³⁶

³⁶ Cassidy, N & Kosev, M (2015) *Australia and the Global LNG Market*, RBA.

8. The industrial footprint of shale gas

One important way in which unconventional gas development differs from other types of resource development is that it covers far greater areas. Mines are generally highly concentrated with relatively small footprints, but unconventional gas fields often cover tens of thousands of square kilometres with an industrial grid of wells, pipelines, access roads, compressor stations and water treatment plants.

The most mature shale gas field in the US, the Barnett Shale, has an average of 1.15 wells per square kilometre, but can be as high as 6 wells per square kilometre due to “infill drilling” needed to extract gas as fields deplete.³⁷

Every shale gas well needs to be fracked multiple times. Every frack requires 11–34 million litres of water,³⁸ the equivalent of 360–11,000 truckloads, and 80–300 tonnes of industrial chemicals.³⁹ This is potentially an enormous increase in truck movements on the Territory’s roads and will inevitably impact other road users.

Pennsylvania in the United States has a mature shale gas industry. A gas industry study last year in Pennsylvania found that more than 6% of gas wells leaked, and up to 75% of wells could have some form of integrity failure.⁴⁰ In Pennsylvania more than 240 private drinking water wells have been contaminated or have dried up as the result of drilling and fracking operations over a seven-year period.⁴¹

³⁷ *Shale Gas Information Platform SHIP*. GFZ, accessed 10 November 2015, <http://www.shale-gas-information-platform.org/categories/operations/the-basics.html>

³⁸ *UNEP Global Environmental Alert Service: Gas Fracking: Can we safely squeeze the rocks?*

³⁹ Hazen and Sawyer (22 December 2009) *Impact Assessment of Natural Gas Production in the New York City Water Supply Watershed*.

⁴⁰ Davies, RJ, Almond, S, Ward, RS, Jackson, RB, Adams, C, Worrall, F, ... Whitehead, MA (2014) “Oil and gas wells and their integrity: Implications for shale and unconventional resource exploitation”, *Marine and Petroleum Geology*, 56, 239–254. doi: 10.1016/j.marpetgeo.2014.03.001

⁴¹ Concerned Health Professionals of New York & Physicians for Social Responsibility (14 October 2015) *Compendium of scientific, medical, and media findings demonstrating risks and harms of fracking (unconventional gas and oil extraction)* (3rd ed.), <http://concernedhealthny.org/compendium/>

Conclusion

Gas companies routinely exaggerate the economic and jobs benefits of their projects. Too often policy makers accept these claims unquestioningly.

The Northern Territory is fortunate to have the Queensland unconventional gas experiment to reflect upon. The Queensland experience is that most of the economic benefits do not materialise, and serious collateral damage is done to existing industries and local communities.

If policy makers in the Northern Territory naively accept the economic claims of speculative gas companies and use taxpayer money to support this industry, Territorians will live the consequences for decades to come.