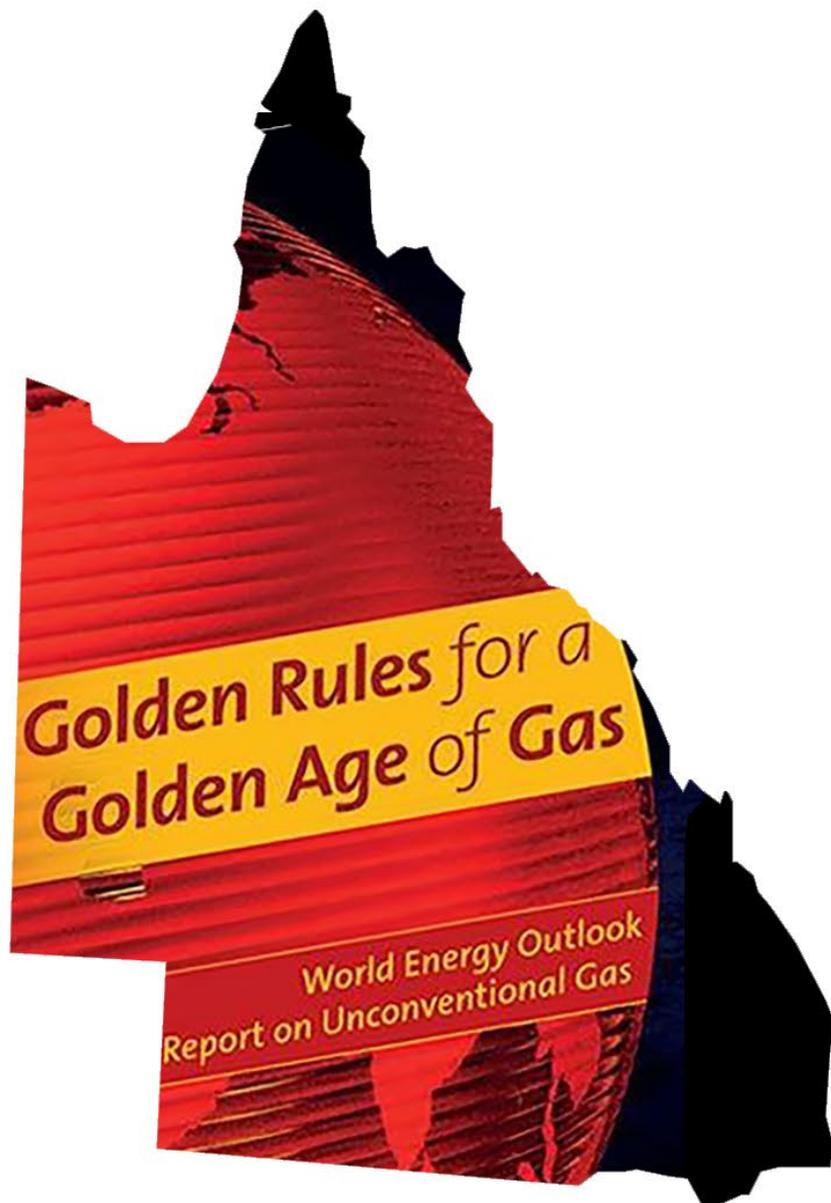


The coal seam gas industry in Queensland and the 'Golden Rules' of gas



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Acknowledgements

This working document was prepared for The University of Queensland Centre for Natural Gas. We sincerely thank all of our participants for their time, insights and reflections on the coal seam gas industry experience in Queensland.

Citation

Witt K, Garnett A, Staggs J & Holm D (2020), *The coal seam gas industry in Queensland and the 'Golden Rules' of gas*, The University of Queensland Centre for Natural Gas Project Report, The University of Queensland.

Publication details

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May 2020

ISBN: 798-1-74272-291-7

Disclosure

This project was funded by The University of Queensland Centre for Natural Gas. The UQ Centre for Natural Gas is currently funded by the University of Queensland and the Industry members (Arrow Energy, APLNG and Santos). The Centre conducts research across Water, Geoscience, Petroleum Engineering and Social Performance themes.

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This report has not yet been independently peer reviewed.

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1 Executive summary

The *Golden Rules for a Golden Age of Gas* contains a set of proposed good practice standards for unconventional gas developments. They were proposed by the International Energy Agency (IEA) in 2012 as a means for the industry to improve its environmental and social performance and earn a social licence to operate. The development of the rules was heavily influenced by experiences in the United States – as the most active area of unconventional gas development in the world.

This pilot study sought to understand the extent to which the experience of coal seam gas (CSG) development in Queensland was seen to have aligned with the Golden Rules, and how well adherence to the Golden Rules was seen to contribute to community acceptance of the industry. The research team conducted interviews with over 30 people who have been directly involved in the development of the CSG industry in Queensland, including local, state and federal governments, gas companies, host communities as well as researchers and consultant ‘experts’.

A dominant theme emerging from the interviews was the view that **the CSG industry improved its performance** across many of the Golden Rules as it matured and learned about the local communities and the social, economic and ecological environment it operated in.

Interviewees pointed out the important but **complex and challenging role of governments** – as both enablers and the regulators. On one hand, bipartisan political support for the industry was seen to contribute to its successful and rapid development in Queensland. This is in contrast to other Australian States for which the development of unconventional gas resources has been hindered by fear of a voter backlash¹.

On the other hand, community stakeholders also reported experiences of a regulatory framework that was not keeping pace with the rapid development of the industry, pointing to a lack of strategic policy and coordination. The regulatory frameworks around **groundwater management and well integrity** were largely described as exemplary, with some respondents referring to these as ‘world leading’ and ‘world class’. Gas company practices across these areas were also rated highly by respondents.

Overall, the Queensland experience of unconventional gas development rated reasonably well in relation to the Golden Rules, with scores of 3 or higher out of 5, for 4 of the 7 of the rule categories.

The most important **areas for improvement** for the CSG industry in Queensland are in the rules:

- ‘*Measure, disclose and engage*’. This addresses **information disclosure, community engagement and benefit sharing**; and
- ‘*Be ready to think big*’. This addresses **coordination at appropriate scales and cumulative impact management**.

However, much of the commentary in relation to the latter conceded that perceptions of industry practice were driven by capital investment decisions made some five years in the past and the results of those decisions (such as three separate pipelines) cannot easily be changed now².

¹ The absence or presence of broad political support is not a ‘Golden Rule’.

² Negative perceptions have a long ‘legacy’, and the rationale for ‘3 pipelines’ is not widely known, or accepted.

This suggests that *measure, disclose and engage* ought to be the focus for industry improvement, as this rule was also rated as being most important for community acceptance. For jurisdictions where unconventional gas development has not yet occurred, these findings highlight the importance of getting the regulatory regime across all levels of government ‘right’ in advance of development, including the coordination and management of cumulative impacts and how the extensive reporting of data by companies to regulators is translated, summarised and disseminated to the wider public.

In relation to the Golden Rules themselves, both our evaluation of the Queensland experience, and interviewee’s insights suggest they can be improved with an **increased focus on social performance**, by including social dimensions alongside environmental performance monitoring and standards and placing greater emphasis on communities’ experiences and the industry’s contribution to sustainable outcomes for local communities.

Our findings also suggest that while we have taken a snapshot and scorecard approach for simplicity and replicability, the **trajectory** of performance in relation each of the rules may be more important than static performance at a given time. There could therefore be more emphasis on the *pursue continuous improvement...* sub-rule, which currently sits within the environmental performance rule category.

This study evaluated and provided insights about the performance of the unconventional gas industry in one jurisdiction, with one form of unconventional gas development, at one point in the development cycle. The method developed here to evaluate the Golden Rules is designed to be easily replicable across jurisdictions, so that different experiences with unconventional gas can be evaluated and compared. In doing so, the continued relevance and applicability of the Golden Rules can be tested through **additional studies**. These would be carried out in different jurisdictions at different stages of unconventional gas developments, as well as **longitudinally** to identify trajectories of improvement, or otherwise.

Key Implications		
<p>The CSG industry and regulator in Queensland can further improve its performance by engaging better with communities, improving its transparency and sharing economic benefits. Incremental improvement can be gained by increasing focus on coordination and collaboration between companies (and with governments and local communities).</p>	<p>Jurisdictions where unconventional gas development has not yet taken off will do well in investing in getting the regulatory regime right in advance, including addressing coordination and cumulative impact. The Golden Rules can function as a litmus test for the adequacy of policy, regulation and company plans.</p> <p>It is important to ensure that large amounts of operational and environmental data reported to the regulators by the operators is translated, summarised and made readily available to the wider public in a timely manner. Regulators need an information validation and dissemination plan.</p>	<p>The International Energy Agency can improve the applicability of the rules by reviewing them with a view to increasing focus on social performance, and considering testing their application in other jurisdictions at different development phases, including understanding longitudinal changes.</p> <p>The importance of establishing and demonstrating a trajectory of performance improvement across the industry can be better emphasised.</p>

2 Introduction

In 2012, the International Energy Agency (IEA) issued a special report named *Golden Rules for a Golden Age of Gas* (International Energy Agency 2012). It contained 22 principles, which the IEA called Golden Rules for unconventional gas development (see Figure 1 below).

The rules were proposed in the context of expected increase in gas demand and production globally, and the opposition to unconventional gas in many jurisdictions – both among the general public and in some instances by governments.

The Golden Rules were intended to be good practice guidelines for addressing the environmental and social impacts of the unconventional gas industry. The IEA argued that a sustained and successful effort from both governments and operators might be necessary in order to convince the public that impacts and risks from the unconventional gas industry are “acceptably small”. The objective of the Golden Rules were to suggest what might be required for the unconventional gas industry to maintain or obtain a “social licence to operate” (International Energy Agency 2012, pp 15).

Since its establishment in the mid-1990s, the coal seam gas (CSG) industry in Queensland, Australia, has experienced rapid growth. This has been largely driven by the development of three CSG to liquefied natural gas (LNG) projects. At the time of writing, these three projects and a number of other smaller CSG developments, are operating and incrementally growing. At the end of 2017, there were more than 6,800 unconventional production wells in Queensland, with more than 3,900 active land access agreements (Australian Petroleum Production and Exploration Association 2017). A conclusion from this could be that the industry had achieved “sufficient” (*de facto*) community acceptance to be able to operate and grow, noting that this is not necessarily the same as majority or even widespread acceptance. The State of Queensland, Australia, is one of few jurisdictions globally which have seen unconventional gas, specifically CSG to LNG, developed at a very large scale.

Therefore, the CSG industry in Queensland is a suitable test case for considering the extent to which stakeholders’ experiences of industry development reflect the good practice standards in the Golden Rules, and to validate whether adherence (or otherwise) to these rules have contributed to the industry gaining the acceptance needed to develop.

This project had dual aims:

1. To understand the extent to which the experience of CSG development in Queensland reflects the Golden Rules.
2. To evaluate the Golden Rules themselves, and whether they can function as a tool for evaluating CSG developments, including whether the rules have equal weighting.

To answer these questions, we conducted a pilot study aimed at understanding the extent to which stakeholders’ experiences of CSG development in Queensland reflect the goals and standards set out in the Golden Rules, and the extent to which alignment with the Golden Rules might contribute to earning community acceptance of the industry. An aspiration of the study was to develop a replicable methodology, based on the Golden Rules, for assessing unconventional gas developments in various jurisdictions, or more importantly, for assessing development and engagement plans in advance of major developments.

The remainder of this report is structured as follows. We first provide a brief description of the development of CSG in Queensland, followed by a methodology section, then describe our findings, and finally reflect on the findings, the methodology and the Golden Rules themselves.

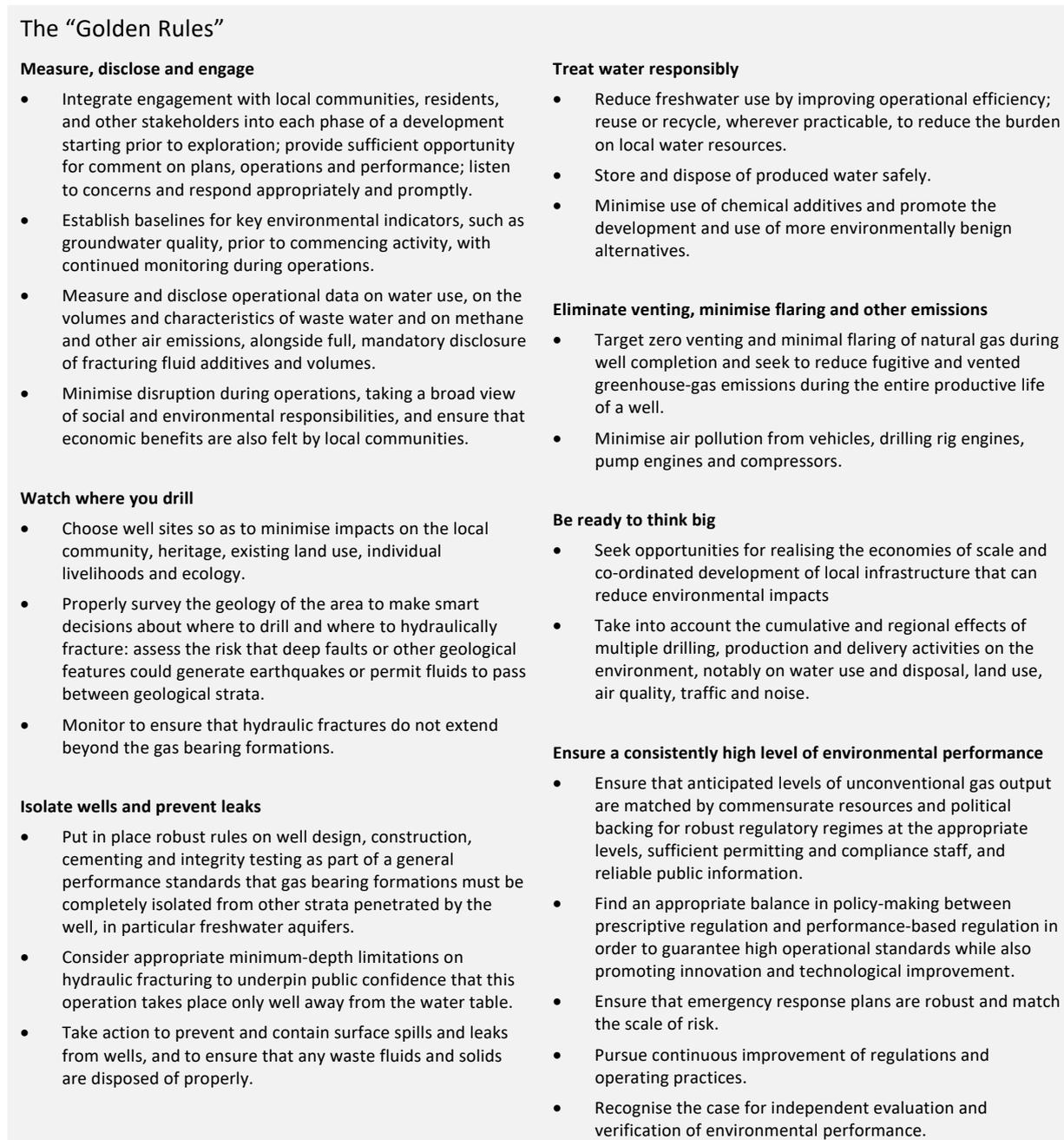


Figure 1 The Golden Rules of Gas (International Energy Agency 2012)

2.1 Coal seam gas in Queensland, Australia

Natural gas production in Queensland dates back to 1900, when the first conventional natural gas well was drilled in the town of Roma. Exploration for CSG, however, only began in the late 1970's as conventional gas production was plateauing. The first commercial production commenced in the Bowen Basin, near Moura, in 1996, solely for the domestic market. At least in part incentivised by a government requirement for 13% of electricity production to be sourced from natural gas, the CSG industry grew, and expanded into

the Surat Basin, with fields developed near the towns of Chinchilla and Dalby in the early to mid 2000s (Towler et al. 2016).

The Queensland CSG industry commenced growing rapidly when four consortia of national and international oil and gas companies commenced planning for the export of CSG as LNG. The industry, which had drilled 10 wells in 1990, grew to drilling more than 1,600 wells in 2013/2014 (Department of Natural Resources and Mines 2016). Three of these consortia proceeded to build export pipelines from the gasfields in the Surat and Bowen Basins to Curtis Island near Gladstone, and construct three LNG plants with a total of six trains. The first LNG train was commissioned by Queensland Gas Company (a BG Group company, later acquired by Shell) in 2014, becoming the first in the world to convert CSG to liquefied natural gas (LNG) for export to international markets (*ibid*), with more trains commissioned over the subsequent years, exporting more than 20 million tons of LNG in 2017 (Gasfields Commission Queensland 2018).

The near concurrent development of three CSG to LNG megaprojects, as well as continued but slower exploration and development from other developers, led to major cumulative social and economic impacts being experienced in the communities in the Surat Basin. The AUD 60 billion investment was said to be the largest private sector investment and combined infrastructure project in the southern hemisphere to date (Fensom 2012). These megaprojects involved not only drilling for and extracting gas in the rural areas of Queensland, but midstream processing and compression facilities, three separate pipelines taking gas over 500kms to the coast to be liquefied in three separate plants and loaded onto ships for export. The scale and pace of this development was likely unprecedented anywhere in the world. As well as physical changes to landscapes, social changes included an associated rapid influx of non-resident workers, rapid growth in business activity, increased road traffic, housing costs and other socio-economic indicators (Rifkin, Everingham & Witt 2015). The rapid 'build phase' of the industry was followed by a contraction when the industry started to wind down from 2014 (see Figure 2 and Figure 3 below for indicators of social change experienced in the towns in the gasfields).

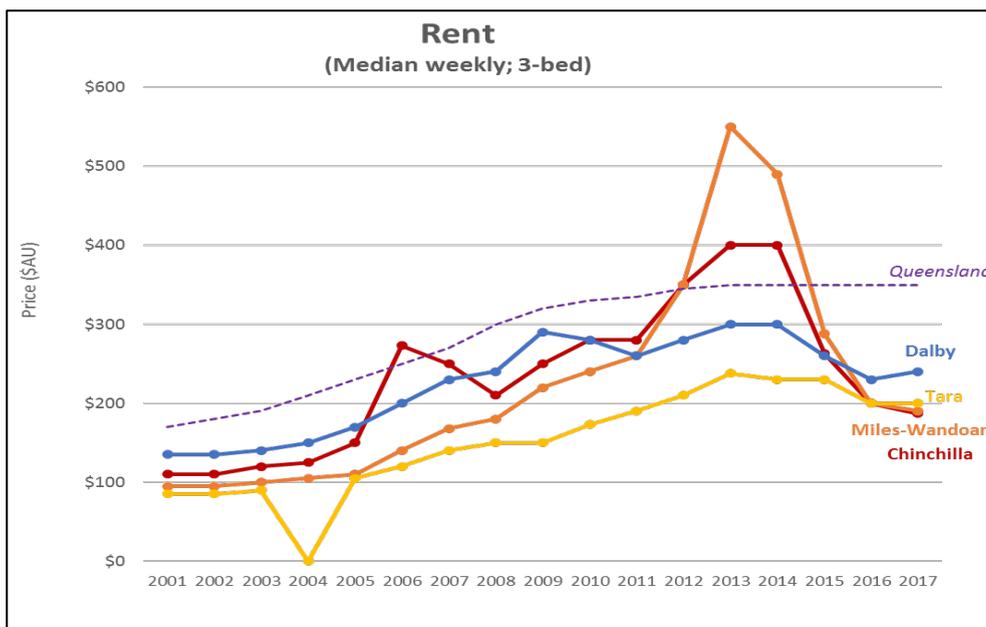


Figure 2 Median weekly rent for selected towns in the gasfields Source: <https://boomtown-indicators.org>

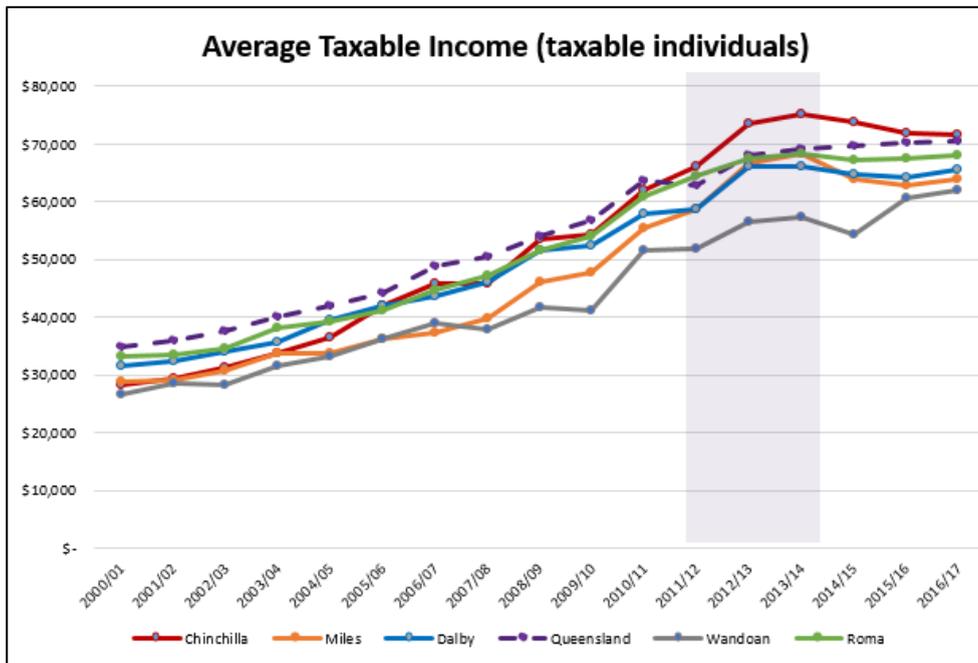


Figure 3 Taxable income for selected towns in the gasfields Source: <https://boomtown-indicators.org>

As had occurred in many other jurisdictions globally, the growth of the CSG industry received a mixed response from the community. Some community members and landholders supported the industry while others were skeptical. A number of groups and organisations formed to protest the industry or aspects of its practice. The issues voiced by these organisations ranged across concerns about groundwater contamination, groundwater take, land access practices, health concerns, and methane emissions (Gasfields Commission Queensland 2017).

Stakeholder trust in the industry continues to show a wide range of trust levels. Some of these groups still exist and their concerns are unabated (Gillespie, Bond, Downs & Staggs 2016). Despite this, the industry has enjoyed political support from the two major parties in the Queensland Parliament (Gasfields Commission Queensland 2017). Recent studies by the Commonwealth Scientific and Industrial Research Organisation (CSIRO) indicate that the majority of the community nearby the gasfields either accept, approve of or embrace the industry (Walton, McCrea & Leonard 2016).

3 Methodology

As described above, the Golden Rules for gas were introduced by the IEA as guidelines for industry operators and governments to address the social and environmental performance of the unconventional gas industry, thus supporting its social licence to operate (International Energy Agency 2012).

This suggests the Golden Rules engage with three constructs: industry practice, policy and regulation and social licence to operate (or community acceptance), indicating that if industry practice and the policy and regulatory environment align with the Golden Rules, social licence to operate is likely to follow.

Recognising these three constructs, the research team developed a methodology seeking to understand:

- To what extent CSG industry practice and the policy and regulatory environment in Queensland aligned with the Golden Rules.
- How important following the Golden Rules were for obtaining community acceptance.

Data was generated from combined qualitative and quantitative interviews. These were conducted with stakeholders who had direct experience of the CSG industry, its interactions with communities, and the attendant regulatory environment.

Using their own research networks, together with those of The University of Queensland Centre for Natural Gas, the project team identified respondents across four stakeholder categories: industry representatives, government representatives, community representatives and experts³. Experts were independent researchers and consultants in specialised fields such as water, petroleum engineering and community engagement. Given the at times controversial nature of the CSG industry, the project team purposively sought to include representation from those who had been publicly opposed to the industry as well as those neutral or supportive. Ensuring a diversity of experiences and attitudes towards the industry was captured strengthens the findings of this report on the Queensland CSG experience.

For each of the Golden Rules, we asked the respondents, in their experience, how industry practice reflected the rule; how the policy and regulatory environment reflected the rule; and how important following the rule was for community acceptance. Respondents were also asked to reflect on any institutional, historical or geographic factors which may impact on the implementation of these rules in Queensland. Finally, respondents were also asked to reflect on the Golden Rules themselves, and if, from their experience, there was anything missing in them.

Respondents were not always well-positioned to answer all questions across all of the Golden Rules 'themes'. In these cases, respondents answered within the domain of their knowledge and experience of the industry. The Golden Rules in general are quite broad. They can be clustered into 7 overarching themes:

- Measure, disclose and engage
- Watch where you drill
- Isolate wells and prevent leaks
- Treat water responsibly
- Eliminate venting, minimise flaring and other emissions
- Be ready to think big

³ It should be noted that these categories are somewhat fluid, as stakeholders tend to move between them, or occupy positions in more than one category. Although sample sizes are too small for statistically significant analysis, we have presented some findings by stakeholder category as they nevertheless provide a useful insight into the multiple viewpoints.

- Ensure a consistently high level of environmental performance

In some instances, mostly due to time constraints, respondents gave summary ratings of between 1 and 5, (where 1 is poor and 5 is excellent) for the 7 overarching clusters of rules.

A total of 32 interviews were conducted, with an average length of 45 minutes. The interviews were recorded and the project team also took research notes. This audio data and research notes were then shared across the project team to collaboratively distill key insights about the Queensland CSG industry.

The project team developed this novel methodology for a number of reasons. Firstly, we deemed that an analysis of records and reports of industry performance alone would not capture the richness of the multiple dimensions industry and government performance, and of 'social licence' and community acceptance. Therefore personal interviews were conducted with those with direct experience of the industry as the main method of generating data.

Second, the project team asked interview questions that examined the interplay between company practice and government policy/regulations. Interviews with government-based respondents were regarded as providing the team with the best opportunity to explore to what extent the regulatory and policy environment supported and/or led industry practice.

Third, the project team chose a mixed method approach by combining qualitative data with a quantitative survey during the interview. The project team sought to develop an evaluation tool that can be applied to evaluate the performance of an unconventional gas industry against the Golden Rules in any jurisdiction, but also take into account local, contextual factors. The method produces an 'index' or 'scorecard' but can also capture the rich, contextual data underpinning the numbers. Qualitative approaches come with some disadvantages however. Respondents for example were asked retrospective questions about the development of the CSG industry in Queensland. This carries some risk about both the accuracy of their recount and the potential for bias in these responses. To mitigate this risk, we asked many questions and sought multiple perspectives.

A mixed methods approach can also provide important context to numerical values such as historical, geographical, institutional, and cultural nuances behind a particular survey score. The mixed methods approach also provided the opportunity for the project team to 'probe' for further explanation when variances were observed across the three constructs in our methodology. For example, where industry practice was scored high but the policy environment scored low, then the project team examined this more closely, seeking further elaboration and explanation.

4 Findings

In this section we describe our findings in relation to the Golden Rules. First, we describe and analyse the responses directly relating to the Golden Rules. A total of 32 responses were collected including 12 industry stakeholders, 8 government, 8 community and 4 experts. Secondly, we describe cross-cutting themes that emerged from the respondents' comments across the rules.

4.1 Golden Rules ratings

Figure 4 below shows a summary of the respondents' qualitative rating of each of the Golden Rule 'clusters'. A gradual scale of 1 to 5 was used where 1 represents 'very poor' and 5 represents 'very good' performance for industry practice and the policy and regulatory environment. For importance for community acceptance, 1 represents 'very low' and 5 represents 'very high'. The mean score of all responses is shown, but the range of responses varied between 1 and 5 across all of the golden rules.

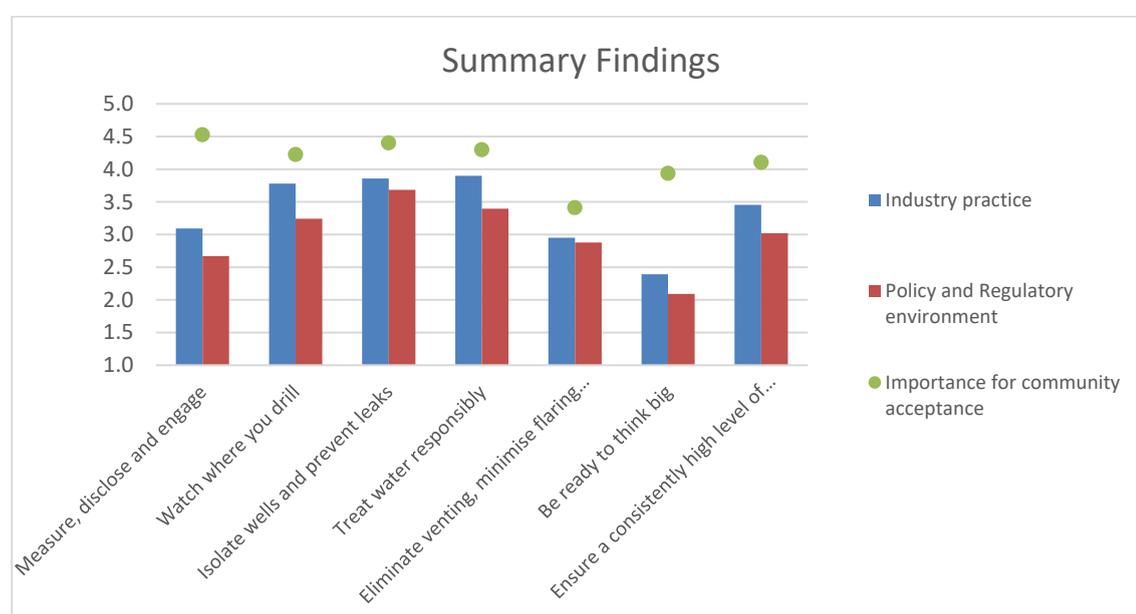


Figure 4 Summary Findings

A general and perhaps unsurprising observation, is that importance for community is always higher than the extent to which industry practice or policy and regulations is perceived to be aligned with the Golden Rules. There are two Golden Rules with higher gaps than the rest - these are 'measure, disclose and engage', and 'be ready to think big'. Another observation is that scores for industry practice are consistently higher than for policy and regulatory environment.

4.1.1 Measure, disclose and engage

The 'measure, disclose and engage' cluster contains four rules:

- Integrating community engagement across the lifecycle
- Baselining environmental indicators and continuous monitoring
- Measuring and disclosing operational data
- Minimising disruption and taking a broad view of responsibilities, including sharing benefits with local communities

Company practice across these four rules had a mean rating of 3.1. The policy and regulatory environment was rated slightly below at 2.7, and respondents rated the importance of following these rules for community acceptance the highest out of all the rules, with a mean score of 4.5. The first of these rules, around integrating community engagement, received the lowest mean scores for both industry practice (2.8) and the policy and regulatory environment (2.3), and yet the highest rating for the importance of community engagement at 4.7.

Interviewees noted that community engagement efforts were extensive during the environmental approvals phase, and when negotiating a conduct and compensation agreement with a landholder. However, community members particularly mentioned how once these approvals or contractual requirements were in place, the amount of community engagement appeared to reduce significantly. For another community member, no amount of engagement would lead to community acceptance and the assumption that following the Golden Rules would result in acceptance was described as “industry-centric” and “arrogant”. Other participants believed the industry operated responsively and transparently. Referring to a suspected toxic spill, one community stakeholder lauded the company’s transparent response:

“[They] picked up an issue, I think it was a BTEX spill⁴, they stopped work, disclosed it and then found out the issue. That’s where we want to be!” (Community member 1)

In a similar vein, a landholder pointed out the responsiveness of companies when things did go wrong, describing the efforts of a CSG company and a level of reciprocity that helped him:

*“Even though they are doing their damndest to keep their disruption (on my business) to a minimum, sometimes sh** happens. But that’s okay, this is a completely unintended thing and just bad luck. This is what is happening during operations. This is something they did not ever think that would happen. They are desperately working it out. Their outcomes are exactly what I want”. (Community member 3)*

However, experts pointed out the challenges in achieving meaningful and equitable community engagement. Community engagement by companies was frequently described as “one-sided” in that it was seen to be designed to achieve outcomes for the company, to achieve their purpose, and not necessarily for the good of the community. This quote from industry can be seen as an example:

“You can sit down with someone and they nod their head but they are not really fully engaged. It’s more than just listening to concerns and responding appropriately. It is preparing the ground before you go forward” (Industry member 4)

One community stakeholder highlighted perceived inequity in engagement activities, explaining how “only key people [in the community] got to know what was going on”.

In summary, a picture emerges of a community engagement that was seen as extensive and largely transparent, but also to some extent, was seen by some as reactive and lacking inclusivity.

⁴ BTEX is a commonly used term referring to the chemicals benzene, toluene, ethylbenzene and xylene, which are known to be carcinogenic. BTEX compounds are banned in Queensland and have not been used in CSG operations (<http://statements.qld.gov.au/Statement/Id/71854>).

The 'gap' between the scores for industry practice and the importance of the rule for community engagement is large for this cluster of rules. While industry practice scored relatively low, the policy and regulatory environment scored even lower, suggesting there is demand for more coordination and leadership from government in relation to standardised best practices for community engagement, better disclosure of operational data and ensuring that local communities partake in the economic benefits of gas extraction. Participants frequently commented on the perceived lack of government interventions to support this type of engagement.

Measure, disclose and engage	Industry practice			Policy and Regulatory environment			Importance for community acceptance		
	Mean	St Dev.	Mode	Mean	St Dev.	Mode	Mean	St Dev.	Mode
Community engagement	2.9	1.1	4	2.3	1	2	4.7	0.4	5
Establish baselines	3.2	1.1	4	3.0	1.2	3	4.4	0.8	5
Disclose operational data	3.3	1.3	3	2.7	1.1	2	4.3	0.7	5
Minimise disruption, share benefits	3.0	1.2	4	2.6	1.1	2	4.6	0.6	5

Table 1 Stakeholders' mean scores for the individual components of Measure, Disclose and Engage. The mode is the score that most people gave. The standard deviation is the amount of variation in the responses from the mean score – the smaller the value, the lesser the variation.

Results can also be analysed by stakeholder group, albeit with caution due to small sample sizes. For the Measure, Disclose and Engage rule, stakeholders within the CSG industry generally ranked industry practice and the policy and regulatory environment higher than other stakeholders. Community stakeholders ranked industry practice and the policy and regulatory environment second highest. Both government and industry stakeholders ranked the importance of this rule for community acceptance highest. Government stakeholders and experts were the most critical of the Queensland CSG experience in terms of both industry practice and the policy and regulatory environment.

Stakeholder group	Industry practice	Policy and Regulatory environment	Importance for community acceptance
Industry	3.6	3.0	4.6
Community	3.0	2.5	4.4
Government	2.4	2.3	4.6
Experts	2.7	2.2	4.1

Table 2 Mean scores by stakeholder group for the Golden Rule: Measure Disclose and Engage

4.1.2 Watch where you drill

The 'watch where you drill' includes:

- Choosing well sites to minimise impacts
- Surveying and assessing risks before drilling and fracturing
- Monitoring hydraulic fractures

Overall, the *watch where you drill* cluster scored relatively highly, at 3.8 for industry practice, and 3.2 for the policy and regulatory environment. In terms of importance for community acceptance, these rules were also rated relatively high, at 4.2.

Specifically, in relation to the rules around monitoring hydraulic fractures and surveying and assessing prior to drilling and fracking, respondents commented on the commercial interests of proponents of getting it right, and argued that company performance therefore was good.

“Companies are not going to waste money when it costs them millions of dollars to frack a well. /.../ They’re bloody five out of five now. They monitor this to the hilt.” (Community member 5)

The first rule in this cluster, about choosing well sites, elicited more mixed responses. A landholder described his surprise that, after investing substantial time in engaging with a company scouting well sites at his property, the actual locations proposed by the company were different. Landholders witnessed a disconnect between decision-making from Brisbane, some hundreds of kilometres away, and the landholder directly impacted by well locations.

“The ‘Brisbanites’ thought that these were concept maps, they didn’t feel constrained to actually pay any respect to the plans /.../

I actually believed that what we had agreed in the scouting phase, which I had spent days and days and days on, was actually what was going to happen. It was like it was a different world. We did it in our world, and they did the mapping in their world, and it all (the sites that were chosen) came out in their world /.../

... and what was most frustrating was they didn’t feel the need to tell me that they had changed it.” (Community member 3)

Thus, despite the relatively high ranking these rules received, these comments highlight the challenge companies experience when taking into account localised factors such as landholder expectations or local geography. The difference between community scores and those of other stakeholders can be seen in Figure 5 below. Industry stakeholders did not think this rule was as important to community acceptance as the other stakeholders. While industry scored itself highly (4.2/5), community stakeholders scored much lower (2.8/5).

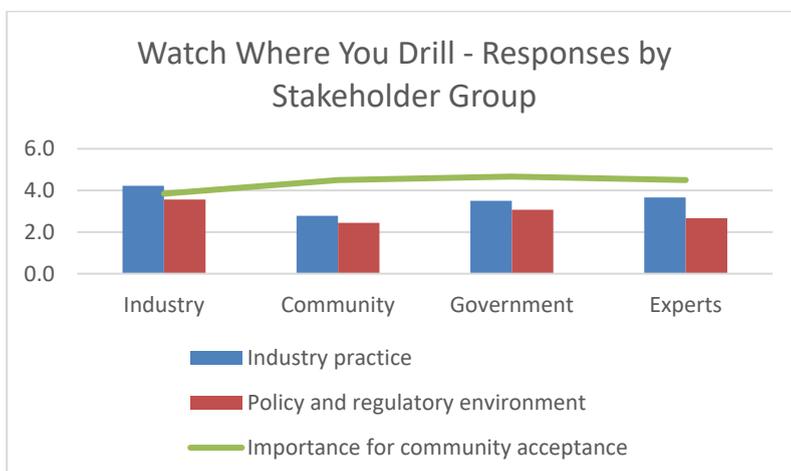


Figure 5 Difference (mean scores) between stakeholders for the Golden Rule: Watch Where you Drill (WWD).

This rule highlighted the importance of considering changes over time, with many participants commenting on the improvement made by companies over time. It was explained that initially the well sites were chosen based on a near perfect 750 meter well spacing grid, with no consideration for local landscapes, production patterns or contours. Over time, and largely in response to landholders' concerns as well as technical advances, companies became more willing and able to negotiate the placement of wells with landholders and other stakeholders. As taking such factors into account arguably requires engagement with local community stakeholders, the challenges of community engagement identified above are reflected again here.

4.1.3 Isolate wells and prevent leaks

The cluster around *'isolate wells and prevent leaks'* contains three rules:

- Put in place robust rules on well design
- Consider minimum depth limitations on hydraulic fracturing
- Prevent and contain surface spills

Overall, this cluster of rules was scored second highest by respondents for industry practice, and highest for policy and regulation. Industry performance in relation to these rules was rated highly among all participants, (3.9/5) with policy and regulation not far behind at 3.7. In terms of importance for community acceptance, this cluster of rules was rated second highest, at 4.4.

A key factor mentioned by respondents was the CSG well design code of practice (Queensland Department of Natural Resources and Mines 2018), a document developed collaboratively between government and industry defining objectives, including minimum enforceable standards, and good industry practices for all aspects of well design and construction. This is a case where technical input has come from the industry and government has accepted the standards. As a one respondent noted:

The CSG well design code is extremely robust and holds up well beyond some of the other legacy well design issues that come up in agricultural water bores. (Industry member 3)

However, the high scores do not tell the full story. Many participants answered "don't know", or did not feel they knew enough to provide a reasonable score for this rule. Only 1 expert, and 3 community members provided a score for this rule. Similarly, although well integrity issues can pose major environmental risks and the importance of following these rules for the acceptance of the industry was scored highly, this cluster of rules did not elicit many comments from stakeholders. This could be because the rules in this cluster are more 'technical' in nature and difficult for people to understand, or that there have not been many incidents of a serious enough nature to elicit a stakeholder response. The high scores may also suggest a degree of trust that industry and government have processes in place to address these issues, although the scores from community stakeholders were generally much lower than those from industry and government.

4.1.4 Treat water responsibly

The three rules around *'treat water responsibly'* include:

- Reducing freshwater use
- Storing and disposing of produced water safely
- Minimising the use of chemical additives

Overall, industry practice in relation to these rules were rated highest at 3.9, marginally above the isolate wells and prevent leaks rules. The policy and regulatory environment was slightly behind at 3.4. In terms of importance for community acceptance, these rules received a high rating of 4.3. When examined by stakeholder group, it is not surprising that community stakeholders scored this rule 4.8 out of 5 for importance to community acceptance, although industry also saw the importance of this rule with a score of 4.7 out of 5.

Concerns around impacts to groundwater quality and quantity were one of the issues behind some of the movements formed to protest against CSG in the early days of the industry. In that context, it is interesting to note that industry performance was rated as high as it was, although again, when examined by stakeholder group, community scores were much lower at 3.0 out of 5, compared to other stakeholder groups who scored 3.9 (government), 4.0 (experts) and 4.3 (industry) respectively.

This was another rule which reflected improvements in both industry practice and the policy /regulatory environment. A key factor mentioned by several respondents was the Office of Groundwater Impact Assessment (OGIA) established by the Queensland Government. The regulatory framework around groundwater management included declaring the gasfields a cumulative impact area, requiring gas companies to undertake baseline assessments, and entering into make good agreements with landholders whose water bores were assessed to be impacted. OGIA has also produced publicly available underground water impact reports, and the groundwater regime further includes aspects of citizen monitoring and regular outreach and community engagement (Queensland Government n.d.).

Commenting on the practice of re-injection of treated CSG water into the aquifers (which occurs in some parts of the gasfields), one landholder said:

“The regulatory environment and the companies get a big tick on treating water responsibly, they really do. They are doing a stunning job with reinjection. The quality and the quantity of the reinjected water is unbelievably high”. (Community member 3)

Further, many respondents (particularly among the government and expert stakeholder groups, but also within the community) noted that a side effect of the industry was an increased knowledge and understanding of groundwater resources, as an important community asset in the gasfields.

Participants also commented on the downsides of an overly stringent regulatory environment, where CSG water was treated as waste. One respondent commented how CSG water was treated differently to stock water, even when it was sourced from the same formations:

“It is exactly the same water yet [the CSG water] is defined as a hazardous waste because it is by-product of the industry /.../ You cannot spill a litre of it without creating an incident.” (Government member 1)

This issue was also raised by government and industry stakeholders as an example of overly-prescriptive (and restrictive) regulations, while at the same time recognising the importance of treating water responsibly for community acceptance.

Another issue mentioned in relation to water management was that of the distribution of benefits (which ties in with the first set of rules). Whilst some respondents praised the industry’s attempts at re-injecting

water or providing treated water to landholders for irrigation, some respondents pointed out inherent inequities. It was felt that some landholders across the Surat Basin might be benefitting more from this practice than others, and that may be a cause for community discord.

“That is no help to someone on the Darling Downs who is taking their water out from 60-70m down and it is just disappearing out of sight. For them, it is horrific. That’s a great community divider that one”. (Community member 3)

Overall however, the high scores assigned to industry and the policy and regulatory environment in relation to these rules suggest this is an area of importance to the community. Scores indicated that both the CSG industry and the policy and regulatory environment had performed well.

4.1.5 Eliminate venting, minimise flaring and other emissions

The ‘*eliminate venting, minimise flaring and other emissions*’ cluster contains two rules:

- Target zero venting and minimal flaring during well completion, and reduce fugitive and vented greenhouse gas emissions
- Minimise air pollution from vehicles, engines, pumps and drilling rigs

Overall, both industry practice and the policy and regulatory environment received average scores for these rules, with industry practice at 3 and policy and regulatory environment at 2.9. Interestingly however, stakeholder rated the importance of following these rules for community acceptance the lowest, at 3.4. This was another rule where many participants felt they did not know enough about industry practice or the policy/regulatory environment to be able to score or comment.

In terms of venting and flaring, industry stakeholders pointed out the commercial interest in reducing venting and flaring, but also commented on the necessity to undertake some flaring in the well completion process.

“There’s a commercial incentive to minimise product loss.” (Industry member 3)

They also commented on how the policy and regulatory environment prohibited them from capturing and selling gas from exploration wells, leaving them no alternative but to vent and flare.

The second rule, around minimising emissions from vehicles, rigs and pump engines, elicited a range of different responses from stakeholders. Many stakeholders pointed out that air emissions from vehicles and engines was a non-issue both for industry and community, and that the main community concern was noise and dust, and consequently rated the importance for community acceptance relatively low.

“Noise is what worries people, not air pollution.” (Community member 5)

“Never hear anybody mention this. It’s different if you include noise” (Industry member 4)

“Perhaps we should be car-pooling” (Industry member 1)

Others pointed out improvements made in relation to this rule included hiring buses to bring workers to the site, and in-vehicle-monitoring-systems (IVMS) to track speeds and location of company vehicles which

may be generating dust. Such comments point to the importance of local context when considering the Golden Rules. In the United States, high volumes of truck traffic and their emissions, particularly for towns in mountain valleys, are a major concern. In the rural setting in Queensland, where there are very low baseline levels of noise, noise pollution may be a more immediately felt impact than air pollution.

4.1.6 Be ready to think big

This cluster of Golden Rules consists of two elements:

- Seek opportunities for realising the economies of scale and coordinated development of local infrastructure that can reduce environmental impacts
- Take into account the cumulative and regional effects of multiple drilling, production and delivery activities on the environment, notably on water use and disposal, land use, air quality, traffic, and noise

This cluster of rules was rated lowest by respondents, at 2.4 for industry practice and 2.1 for the policy and regulatory environment. In terms of importance for community acceptance it was rated at 3.9, demonstrating a gap between performance and community expectations.

These rules address coordination and management of cumulative impacts, and relate to both company and government practices. One company representative described this area as “one of the largest missed opportunities” for the industry, mentioning that while cumulative impact management had been good in relation to groundwater, it was lacking in other areas. Other industry stakeholders pointed out the near concurrent construction of three export pipelines and LNG plants side by side as other examples of failings in this regard, but also explained the financial and legal impetus that resulted in that outcome.

Participants frequently commented on the lack of government action in enforcing coordination and management of cumulative impact. Overall, there was a general sense that multiple levels of government had neglected or chose not to intervene to minimise impacts and enforce cooperation and coordination. Perceptions of government inaction were directed at all levels of government, albeit through different mechanisms. For the federal government, respondents noted the absence of a strategic and coordinated energy policy, for state government, concerns related to a lack of oversight and approvals, and for local government, respondents criticised a lack of foresight and planning for adequate growth.

“Where the hell was the local council? They must have been absent without leave in this process. How was all of this allowed to happen? They must have known at some point that the [housing] approvals that they were issuing were way over the top for what was required” (Community member 3)

“It was more of a money grab than a resource management exercise” (Industry member 2)

The importance of these rules for community acceptance at 3.9 was rated second lowest by respondents. However, the ‘gap’ between performance and importance for community acceptance was the highest for this set of rules. This is discussed more detail later in the report.

4.1.7 Ensure a consistently high level of environmental performance

This cluster of rules consists of five rules:

- Matching oversight resources with expected levels of output
- Balancing prescriptive and performance-based regulation
- Ensuring robust emergency response plans
- Pursuing continuous improvement
- Recognising the case for independent evaluation of environmental performance

Overall, industry practice rated reasonably high for these rules, at 3.5, and the policy and regulatory environment was rated at 3. Importance for community acceptance was rated at 4.1.

Whilst these rules are fairly broad in scope, the common denominator is the environmental management regime. Although scores were reasonably high, the challenged role of government appeared in many respondent comments, often reasoning around the motives of government action or inaction. Some stakeholders commented on the lack of objectivity of the government in regulation the environmental performance of the industry:

“if you look at it overall it’s not a pretty picture. The majority realise the government is not an independent player.” (Community member 2)

On the contrary, however, one stakeholder described the regulatory environment with some empathy:

“I don’t think that there is a department that is purposely making things hard but they do get tied up with the ‘box-ticking’ exercise”. (Government member 1)

Some respondents commented on the appropriateness of the environmental regulatory regime, suggesting that regulations were too many and too prescriptive. It was suggested that this was a response to the social contestation around CSG, rather than its environmental risks.

In a similar vein, it was also pointed out by some respondents that that whilst a performance-based regime might provide better outcomes, communities sometimes wanted to see “strict” regulation. Other respondents commented that the industry itself had used the number of conditions it had to comply with to argue that the risks associated with the industry were in fact well controlled. In summary, the picture that emerges in relation to these rules is quite mixed. Company practice and the policy and regulatory environment were rated as average compared to the other rules, and respondents’ commentary suggested stakeholders held divergent views on what an appropriate environmental management regime should entail. This arguably reflects the challenge governments face when seeking to regulate the environmental performance of unconventional gas industries. This is discussed in more detail later in the report.

4.2 Major themes across the Golden Rules

Two major themes cutting across the Golden Rules emerged from the interviews:

1. An almost unanimous view that the industry had improved its performance over time
2. The challenging role that all levels of governments face in planning for, regulating and responding to the industry

4.2.1 The industry has improved

The most pervasive theme throughout this evaluation was that the CSG industry is perceived to have improved its practices as it learned to adapt from an offshore to an onshore operating environment. Although described as “reactive” and “lagging” in some areas, the policy and regulatory environment was seen to have improved. This included the need for the unconventional gas industry to interact with existing industries, communities and local economies. Nearly every participant pointed out improvement across one or more of the Golden Rules. Statements like “I would have given them a one in the beginning and a four now” were common across all stakeholder categories.

Many participants explained how this improvement had come about, and offered their own interpretation of the drivers of change. Factors proposed by participants included the regulatory environment “forcing” companies to improve, the efforts of individual change agents (usually in a senior position) within the companies, commercial incentives “not to waste money” or for more efficiency in production, health and safety expectations, or in response to feedback from the interactions with local communities. One community stakeholder neatly summed up his view, but added in uncertainty about motivation to his observation:

“Companies realised they were a part of the community – that was the change, but I don’t know where it was coming from.” (Community member 5)

4.2.2 The complex role of government

Another pervasive theme across stakeholder groups was the complex role of government. Notably, the policy and regulatory environment was consistently rated lower than industry practice, with criticism directed at all three levels of government. Government was described as “absent” and “bungling”. One government stakeholder explained that, without any precedent or previous exposure, government staff did not understand the operating environment of the industry well enough to be proactive in establishing regulations and controls. Community stakeholders described feeling “abandoned” by government, who they perceived to be supportive of the industry as demonstrated in their unwillingness to restrict it. Community stakeholders expected stronger leadership from government, specifically in relation to cumulative and regional effects. For example, “Why did they need to build three of everything? The government should have stepped in there and just made them share”.

Other comments around the role of government were in relation to community engagement. “Where was the government in all that?”, asked one community member in relation to the initial community engagement about the industry, the range of community responses, and increasing social division and conflict (largely fueled by urban media) as the industry progressed.

Some participants provided opinions about the reasons for this “absence” by governments. A common

opinion among community members was that governments were only considering the economic incentives, such rates for local governments and royalties for state government. There were expressions such as “it was a money grab” and “government acted like a junkie on crack”. Other comments were around the fact that the CSG industry was new, and the rapid pace of development was difficult to match through the much slower process of regulatory change. For example, “government was playing catch up” (Government member 2).

One frequently provided example of “good government leadership” (from all stakeholder groups) was the groundwater management regime and the establishment of the Office of Groundwater Impact Assessment. This was described as both “world class and “world leading”. Positive comments were also provided in relation to the policy around well integrity - the CSG well design code of practice. Of note is that where the regulatory environment was thought to be strong, i.e. in Golden Rules relating to water and well integrity, the scores for industry practice were also higher. This suggests that where the regulatory environment is seen to adequately address a key risk area, trust and belief in industry performance is higher.

As well its regulatory role, governments also play a key enabling role. Bipartisan political support for the industry from both major parties in the Queensland Parliament was a key factor in enabling the development of the industry in Queensland. This is in contrast to other Australian States where CSG development has been hindered and stalled. There is clearly a fine balance between creating incentives for investment and facilitating the development of the industry and creating a robust regulatory environment to ensure that development is carried out in way that adheres to the Golden Rules and meets community expectations.

These findings suggest the Queensland Government, as well as the federal government, and local councils were faced with a challenging role of supporting the industry, regulating it appropriately, as well as advocating on behalf of community members affected by the industry. This challenge was exacerbated by the rapid pace of industry development. The performance in achieving this balance appeared mixed, containing both good examples and some areas for improvement.

5 Discussion

This pilot study, conducted in 2018, evaluating the CSG industry in Queensland in relation to the International Energy Agency's *Golden Rules for a Golden Age of Gas* (2012) was aimed at understanding the extent to which the experience of CSG development in Queensland aligned with the Golden Rules, and also to understand how well the Golden Rules can be used as an evaluative framework for assessing and comparing experiences of unconventional gas developments in other jurisdictions.

We found that industry practice for the clusters of rules addressing well integrity, water management and choosing well sites were scored highly by many respondents. In contrast, the rules relating to thinking big and eliminating venting and minimising flaring were scored lowest. The measure, disclose and engage cluster of rules were scored highest for importance for community acceptance, and the rules around venting and flaring scored as least important. Further, the 'gap' between industry practice and the policy and regulatory environment on the one hand, and importance for community acceptance on the other, were highest for *measure, disclose and engage*, and *be ready to think big*. Further, nearly all respondents pointed out that industry practice had improved over time and that the role of government was complex, at times lagging, but also in some instances displaying world-leading regulatory regimes.

In this section we discuss the implications of these findings for CSG industry in Queensland, as well as what the findings say about the Golden Rules themselves. The section concludes with a reflection on limitations of this study, and suggestions for future studies.

5.1 Implications

The Golden Rules of Gas were developed in the context of seeking to improve the community acceptance of the unconventional gas industry. Our analysis suggests some key implications for the CSG industry in Queensland, for jurisdictions where unconventional gas developments are yet to take off, and for the Golden Rules themselves. Improvements in community engagement and disclosure, as well as cumulative impact management seems to be the key opportunity for the CSG industry in Queensland as well as for unconventional gas developments in other jurisdictions. Further, the Golden Rules can be reviewed with a view to increase its focus on social performance. Finally, our findings suggest the trajectory of performance against the Golden Rules may be more important than static performance at one point in time.

5.1.1 Community engagement and disclosure are key improvement opportunities

Our findings suggest that the *'measure, disclose and engage; isolate wells and prevent leaks; and treat water responsibly* rules are the three most important rules to align with for the Queensland CSG industry, when considering importance for community acceptance. Industry performance in relation to well isolation and leak prevention and responsible water treatment was also rated fairly high. In contrast, our findings highlight a 'gap' between importance for community acceptance and industry practice for measure, disclose and engage, suggesting this is an area for improvement. This was further supported by the commentary given by the respondents.

Engagement with communities was seen to have improved over time as the industry began to understand that, in contrast to its earlier developments offshore and in very remote areas, it needed to operate as a part of the social and economic fabric of the regions it operated in. However, there were still many mentions and examples provided of community engagement that was seen to be transactional in nature,

where the engagement was purely to achieve an industry-set agenda or purpose. Comments about engagement suggest that companies engage “only when they needed something” from communities or landholders. This suggests that the industry is not yet fully meeting community expectations in relation to community engagement, in terms of establishing and maintaining relationships of two-way conversation and information sharing.

The difference in industry and community scores around the third component of the rule around social and environmental responsibility and ensuring local benefits is particularly striking. Industry believed it performed well in this rule but community scores were some of the lowest. This suggests a misalignment of community’s expectations of benefits and industry’s views about ensuring local benefits.

As this cluster of rules was rated the highest in relation to its importance for community acceptance, it appears community engagement and benefit sharing is an area where practice improvement by the industry could be beneficial for both communities and the industry.

5.1.2 Coordination and cumulative impact management can be improved

The rules around ‘*be ready to think big*’ address coordination and management of cumulative impact and were rated lowest for both industry practice and policy and regulatory environment. Among all the clusters of rules, the gap between performance and importance for community acceptance is largest for this set of rules, suggesting there is opportunity for improvement in relation to these.

Much of the commentary in relation to these rules related to capital investment decision made in the development phase of the LNG export projects, in particular the development of the three main export pipelines and three LNG plants. Some additional commentary related to the lack of coordination in airports used for transport of staff during this period. It therefore seems that the low ratings and attendant criticism is a function of decisions made previously, and that the scope for improvement may not be as large as the numeric gap suggests. However, as the industry continues to develop and mature, there may be incremental opportunities to improve coordination. Overall, there is a lesson for developers and regulators in other jurisdictions to take management of **cumulative** impacts seriously.

5.1.3 The Golden Rules can be improved with an increased focus on social performance

When asked to comment on the Golden Rules themselves, most respondents mentioned the cluster of rules relating to community engagement and benefit sharing, indicating the centrality of these rules. Many respondents pointed out that “community” is not a homogenous term, and that the Golden Rules to some extent framed it as such.

“There’s nothing about boom and bust /.../ there’s nothing [in the Rules] about landholders /.../ there’s also nothing about Indigenous people. That’s important in an Australian context.” (Industry member 5)

“Managing activist groups need to be considered. They need to be respected but they also play a role in creating misinformation, creating difficulties for genuine engagement.” (Community member 5)

“The people on the periphery, that don’t have infrastructure on their property, gets treated the same way as the shop owner in town” (Industry member 1)

Another set of comments related to how the Golden Rules, whilst being developed in the context of community acceptance, were industry-centric in their framing.

“... paternal in their approach, don’t have the community at the centre.” (Industry member 6)

“the thing that isn’t in there is /.../ coexistence – competing land uses between the host and the intruder, if you like.” (Industry member 2)

“They assume that by following all these they will gain community acceptance. But what if the community just plain doesn’t want it?” (Community member 6)

These comments point out that the Golden Rules have a distinctly industry-centric framing. The rules are framed around a set of standards for what industry and governments should “do” in a set of key risk areas in order to be granted acceptance by the community. The assumption contained within this approach is that if company or government performance is of certain kind, community acceptance will follow. These comments, and the fact the rule cluster focusing on community engagement and benefit sharing was rated highest for community acceptance by respondents, suggests that the rules themselves, as well as industries wishing to improve their performance, would do well to place the community experience in the centre.

5.1.4 Is trajectory the key?

The findings about how the CSG industry had improved its performance in relation to the Golden Rules, sometimes from low levels seem to suggest that it is possible for an industry to establish itself with relatively low performance in some of the Golden Rules areas. This indicates that ‘high’ performance against the rules is not an absolute pre-requisite for the initial establishment of an industry. However, it does suggest that a positive trajectory is the key; and that an industry needs to **display** improvement in how it performs against the rules over time. In the case of CSG in Queensland, the fact that so many respondents pointed out industry improvement, may seem to have been a deciding factor in it being able to be established and grow.

5.2 Limitations and directions for further study

The aim of this pilot study was to provide a reflection of the Queensland CSG experience from a variety of stakeholder perspectives in relation to the Golden Rules.

It is important to consider limitations of the study. Firstly, the retrospective nature of the questioning introduces the risk of hindsight bias. The project team made every effort to seek alternative perspectives to provide a balanced view of the development of the industry and the performance of both the CSG industry and the Queensland Government. Secondly, the retrospective nature of the questioning made it difficult for respondents to provide an overall rating, particularly as (as noted above) many pointed out issues that had happened in the past and the change in performance over time. This improvement in industry practice was a strong theme across the data, however it was difficult to obtain scores across each phase of the industry and across each of the Golden Rules. Lastly, this study was limited to the Queensland CSG industry, which means that findings may not be generalisable to other jurisdictions. Local factors are essential to social licence to operate and every area varies in a range of contextual factors.

The research showed the Golden Rules translate well into an effective evaluation framework. They also

lend themselves to being used to clearly show the real-world impact of research in natural gas. Further studies on the applicability of the Golden Rules can be undertaken in other jurisdictions at different phases of the gas development cycle to uncover the tension between global standards such as the Golden Rules, and the role of contextual factors. The observation that the trajectory of performance against the Golden Rules appears to be of importance in the granting of social licence, suggests that undertaking longitudinal research would help to gain a better understanding of how performance against the rules changes over time.

In relation to the Queensland experience, the largely positive responses from respondents about company practice and the policy and regulatory environment for groundwater management in particular, and to well integrity, suggest that these themes warrant further study. The groundwater management regime in particular, with its combination of cumulative impact management, monitoring and disclosure, community engagement and citizen science has emerged as an interesting case study of where a 'technical' domain is meshed together with a 'social' domain. Further study could investigate how this management approach emerged, and the role it may have played in allaying community concerns around groundwater impacts.

Finally, CSG companies in Queensland access land for development through negotiations with, largely private, landholders. As noted in the introduction, there were 3,900 active compensation agreements between landholders and CSG developers in 2017. This is a contextual factor that is largely obscured in our study. The Golden Rules, and by consequence our questions, do not explicitly mention landholders or land access, potentially leading respondents to under-appreciate their role in the evolution of the industry. Further research could investigate how the practice of land access has evolved, and the role it may have played in legitimising the CSG industry.

In closing, it is important to note that bipartisan political support is central to being able to establish and develop an industry. Such bipartisan political support has been instrumental to successful and rapid development in Queensland, whereas, development across the rest of Australia has been hindered by fear of a voter backlash.

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