The patchwork approach to the regulation of fraccing and unconventional gas in Australia

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ABSTRACT

With hydraulic fracturing, shale gas, tight gas and coal seam gas continuing to be a target for environmental and landholder groups, and an issue politicians of all stripes continue to grapple with (in both cases, often without understanding the nuances of what those various terms mean), the legal framework under which they are regulated is changing rapidly.

From the moratoriums in Victoria and Tasmania through to the more open regimes operating in Queensland, SA, WA and the NT, the regulatory responses have varied wildly across Australia. This has resulted in investment outcomes being focused in those states and territories where the regulatory framework for unconventional gas is more welcoming. There are also regimes undergoing development as this paper was being written, as is presently occurring in the NT with the release of the Onshore Oil and Gas Guiding Principles, the pause and reset that is occurring in NSW with the implementation of the NSW Gas Plan, and the recent WA and anticipated SA responses to recent parliamentary inquiries.

This paper provides a comparative analysis of where the legal frameworks in the various states and territories presently stand on some of the key issues for unconventional gas developments, and considers likely future developments in those legal frameworks. Regarding future developments, the paper covers both the short-term outlook based on announced inquiries, policies and processes, and whether there is hope in the medium to longer term—with some political will, the assistance of further scientific inquiries and a longer period of practical experience with unconventional gas operations Australia—of the convergence towards a more consistent regulatory approach across Australia.

KEYWORDS

Hydraulic fracturing (also known as fraccing, fracking or hydraulic fracturing stimulation), unconventional gas (also referred to as unconventional gas, as used in this paper), shale gas, tight gas, coal seam gas (also referred to as coal bed methane), onshore gas, overlapping tenements, water, water trigger, regulation, law, reform, moratorium, harmonisation, BTEX chemicals.

INTRODUCTION

With the emergence of the unconventional gas sector in Australia, the regulation of hydraulic fracturing, shale gas, tight gas, coal seam gas and other issues relating to unconventional gas developments is now exercising the minds of politicians in many Australian jurisdictions. That consideration is occurring in the context of active environmental and landholder groups (like Lock the Gate), a lack of understanding outside the industry about what unconventional gas developments involve, declining conventional resources in some of Australia’s well-developed oil and gas fields, and export-focused LNG facilities and domestic gas needs providing a market for unconventional gas developments.

The starting point in all jurisdictions has been to regulate unconventional gas using the same legislative framework that applies to conventional petroleum operations, and then to consider what supplements are required to that. While the petroleum products produced from unconventional gas developments are not functionally different to those from conventional developments, there are unarguably different issues that arise, which traditional petroleum legislation has not previously anticipated or had to resolve. As such, previous petroleum legislation has typically been recognised as requiring amendments (or differences in application) to deal with those differences.

As onshore petroleum is principally regulated by the various states and territories, albeit with a degree of Commonwealth regulation also applying, a patchwork of different regulatory regimes have developed across the country. To make matters more complicated, that patchwork is rapidly evolving in response to new scientific findings, industry experience and policy developments in Australia and internationally. Regulation is also occurring through a mixture of petroleum legislation, environmental and water legislation, and a mixture of legislation and non-legislative policy decisions and documents. These factors were part of what led the Chief Scientist’s independent (and final) review into coal seam gas in NSW to describe the ‘complex and opaque legislation and complex regulatory processes’ as a key concern to be addressed.

Some degree of difference between states is both expected and appropriate. The focus in Queensland and NSW is, given those states’ extensive coal resources, on coal seam gas development. Other jurisdictions are focused on shale and tight gas developments. It is clear, however, that a greater degree of harmonisation in approach would be preferable for Australia’s unconventional gas industry, and there are early signs there may be some political will to achieve that in the longer term.

The present patchwork of regulation, however, will be critically important in shaping the more immediate future development of the industry. The next wave of onshore gas developments would be anticipated to occur in Queensland, SA, NT and/or WA, each of which have developed (or in the case of the NT are developing) a comprehensive regulatory regime applicable to unconventional gas developments, and bypass those states using moratoriums (Victoria and Tasmania) or policies that are perceived as strongly favouring alternative land uses (NSW).
UNCONVENTIONAL GAS—SIMILAR BUT NOT IDENTICAL CHALLENGES

While often clumped together, the various types of unconventional gas (coal seam gas, shale gas and tight gas) involve differences in geology and extraction procedures, and consequently pose some different regulatory challenges.

Due to the different permeability of the substances in which the gas is held, shale gas extraction at a commercial level will always involve hydraulic fracturing, whereas only a relatively small proportion of coal seam gas will do so. Furthermore, coal seam gas operations necessarily involve:

- operating in areas of coal resources, creating a need for regulatory regimes to deal with overlapping tenure granted under mineral (coal) and petroleum legislation and how conflicting coal and coal seam gas proposals are resolved;
- and,
- large volumes of water (that are often highly saline) being generated, creating a need for regulatory regimes to deal with issues associated with the water’s subsequent treatment and disposal and the impact of coal seam gas operations on other water users.

As a result, there are appropriate differences in approaches to the regulation of unconventional gas arising purely from the resources of each jurisdiction. The Queensland regulatory framework is focused on the coal seam gas industry, whereas the other unconventional-friendly jurisdictions are focused on the regulation of unconventional gas arising purely from the resources of each jurisdiction. The Queensland regulatory framework is focused on the coal seam gas industry, whereas the other unconventional-friendly jurisdictions are focused on regulation of the shale (and to a lesser degree tight) gas found in those jurisdictions. Figure 1 provides an overview of the basins containing Australia’s major unconventional gas resources.

At a national level the focus has principally been on coal seam gas as a result of the earlier large-scale coal seam gas developments, but it is anticipated that in time the application of Commonwealth regulations and national harmonisation efforts may also extend, to a greater extent, to other unconventional gas developments, and the author considers that this would be a positive outcome.

OVERVIEW OF THE PRESENT REGIMES

A comprehensive review of the regulatory regimes of each state and the NT in respect of unconventional gas is necessarily beyond the scope of a single paper. Table 1, however, provides a high-level snapshot of the existing approaches and anticipated reforms in the near-term across each of the Australian jurisdictions (excluding the ACT, which has no identified unconventional gas resources).

Australia’s regulatory landscape for unconventional is presently separated into the southeast states (NSW, Victoria and Tasmania), which have a range of policies that either prohibit, hinder or discourage unconventional gas developments, and the balance of the country (Queensland, SA, WA and the NT), in which each state or territory is pressing forwards with legislation and policies designed to promote unconventional gas development, subject to resolving appropriate environmental and safety protections. These differences in policy approaches have altered investment outcomes, and are now likely to bring about long-term structural changes in the east coast gas markets. That much is evident from the proposal to develop the Northern Gas Pipeline (connecting NT gas resources to the east coast gas pipeline network) to allow NT gas developments to fill a looming gas shortage in NSW, while gas resources in NSW itself remain undeveloped.

THE PATCHWORK OF POLICY APPROACHES

As should be evident from the overview presented in previous sections of this paper, the positions adopted by the various states and the NT vary substantially. That variance in part reflects a fundamentally different approach to policy making in this area, ranging from the most conservative approach of moratoriums (underpinned by policy akin to the precautionary principle), through to Queensland’s adaptive environmental management approach.

The precautionary principle provides that where there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation. That principle has been interpreted as effectively assuming irreversible environmental damage where a threat exists and there is no scientific certainty as to whether it will eventuate.

At the other end of the spectrum, with the benefit of a combination of practical experience internationally and in Australia, and an increasing number of studies and reviews being completed, the scientific uncertainty has been reduced to a point that policy makers in other jurisdictions have felt it possible to create a robust regulatory regime that permits the development of unconventional gas, but in a way that manages any residual risks and uncertainties. This approach is consistent with the findings of reports such as the O’Kane Report (2014) in NSW and the Hawke Report (2014) in the NT.

The challenges this patchwork approach—that has evolved from states taking divergent approaches—creates has at least been recognised by governments at all levels. The December 2015 COAG Energy Council meeting resulted in the release of a national gas supply strategy that acknowledged the critical role of unconventional gas in future gas supply and specifically provides for harmonising regulatory frameworks, improving collaboration between the states and territories to promote best practice, and greater sharing of geoscience and other information and data.

As will be evident from other parts of this paper, coal seam gas regulation is further along the path to harmonisation than regulation of other unconventional gas developments. While harmonisation efforts are clearly in the early stages, with policy development presently underway or reform proposals being given consideration, in Queensland, WA, SA and the NT, there is hope that greater consistency of the various Australian regulatory frameworks for unconventional gas might emerge. In particular it is notable that the recent WA inquiry6 has made a number of recommendations that would create greater alignment with Queensland’s regulatory framework, such as:

- land access arrangements using the Queensland Land Access Code as a guide;
- an independent body akin to the Queensland Gas Fields Commission as an arbiter for land access negotiations;
- banning of BTEX (benzene, ethylbenzene, toluene and xyylene) chemicals;
- baseline monitoring of aquifers; and,
- encouragement for water recycling.

The latter three of these recommendations are supported in WA’s recent response to the inquiry.
Queensland

Unconventional gas developments permitted, with numerous coal seam gas fields in operation. Existing petroleum, environmental and water legislation have been amended to provide for specific regulation regarding hydraulic fracturing, water impacts, regional planning interests, and overlapping tenements (principally for coal seam gas).

- Petroleum and Gas (Production and Safety) Act 2004 (and Petroleum Act 1923)
- Code of Practice for coal seam gas well head emissions detection and reporting
- Code of Practice for constructing and abandoning coal seam gas wells and associated bores in Queensland
- Land Access Code (November 2010)
- Environmental Protection Act 1994
- Regional Planning Interests Act 2014
- Water Act 2000
- Waste Reduction and Recycling Act 2011
- Coal Seam Gas Water Management Policy 2012
- Gasfields Commission Act 2013

The Modernising Queensland Resources Act single Common Resources Act program proposed transitioning towards a single Common Resources Act for all mineral and petroleum rights, including reforming the overlapping tenure regime, with the Minerals and Energy Resources (Common Provisions) Act 2014 being the first tranche of that reform (which has been passed but the main parts have not yet commenced, and are now anticipated to be further amended prior to their introduction by the Mining and Other Legislation Amendment Bill 2016).

The Water Reform and Other Legislation Miscellaneous Amendment Act 2014 contains amendments relating to an underground water framework for managing the impacts of resource sector developments (but commencement has been postponed following the change in Queensland government, with the Water Legislation Amendment Bill 2015 introduced to realign the water regulation framework with the policy position of the new government).

Table 1. Comparative overview of unconventional gas regulatory frameworks. (Table continues on next page.)
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<table>
<thead>
<tr>
<th>Jurisdiction</th>
<th>Overview of present status</th>
<th>Principal regulatory and policy documents</th>
<th>Proposed/anticipated reforms</th>
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</thead>
</table>
| NSW          | The previous moratorium has been lifted with the release of the NSW Gas Plan. The NSW Gas Plan also introduced moves to restrict the industry by extinguishing pending licence applications, freezing new applications, and introducing a voluntary buy-back scheme operating for petroleum exploration licences that have previously been granted. The extent of regulation has also increased in a variety of other ways for remaining projects (including through residential coal seam gas exclusion zones and changes to the State Significant Development criteria for coal seam gas wells). | • Petroleum (Onshore) Act 1991  
• Code of Practice for Coal Seam Gas Activities: Well Integrity  
• Code of Practice for Coal Seam Gas Activities: Fracture Stimulation Activities  
• Environmental and Planning Assessment Act 1979  
• Protection of the Environment Operations Act 1997  
• Water Management Act 2000  
• NSW Gas Plan and Petroleum (Onshore) Amendment (NSW Gas Plan) Act 2014  
• Strategic Regional Land Use Policy  
• State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007  
• NSW Aquifer Interference Policy  
• Protection of the Environment Operations Act 1997 | Continued implementation of the relatively recent NSW Gas Plan. The Department of Resources and Energy is understood to be continuing to review codes, systems and processes in connection with that implementation. |
| Victoria      | Moratorium on all onshore gas activities (including exploration, drilling and hydraulic fracturing). | • Petroleum Act 1998 (coal seam gas)  
• Mineral Resources (Sustainable Development) Act 1990 (shale and tight gas)  
• Environment Protection Act 1970 | A government decision on the future regulatory framework is now anticipated in the first half of 2016 following the issue in December 2015 of the final report into onshore unconventional gas. It appears (at least to the author) that there are real prospects of an extended moratorium (or at best an extremely cautious approach continuing to be adopted). |
• Environmental Management and Pollution Control Act 1994  
• Tasmanian Government Policy Statement on Hydraulic Fracturing (Fracking) 2015 | None anticipated. The present moratorium is expected to be kept in place for the foreseeable future. |
| SA            | Unconventional gas developments permitted, but in practice unconventional operations have been restricted to the Cooper Basin to date. Specific regulation regarding issues arising from shale and tight gas operations. | • Petroleum and Geothermal Energy Act 2000  
• Environment Protection Act 1983  
• Roadmap for Unconventional Gas Projects in South Australia | A final report will be produced by the parliamentary Inquiry into Unconventional Gas (Fracking) in 2016, which is anticipated to result in regulatory or policy developments regarding unconventional operations outside the Cooper Basin. (The interim report was published on 17 November 2015[10]). The author anticipates more restrictive regulatory controls over unconventional gas developments in the state’s more populated regions. |
| WA            | Unconventional gas developments permitted. Specific regulation regarding issues arising from shale and tight gas operations. | • Petroleum and Geothermal Energy Resources Act 1967  
• Environmental Protection Act 1986  
• Petroleum and Geothermal Energy Resources (Environment) Regulations 2012  
• Guide to the Regulatory Framework for Shale and Tight Gas in Western Australia | The final report in the parliamentary inquiry into Implications for Western Australia of Hydraulic Fracturing for Unconventional Gas was handed down on 17 November 2015[11], which included a number of recommendations on the regulation of hydraulic fracturing. On 17 March 2016, the WA government responded to 12 of the recommendations from that inquiry, supporting 10 in whole or in part and endorsing a ‘fact based approach to production’[12]. When implemented, that response will create greater alignment with regimes in other states, with more developed regulatory frameworks in respect of unconventional gas. |
| NT            | Unconventional gas developments permitted, presently subject to an interim regulatory framework under the Onshore Oil and Gas Guiding Principles while a regulatory review and development of revised legislation occurs. | • Petroleum Act 1984  
• Environmental Assessment Act 1982  
• Onshore Oil and Gas Guiding Principles—Petroleum (Environment) Regulations—Discussion Draft | Review of existing petroleum legislation (and amendments needed in connection with the onshore oil and gas industry) is underway with a view to introducing amendments to commence in 2016. A discussion draft of new Petroleum (Environment) Regulations has been released for public consultation, and the review is ongoing. |

Note: This table seeks to cover the principal petroleum and environmental (and in the case of the two states with substantial coal seam gas resources, water) legislation and policies applicable to unconventional gas operations in each state and territory. It necessarily does not cover all types of applicable regulation (such as workplace health and safety, native title and other matters), the regulations made under the legislation listed, or the regulatory instruments in the ACT. As discussed later in this paper, at the Commonwealth level the Environment Protection and Biodiversity Conservation Act 1999 (Cth) has potential application to unconventional gas developments in all Australian jurisdictions (particularly for coal seam gas projects).
Moratoriums (Victoria and Tasmania)

A number of states have responded to community concerns by way of imposing moratoriums on all or certain types of unconventional gas activities. The moratoriums have had a chilling impact on investment in unconventional gas in those jurisdictions.

Victoria has had moratoriums of varying scope in place since 2012 (initially relating to fracking) and presently has a broader moratorium on all onshore gas activities. Following the most recent Victorian state election, it was announced that the moratorium would continue until a parliamentary inquiry reports to the government. The parliamentary inquiry has now released its final report with a response from the Victorian government pending. Despite the Reith Report (2013) recommending the development of Victoria’s unconventional gas industry subject to strengthening of the regulatory framework, presently there is perceived to be a real risk of the moratorium being extended again.

The Tasmanian government announced a moratorium on the use of hydraulic fracturing for the purposes of hydrocarbon resource extraction for five years until March 2020. Onshore petroleum exploration is theoretically permitted to the extent that it does not involve hydraulic fracturing. A further review into—and consultation regarding—the practice of hydraulic fracturing is proposed to occur prior to the expiry of the moratorium.

Even if a moratorium was removed in either of these states, the time it will take to reform the regulatory frameworks and restore industry confidence (particularly in relation to whether any future change of government will simply see reintroduction of the moratorium) means that it is unlikely the unconventional industry will develop in either Victoria or Tasmania in the foreseeable future.

Adaptive management (Queensland)

The Queensland government has adopted an adaptive environmental management system to the regulation of unconventional gas (as it has for petroleum generally, and other emerging resource types like geothermal energy and greenhouse gas storage). That has often been described as an approach to regulation of ‘learning by doing’. That approach to regulation resulted in the grant of approvals for unconventional gas operations, despite a degree of uncertainty about potential outcomes, but with the relevant regulatory framework then being amended over time to take into account any new research, monitoring or modelling that suggests the potential for unintended or unexpected impacts on the environment.

Without this approach, the author considers it is doubtful that the early investment in Queensland’s coal seam gas industry, which now provides the vast majority of Queensland’s domestic gas supply and underpinned the development of Queensland’s emerging LNG industry, would have been made, or would have been made at the rapid pace at which it occurred.

The adaptive environmental management system, however, has resulted in some challenges to the industry’s social licence to operate, and the Queensland regulatory framework undergoes fairly continuous amendments, typically in the context of reactive policy changes on particular issues (as occurred in relation to the strategic cropping land and regional planning interests amendments) rather than through an industry-wide review.

From a national perspective, Queensland’s policy settings have been a double-edged sword, resulting in extensive practical experience with unconventional gas developments, which other jurisdictions have considered in subsequent inquiries and reports, and also a legacy of some community disquiet that comes to light in those reviews.

Measured reform (SA, WA and NT)

The other jurisdictions, which might be described as providing a favourable regulatory framework for unconventional gas projects (SA, WA and more recently the NT), have adopted a more measured reform process. This has typically involved government only seeking to implement reforms following a period of community and industry consultation (typically through a parliamentary inquiry) and an expert scientific report. It is evident from each of the parliamentary inquiries and reports that these jurisdictions have increasingly drawn on the experience of Queensland and each other’s emerging approach in settling best practices to be reflected in their regulatory framework. At the time of writing this paper, that development is still underway. The NT is in the midst of designing an appropriate regulatory regime for unconventional gas. As an interim measure, the Onshore Oil and Gas Guiding Principles have been published, which set out the ‘minimum expectations of how industry will conduct itself while a comprehensive review of the NT’s existing regulatory regime framework is undertaken’, and will be used by the Department of Energy in assessing whether to grant future onshore petroleum exploration and production tenements. It is intended that the new or amended legislative and regulatory framework will be finalised in the fourth quarter of 2015, with passage in Parliament in the first quarter of 2016 and commencement in the second quarter of 2016.

Even in jurisdictions where the regulatory framework might be regarded as more settled, there remains significant uncertainty about the long-term regulatory framework for the industry. The NT opposition is now proposing to effectively shut down the industry by a moratorium on unconventional gas exploration and extraction if it wins government in the next election, and a final report is awaited in SA in relation to a parliamentary inquiry into unconventional gas in the state’s southeast.

Pause and reset (NSW)

The regulatory framework for unconventional gas projects in NSW has been in a state of constant change for a number of years. Moratoriums of varying scope were in place from 2011–14 (subject to exclusions for the operational Camden project and the Gloucester and Narrabri Strategic Energy Projects), until the NSW Gas Plan reset the regulatory framework. As a result, NSW, despite being the most populous state and highly industrialised (and thereby a higher energy-using jurisdiction) is only presently producing approximately 5% of its energy requirements from a single project (Camden) in that state. The NSW Gas Plan tries to pause most development while seeking a position between the moratoriums and the more favourable regimes of the other jurisdictions. The combination of the voluntary buy-back scheme (under which the government has paid to acquire 17 exploration licences to date), the extinguishment of exploration licence applications, the freeze on new grants of exploration licences, and the 2 km exclusion zones around residential areas and ‘Upper Hunter equine and viticulture Critical Industry Cluster Areas’, and moratorium on exploration and extraction of coal seam gas in the Sydney drinking water catchment ‘special area’ zone have together effectively restricted the industry to a small number of existing projects. That is only likely to be exacerbated by any future strict application of the use it or lose it principle suggested in the NSW Gas Plan (particularly given its implementation at a time of relatively low prices).

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REGULATION OF HYDRAULIC FRACTURING

Hydraulic fracturing is often considered outside the industry as being synonymous with unconventional gas. Hydraulic fracturing was first used in the US in 1949, and has been in use in Australia in conventional gas operations since 1969. Frac- cing started seeing use in coal seams in the 1970s in Australia.

Since the release of the GasLand® movie28, featuring the shale gas industry in the US, hydraulic fracturing appears to have come under increasing public scrutiny. Community and environmental groups and land owners have raised community concerns and public debate about social licence to operate, and the place of fracting in the gas industry has become emotional and clouded by a lack of understanding about what unconventional gas operations involve and the differences to other resource extraction techniques (which themselves will involve a level of risk).

That situation is potentially starting to change with regulation now being informed by scientific reviews that have been undertaken in SA, WA, NSW and the NT, and a widening range of experiences with unconventional gas operations. Hydraulic fracturing is now more regulated than ever, and it is difficult to see that trend reversing.

Hydraulic fracturing in Australia

Hydraulic fracturing is, in each state and the NT, subject to additional regulatory requirements beyond the leases or licens- es required under principal petroleum legislation. It varies as to whether this occurs by way of express legislative or policy requirements, which apply particularly to hydraulic fracturing operations, or simply on a project by project basis through the conditions imposed on projects approvals. The focus of much of the additional regulation has been to promote transparency (through notification and reporting requirements) as a key plank of seeking to allay community concerns about hydraulic fracturing. Table 2 illustrates the varying approaches to hydraulic fracturing regulation.

While the regulations are not identical, there are clear common threads, and those key areas are discussed in more detail in the next section.

Use of BTEX and other chemicals

Water and sand typically make up approximately 97–99% of fracturing fluid used in hydraulic fracturing operations. The use of BTEX chemicals (benzene, ethylbenzene, toluene and xylene) in drilling fluids have come under particular scrutiny, as they have the potential to be toxic to human and animal life above certain concentration levels, and are now consid- ered to be safer alternatives39.

Queensland36, NSW31, 32, Victoria33 and the NT34 ban the addition of BTEX chemicals to hydraulic fracturing fluids. In Queensland the ban extends to chemicals that produce or are likely to produce BTEX chemicals as the chemical breaks down in the environment35. While a ban on BTEX chemicals does not presently exist in WA, the recommendation to introduce it in a recent parliamentary inquiry36 has now been partially sup- ported by the WA government’s proposal to prohibit intention- ally introducing such chemicals into hydraulic fracturing fluid37.

As BTEX compounds are found naturally in crude oil, and coal and gas deposits, they can be naturally present at lower concentrations in groundwater near these deposits. As a way of recognising those naturally occurring low concentrations, NSW and Queensland require drilling additives and fracture stimulation additives to be demonstrated to meet Australian drinking water health guidelines38, 39.

There are also requirements in most jurisdictions regarding disclosure (at least to the government/regulator and in some cases to the public) of any chemicals used in fracturing fluids40, 41.

The fracturing-related regulation of chemicals exists in addition to the numerous other pieces of Commonwealth, state and local government regulation of industrial chemicals. In particular, chemical additives used in fracturing fluid are required to be notified to and assessed by the National Industrial Chemi- cals Notification and Assessment Scheme under the Industrial Chemicals (Notification and Assessment) Act 1989 (Cth).

Well integrity

Well integrity is a broad description for the regulatory require- ments relating to the design and completion of a well in a way intended to isolate the well from non-targeted subsurface geologi- cal layers. In particular, it is important for ensuring that fugitive methane emissions from a well do not contaminate water sources.

Both Queensland and NSW have introduced specific codes of practice to deal with this issue. In every jurisdiction (irre- spective of whether such codes exist), well integrity will effec- tively be a requirement in getting approvals for environmental authorities or plans required under the relevant state or terri- tory legislation.

The Code of Practice for Constructing and Abandoning Coal Seam Gas Wells and Associated Bores in Queensland40 and NSW Code of Practice for Coal Seam Gas: Well Integrity41 are both designed to take the statements of principle in legislative sources down to more technical specification and design is- sues. Both codes only apply to coal seam gas wells, although the NSW code indicates the government can apply it to other types of wells. Analysing the details of the standards (which address well casing) is beyond the scope of this paper, but pleasingly there is a high degree of consistency between the Queensland and NSW codes.

The codes of practice contain prescriptive regulations that operators need to be aware of in Queensland and NSW. Not everything in the codes are strictly mandatory, with much of them describing good industry practice that operators should follow. It, however, seems likely that complying with these good industry practice requirements will be important for obtaining other required approvals under petroleum, environmental or water legislation.
### Table 2. Hydraulic fracturing regulation.

<table>
<thead>
<tr>
<th>Jurisdiction</th>
<th>Requirements and Regulations</th>
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<tr>
<td>Queensland</td>
<td>• In addition to the requirements for other petroleum operations, hydraulic fracturing operations are also subject to: &lt;br&gt;  - mandatory notification to government and owners and occupiers 10 business days prior to—and after completion of—hydraulic fracturing activities; &lt;br&gt;  - mandatory requirement to submit a complete list of chemicals used to state regulators (along with volumes, concentration and potential toxicity for hydraulic fracturing, details of commencement and completion dates, and details of operator and contractor involved in the hydraulic fracturing activities); and, &lt;br&gt;  - prohibition on using BTEX chemicals in fracturing fluid. &lt;br&gt;  Project specific conditions are also typically included in environmental authorities for each project, which typically include a very detailed risk assessment and requirements for baseline water monitoring.</td>
</tr>
<tr>
<td>NSW</td>
<td>In addition to the requirements for other petroleum operations, hydraulic fracturing operations are also subject to: &lt;br&gt;  - requirements for a Fracture Stimulation Management Plan (FSMP), which is to be submitted prior to commencement of any hydraulic fracturing activities, and which must (among other things) identify how the proponent will comply with the NSW Code of Practice for Coal Seam Gas Fracture Stimulation Activities (Code). The FSMP is usually submitted with a Review of Environmental Factors (REF). The FSMP must, among other things, …describe the nature, location, scale, timing, duration, hours of operation and other relevant features of the fracturing stimulation activity as well as a compliant risk assessment in relation to the project; &lt;br&gt;  - mandatory notification 10 days prior to hydraulic fracturing activities (in the form of a Notice of Intention to Carry out Fracking Stimulation); &lt;br&gt;  - mandatory requirement to submit a complete list of chemicals for approval to state regulators (along with volumes, concentration and potential toxicity prior to gaining approval for hydraulic fracturing); and, &lt;br&gt;  - a completion or post-fracturing report (Fracture Stimulation Completion Report) to be submitted to the Mine Safety Operations and Environmental Sustainability Unit of the Department of Trade and Investment within 30 days of ceasing fracturing.</td>
</tr>
<tr>
<td>Victoria</td>
<td>Due to there being a complete moratorium on all onshore gas activities (as noted earlier in this paper), Victoria has not needed to provide more detailed regulation of hydraulic fracturing.</td>
</tr>
<tr>
<td>Tasmania</td>
<td>Due to there being a complete moratorium on all hydraulic fracturing until March 2020 (as noted earlier in this paper), Tasmania has not needed to provide more detailed regulation of hydraulic fracturing.</td>
</tr>
<tr>
<td>SA</td>
<td>Any specific conditions relating to hydraulic fracturing are imposed on a project basis through the Statement of Environmental Objectives, which must be prepared on the basis of an Environmental Impact Report (both of which are public documents and are required to go through a consultation process prior to approval). In addition, an activity notification is to be provided for all activities to be carried out (with minimum notice periods) providing details of the planned operations to all relevant stakeholders (including landholders). Landholders will also have notification at the time of the issue of a Notice of Entry and will have a right of objection therein.</td>
</tr>
<tr>
<td>WA</td>
<td>Petroleum activities (including hydraulic fracturing) require approval of: &lt;br&gt;  - a detailed well management plan (which is required to include information on chemicals used in hydraulic fracturing, well integrity measures and monitoring); and, &lt;br&gt;  - a field management plan, including details of the operations to be carried out and various other matters such as monitoring and aquifers that may be affected. &lt;br&gt;WA's response to recommendations made in the recent parliamentary inquiry included supporting proposals for formalising in legislation the policy of requiring public disclosure of chemicals used in fracturing activities, prohibiting the deliberate addition of BTEX to fracturing fluids, encouraging recycling of wastewaster during fracturing operations, making baseline monitoring of aquifers (and publication of that data) a mandatory condition of all approvals for fracturing operations, and making any future consideration of approvals for fracturing for unconventional gas based on established facts ascertained through such baseline data and monitoring. WA did not adopt the recommendation from the recent parliamentary inquiry that companies carrying out fracturing would be compulsorily required to negotiate with landowners, instead proposing a working group to draft legislation regarding any future land access agreements, and in the meantime continuing to favour the voluntary land access agreement agreed upon in 2015 between the petroleum industry and agricultural groups.</td>
</tr>
<tr>
<td>NT</td>
<td>The Onshore Oil and Gas Guiding Principles include requirements for hydraulic fracturing in respect of pre-operation understanding and risk assessments, limits on fracturing fluid additives, disclosure of chemicals used (only water-based additives are permitted, see Use of BTEX and other chemicals section in this paper), risk-focused monitoring, and contingency measures within environmental plans. &lt;br&gt;The draft Petroleum (Environment) Regulations requires that for hydraulic fracturing activities, the environmental management plan must include details of the chemicals or other substances that may be in, or added to, any treatment fluids to be used in the fracturing activity.</td>
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COAL SEAM GAS ISSUES

Overlapping coal and coal seam gas tenements

In Queensland, one of the most complex aspects of regulation of unconventional gas operations is how to resolve overlaps between coal and coal seam gas tenures. This issue is dealt with far less comprehensively (if at all) in other jurisdictions, either due to limited coal resources, or restrictions on unconventional gas operations making it unnecessary.

The present position in Queensland\textsuperscript{16}—\textsuperscript{19} can be summarised as:

- to obtain a production tenure over an existing production tenure of the other resource type, the consent of the existing production tenure holder is required;
- exploration tenure of each resource type can be granted over existing exploration tenure of the other resource type; and,
- where there are conflicting proposals for the application for production tenure from overlapping exploration tenure, there is a regime for a Ministerial preference decision as to how to resolve that issue.

No Ministerial preference decision has ever been made. Rather, this has, in practice, resulted in coal and coal seam gas operators reaching commercial agreements about how to develop their respective resources, such that overlap issues are typically regulated principally by contract.

The potential for reform to that position gained momentum in 2012 when major participants in the coal and coal seam gas industries took the initiative through the Queensland Resources Council to develop a White Paper\textsuperscript{26} proposing a commonly supported position on how to regulate overlapping coal and coal seam gas tenures. The previous Queensland government had intended to largely enshrine that industry-proposed approach through Chapter 4 of the Mineral and Energy Resources (Common Provisions) Act 2014 (Queensland) (MERCPA). Together with many other chapters of MERCPA, following the change of Queensland government the proposed revised overlapping tenements regime has not yet commenced. With the introduction of the Mining and Other Legislation Amendment Bill 2016 (Qld), however, the industry now has more clarity that it will commence with some refinements to more closely align the overlapping tenures regime with the proposals of the White Paper.

Importantly, while MERCPA (both as introduced and as now proposed to be amended) would preserve the consent requirement for obtaining an overlapping production tenure over a production tenure existing at the date it commences, it would remove the Ministerial preference decision regime for other future overlaps in favour of a process allowing for future grant of overlapping production tenure, subject to extraction only occurring in accordance with an agreed (or arbitrated) joint development plan and a statutory right of way for coal developments (subject to compensation for lost production and other relevant matters as a consequence of acceleration of coal rights in the area of the overlapping tenure).

By way of contrast, NSW has a much less prescriptive regime that simply leaves decisions on whether an overlapping tenement should be granted (and, if so, what conditions should be imposed) to the Minister under the grant provisions (as is the case for all tenements). Where there is a subsequent dispute in relation to operations carried out or proposed to be carried out by tenure holders under the Mining Act 1992 and the Petroleum (Onshore) Act 1991, either party may apply to the Land and Environment Court for a determination of the matter\textsuperscript{45}.

Coal seam gas extraction under a mining lease—incidental coal seam gas

Coal mining typically involves a release or extraction of any coal seam gas trapped within the relevant coal resource.

In Queensland, mining lease holders are permitted to extract incidental coal seam gas (which is coal seam gas produced as a necessary result of coal mining or where extraction of the coal seam gas is necessary to ensure safe mine working or to minimise the fugitive emissions of methane during the course of coal mining operations)\textsuperscript{45}, subject to limiting its use to mining and a limited range of other purposes\textsuperscript{50}.

Chapter 4 (Part 2, Division 4) of MERCPA (which, as noted in the previous section, has not yet commenced) proposes to amend this position to provide a statutory first right of first refusal in favour of any overlapping petroleum tenure holder, and that will continue to be the case following the Mining and Other Legislation Amendment Bill 2016 (Qld).

Again, NSW has adopted a far less prescriptive regime. In NSW the holder of a coal mining lease can apply for inclusion in the lease of petroleum\textsuperscript{44}, subject to:

- the Minister being required to refuse an application if the area is already subject to an exploration licence or a petroleum mining lease granted under the Petroleum (Onshore) Act 1991 or within certain specified areas; and,
- tenement grants being able to be subject to conditions directed by the Minister, which can include limits on the area, type or form of petroleum, working practices and methods of extraction, use to which the petroleum may be put, or subject to a direction on the joint mining and development of petroleum with the holder of a mining lease or petroleum mining lease over land adjoining the mining area.

Regulation of water impacts

Coal seam gas extraction involves the extraction of substantial quantities of water to depressurise the coal seam in which the gas is held (often referred to as dewatering or depressurisation). The water produced (generally referred to as produced or associated water) varies in quality with the potential to be high in salinity and varies substantially in volume between different projects\textsuperscript{45}. By way of illustration of the volumes involved, in August 2014 the average produced water generated was 30,000 L per coal seam gas well per day\textsuperscript{46}. As the topic of water regulation is relevant to other types of un-conventionals it is discussed separately in the next section.

REGULATION OF WATER IMPACTS

In many of the parliamentary inquiries and reports on unconventional gas and hydraulic fracturing, concerns about water resources have been prominent in the submissions received. Those concerns have, in part, arguably been driven by the American experience, where certain consequences of hydraulic fracturing activities were exempted from the federal Clean Water Act and Safe Drinking Water Acts, as well as other federal legislation, for various policy reasons.

The main concerns in relation to potential impacts are depletion and contamination of water resources (and the impact of such depletion on other users of water). Due to the differences in geology and extraction techniques, different water issues arise for coal seam gas projects, and shale and tight gas projects.

Coal seam gas water

As noted previously, coal seam gas operations can produce substantial volumes of associated water.

In Queensland, a petroleum lease provides authorisation for coal seam gas proponents to withdraw an unlimited amount of groundwater as part of their coal seam gas operations\textsuperscript{57}. Those rights, however, are subject to make good obligations to impacted landholders\textsuperscript{56}, restrictions on the use and disposal of
that water, and additional conditions of the environmental au-
thority for the project. Common conditions imposed on coal
seam gas operations in Queensland include:
- providing a detailed hydraulic fracturing impact monitoring
  program that considers the findings of the risk assessment
to the government for review, prior to carrying out hydraulic fracturing
to ensure any adverse impacts to water quality are detected;
- undertaking baseline bore assessment to collect sufficient
  water quality data to accurately represent the water in the
well prior to hydraulic fracturing;
- conducting long-term monitoring of wells that have been
  hydraulically fractured; and,
- monitoring groundwater and all active landholder bores
  within a 2 km horizontal radius prior to and following hy-
draulic fracturing.68

Initially, coal seam gas operations were permitted to utilise
evaporation dams, but that approach has now been jettisoned
in favour of requiring treatment and/or beneficial use of coal
seam gas water70.

In NSW, regulatory arrangements, including the Code of
Practice for Coal Seam Gas: Fracture Stimulation Activities71
and the Aquifer Interference Policy72, place similar require-
ments on coal seam gas operations. The main difference is that
a water access licence is required under the Water Management
Act 2000 for dewatering activities required for coal seam gas
operations (and such a licence will place an extractive limit on
the licence holder).

The National Harmonised Regulatory Framework for Coal
Seam Gas 201373 recommends that if production of natural
gas from coal seams is proposed in jurisdictions other than
Queensland and NSW in the future then governments in those
jurisdictions will need to consider appropriate baseline moni-
toring requirements.

Flow-back water

After hydraulic fracturing of deep (shale or tight) gas wells,
pressure in the geological formation causes about a third of the
volume of fluid injected74 to flow back up the well (sometimes
referred to as flowback or flowback water) during depressur-
sation. Flowback is a mixture of the fracturing fluid and natural
formation water, and as a result will contain water, oil or gas,
the original chemicals used in the fracturing fluid, and elements
that were naturally occurring in the formation water.

As all shale and tight gas wells require hydraulic fracturing,
large volumes of water are required (compared to the coal
seam gas operations described previously). A proportion of the
flowback can, after treatment, be re-injected for reuse in con-
nection with further hydraulic fracturing activities, but there
are practical limits to that occurring; such reuse for other pur-
poses would also be pursued (or storage in evaporation ponds
or enclosed tanks).

Regulatory frameworks (or at least the approvals given under
them) in jurisdictions where such operations exist will therefore
seek to deal with not just the taking of water for injection, but
the recovery, storage, treatment disposal or reuse of such flow-
back. Some of these steps may be subject to different legisla-
tion or policy instruments. For example, in WA the taking of water
requires a licence under the Rights in Water and Irrigation Act
1914, whereas the injection of water is regulated under the Pe-
troleum and Geothermal Energy Resources Act 1967 (WA).

Catchment exclusions

One of the clearest examples of the precautionary principle
being adopted is in the approach to unconventional gas op-
erations in areas of drinking water catchments. In the Sydney
drinking water catchment special area zone, there was a mora-
torium on exploration and extraction of CSG pending an inves-
tigation by the NSW Chief Scientist and Engineer on the impact
of CSG activities75, with each of the exploration licences in the
Sydney water catchment special areas having subsequently
been acquired as part of the voluntary buy-back under the
NSW Gas Plan. That, of course, is only one of the many water
specific protections created in NSW by the State Environmental
Planning Policy (Mining Petroleum Production and Extractive
Industries) 2007.

For those jurisdictions that do not have express area specific
exclusions, there is clearly less prospects of being granted de-
velopment rights in areas of extremely high sensitivity regarding
water issues (whether that be for drinking water catchments,
prime agricultural land, or environmentally sensitive water-ways).

IMPACT OF COMMONWEALTH REGULATION

In some other areas, the involvement of the Commonwealth
has been a major factor in creating greater harmonisation re-
garding how particular issues are regulated across the coun-
try. To date, however, that has not prevented the states and NT
based patchwork of various regulatory approaches coming into
being.

EPBC Act and the water trigger

The Australian Constitution does not provide the Common-
wealth with any direct source of constitutional power to regu-
late the onshore petroleum sector generally, or unconventional
gas resources in particular. Through other heads of power (such
as corporations and external affairs heads of power), however,
the various state and territory regulatory frameworks that apply
to unconventional gas have become overlaid with additional
Commonwealth regulation, most relevantly the Environmental
Protection and Biodiversity Conservation Act 1999 (Cth) (the
EPBC Act).

The EPBC Act was amended in 2013 by the Environment and
Protection Biodiversity Amendment Act 2013 (Cth) to introduce
the ‘water trigger’, making water resources a matter of national
environmental significance in relation to coal seam gas and
large coal mining developments. This has significantly expand-
ded the range of crucial coal seam gas activities that require notifica-
tion and potential assessment under Commonwealth legislation, as
all coal seam gas developments that have the potential for a sig-
nificant impact on water resources must now be referred (rather
than requiring assessment of whether the relevant coal seam
gas project would have a significant flow on impact to other
matters of national environmental significance).

As a result, any future coal seam gas project that is likely
to have a significant impact on water resources needs to be
referred to the Commonwealth Department of Sustainability,
Environment, Water, Populations and Communities under the
EPBC Act, with significant impact guidelines77 having been is-
sued to assist proponents in making an assessment of whether a
significant impact is anticipated.

The water trigger under section 24D of the EPBC Act, as pres-
ently drafted, does not apply to other non-CSG unconventional
developments (such as shale gas). The proponents for other
unconventional developments, however, would need to con-
sider whether notification is required due to the potential for
a significant impact on any other matter of national environ-
mental significance (such as if the operations would disturb the
habitat of a threatened species or were located in wetlands of
international importance).
**Bilateral arrangements**

There have been attempts to streamline the issues arising from the application of state (or NT) and Commonwealth regulation to the same project, by way of bilateral arrangements regarding environmental assessments or approvals occurring under state and NT legislation and the EPBC Act (pursuant to Chapter 3, Part 5, Division 2 of the EPBC Act, which permits the Minister to make bilateral agreements to accredit state or territory practices and approaches to environmental protection).

Providing a one-stop shop for both assessments and approvals (at least for willing states) is Federal government policy, and from the industry’s perspective would reduce the regulatory burden for future projects. The existing bilateral arrangements, however, only go as far as parallel assessment processes, such that state and Commonwealth Ministers have the power to impose different conditions on a single project.

The present status of the various bilateral arrangements is set out in Table 3.

While these arrangements are not specific to unconventional gas developments, in time those bilateral arrangements are likely to assist in providing a more efficient assessment and approval process, and more consistent decisions in relation to the regulation (at a project level) of unconventional gas developments.

**HARMONISATION OF REGULATION**

**Attempts at national harmonisation**

Harmonisation across Australian jurisdictions is generally perceived as being desirable by both the petroleum and minerals industries. Perhaps unsurprisingly, given the relative infancy of Australia’s unconventional gas industry, the attempts to create greater alignment between unconventional gas regulation across jurisdictions are also in their infancy.

The leading example was the Council of Australian Government’s Standing Council on Energy and Resources endorsement of the National Harmonised Regulatory Framework for Coal Seam Gas 2013 (the Framework). The Framework provides a consistent approach to managing coal seam gas development in the core areas of well integrity, water management and monitoring, hydraulic fracturing, and chemical use through identifying 18 leading practices.

Although the title would indicate it relates to coal seam gas, it also seeks to provide guidance on hydraulic fracturing more generally.

While of no direct regulatory force, the Framework was an important stepping stone towards some jurisdictions developing more robust regulatory frameworks. Much of what is common in terms of the detailed regulation of coal seam gas related matters between Queensland and NSW also shows the hallmarks of the Framework. Through providing a common understanding of leading practices, the Framework has laid the groundwork for future incremental convergence, which will be assisted by the plan to progressively update it as best practice develops.

**Likelihood of future incremental convergence**

Despite there not being much until very recently in the way of formal policies pursuing harmonisation or convergence, the earlier parts of this paper demonstrate that, by virtue of a number of jurisdictions looking to adopt best practice, unconventional are starting to be regulated in broadly similar ways (at least on some issues) in the unconventional-friendly states and territories.

It is to be hoped that the COAG Energy Council’s strategy of harmonising regulatory framework will give greater momentum to the progress that has been made in striving for greater consistency than is offered by the present patchwork approach.

It also appears likely that regulators will, in assessing, granting and proposing conditions for project approvals, adopt some of the learnings of other jurisdictions (even if the generally applicable legislative framework is less prescriptive). Consequently, an incremental creep towards greater convergence of regulation (at least as between Queensland, SA, WA and the NT) appears likely to continue to occur.

**Table 3. Present status of bilateral arrangements.**

<table>
<thead>
<tr>
<th>Jurisdiction</th>
<th>Existing environmental assessment agreements</th>
<th>Status of bilateral arrangements for environmental approvals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Queensland</td>
<td>Agreement between the Commonwealth of Australia and the State of Queensland relating to Environmental Assessment, 18 December 2014.</td>
<td>Draft bilateral agreement for environmental approvals has been published for consultation (submissions closed 13 June 2014).</td>
</tr>
<tr>
<td>NSW</td>
<td>Agreement between the Commonwealth of Australia and the State of New South Wales relating to Environmental Assessment, 26 February 2015.</td>
<td>Draft bilateral agreement for environmental approvals has been published for consultation (submissions closed 13 June 2014).</td>
</tr>
<tr>
<td>Tasmania</td>
<td>Agreement between the Commonwealth of Australia and Tasmania relating to environmental assessment, 22 October 2014.</td>
<td>Draft bilateral agreement for environmental approvals has been published for consultation (submissions closed 15 September 2014).</td>
</tr>
<tr>
<td>SA</td>
<td>Agreement between the Commonwealth of Australia and the State of South Australia relating to Environmental Assessment, 25 September 2014.</td>
<td>Draft bilateral agreement for environmental approvals has been published for consultation (submissions closed 2 February 2015).</td>
</tr>
<tr>
<td>WA</td>
<td>Agreement between the Commonwealth of Australia and Western Australia relating to environmental assessment, 3 October 2014.</td>
<td>Draft bilateral agreement for environmental approvals has been published for consultation (submissions closed 13 February 2015).</td>
</tr>
</tbody>
</table>
CONCLUSIONS

As this paper highlights, Australia’s regulation of unconventional gas can seem like a bewildering and divergent patchwork of different regulatory arrangements. This has not been helped by some of the rapid policy changes that have occurred in some states, and the proliferation of documents that make up the regulatory framework in each jurisdiction.

There is also no doubt that the numerous divergent approaches impose an administrative burden on operators with operations in multiple jurisdictions. As the industry matures, however, practical experience and further studies assist in identifying risk areas and the best operating practices; parliamentary inquiries and best practice reviews recommend adopting approaches utilised in other states, such that greater convergence between the individual jurisdictions approaches is beginning to occur in much of the country.

The obvious exception to that is the southeastern states (Victoria and Tasmania and, to some degree, NSW) whose regulatory framework has effectively prohibited or hamstrung the unconventional gas industry in those states for the foreseeable future.

A level of differences will always exist (and be appropriate) due to reflecting the nature of the predominant unconventional gas resources in the relevant state (coal seam gas or shale gas) and the extent of community concerns (which is often closely tied to major alternative land uses in the areas of unconventional gas resources).

There is, however, clearly greater potential to settle on best practice regulatory principles, which are reflected in multiple jurisdictions, and for the regulatory framework for unconventional to play its part in facilitating further investment in the unconventional gas industry.

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NOTES

See References section for full bibliographic listings.
2. Intergovernmental Agreement on the Environment, 1 May 1992, s 3.5.1.
18. See, for example, Natural Resources Committee, Parliament of South Australia (2015), i.
26. Ibid.
27. Ibid, p. 10.
29. Leusch and Bartkow (2010).
37. Parliament of Western Australia (2016).
40. See, for example, Petroleum and Geothermal Energy Resources (Environment) Regulations 2012 (WA), regulation 15.
41. See, for example, Northern Territory Government (2015), section 4. Hydraulic Fracturing.
42. Department of Natural Resources and Mines, Queensland Government (2013).
43. Department of Trade and Investment, Regional Infrastructure and Services, NSW Government (2012b).
44. Petroleum and Gas (Production and Safety) Regulation 2004, sections 30A, 35 and 35A.
45. Environmental Protection Act 1994, s 206.
46. Department of Trade and Investment, Regional Infrastructure and Services, NSW Government (2012a).
47. Ibid, Clause 1.
48. Ibid, Clause 1.2(b).
49. Ibid, see Clause 4.
50. Ibid, Clause 12.
51. Ibid, Clause 6.2.
52. Ibid, Clause 14.
53. Petroleum and Geothermal Energy Resources (Resource Management and Administration) Regulations 2015. Schedule 3 details the information to be provided for a field management plan.
54. Parliament of Western Australia (2016).
55. Ibid.
58. Under Chapter 8 of the Mineral Resources Act 1989 (Queensland).
60. Queensland Resources Council (2012).
63. Ibid, section 318 CN.
64. Mining Act 1992, section 78.
71. Department of Trade and Investment, Regional Infrastructure and Services, NSW Government (2012a).
75. O’Kane (2014).
76. Environmental Protection and Biodiversity Conservation Act 1999, section 24D.

REFERENCES

Cases and legislation references

Case law
- Telstra Corporation Ltd v Hornsby Shire Council [2006] 67 NSWLR 256
- Commonwealth
  - Commonwealth Constitution
  - Environmental Protection and Biodiversity Conservation Act 1999
  - Industrial Chemicals (Notification and Assessment) Act 1989
- Queensland
  - Environmental Protection Act 1994
  - Gasfields Commission Act 2013
  - Mining and Other Legislation Amendment Bill 2016
  - Petroleum Act 1923
  - Petroleum and Gas (Production and Safety) Act 2004
  - Public Health Regulation 2005
  - Regional Planning Interests Act 2014
  - Waste Reduction and Recycling Act 2011
  - Water Act 2000
  - Water Legislation Amendment Bill 2015

New South Wales
- Environmental and Planning Assessment Act 1979
- Petroleum (Onshore) Act 1991
- Petroleum (Onshore) Amendment (NSW Gas Plan) Act 2014
- Protection of the Environment Operations Act 1997
- Water Management Act 2000

Victoria
- Environment Protection Act 1970
- Mineral Resources (Sustainable Development) Act 1990
- Petroleum Act 1998

Tasmania
- Environmental Management and Pollution Control Act 1994

South Australia
- Environment Protection Act 1983
- Petroleum and Geothermal Energy Act 2000

Western Australia
- Environmental Protection Act 1986
- Petroleum and Geothermal Energy Resources Act 1967
- Petroleum and Geothermal Energy Resources (Environment) Regulations 2012
- Petroleum and Geothermal Energy Resources (Resource Management and Administration) Regulations 2015
- Rights in Water and Irrigation Act 1914

Northern Territory
- Environmental Assessment Act 1982
- Petroleum Act 1984

United States of America
- Clean Water Act
- Safe Drinking Water Act

Other references


TASMANIAN GOVERNMENT, 2015a—Fracking Moratorium to continue. Media release from Minister for Primary Industries and Water (Jeremy Rockliff) and Minister for Resources (Paul Harriss) published 26 February 2015. Hobart: Tasmanian Government.


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