

EDOs of Australia



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Submission regarding the Landholders' Right to Refuse (Gas and Coal) Bill 2015

29 May 2015

EDOs of Australia (Australian Network of Environmental Defenders Offices Inc.) consists of eight independently constituted and managed community legal centres located across the States and Territories.

Each EDO is dedicated to protecting the environment in the public interest. EDOs:

- provide legal representation and advice,
- take an active role in environmental law reform and policy formulation, and
- offer a significant education program designed to facilitate public participation in environmental decision making.

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Senate Standing Committees on Environment and
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Introduction

EDOs of Australia (**EDOA**) is a national network of environmental lawyers who help people to use the law to protect the environment. We provide legal advice and representation, legal education and policy, and law reform advice.

EDOA welcomes the opportunity to comment on the *Landholders' Right to Refuse (Gas and Coal) Bill 2015 (Bill)*.

The Bill before the Committee proposes to regulate two aspects of gas and coal mining: access to land and hydraulic fracturing (**fracking**). These two issues have generated significant community concern across many Australian jurisdictions, in part due to the inadequacy of State and Territory laws. As a result, EDOs across Australia have provided detailed legal advice to clients and in response to regulatory processes on these issues. Current regulatory inadequacies have been detailed in submissions and reports prepared by EDOA, EDO NSW, EDO Tasmania, EDO Northern Territory and EDO South Australia. These documents are available online.¹

Landholder rights and fracking are therefore issues of national significance in urgent need of national regulation. We therefore support the intent of the Bill, namely to introduce a national law which makes landholder consent a precondition to undertaking coal and unconventional gas mining activities on private land, and to prohibit fracking.

Part 1 - In relation to **land access**, this submission provides two case studies (NSW and Queensland) to demonstrate that State laws do not adequately address this issue and fail to provide a right of refusal to landholders.

Part 2 - In relation to **fracking**, this submission notes the significant concerns regarding the impacts of fracking and identifies inadequacies of current regulation.

Part 3 – We submit that the Australian Government can and should take a lead role in regulating the significant impacts and equity issues around coal and gas mining. We refer the Committee to two relevant EDO reports:

- **Attachment 1** – *A review of NSW Coal Seam Gas Regulation and International Best Practice*. Legal Briefing Paper, November 2014.
- **Attachment 2** - *Coal and gas mining in Australia – Opportunities for national law reform*. Technical Brief No. 24, The Australia Institute (2013).

We recommend that the Bill be **supported**.

Part One – Land Access and Landholder Rights

1. Location of resources and tenements

Australia possesses globally significant deposits of coal and unconventional gas.ⁱⁱ As a consequence, exploration and extraction of these resources occurs (or is projected to occur) across large parts of Queensland (**QLD**), New South Wales (**NSW**), Victoria, South Australia, Western Australia and the Northern Territory. We further note that exploration licences for oil and gas are widespread in Tasmania, covering an area of approximately 15,590 km².ⁱⁱⁱ **Attachment C** includes detailed information regarding coal deposits and unconventional gas deposits in Australia.

Many of these resources are located in populated areas, or areas of agricultural significance. As a consequence, communities are or may be directly impacted by decreased air and water quality, noise, loss of significant biodiversity and social fragmentation.^{iv} For example:

- Most coal resources in NSW are located in the densely populated Sydney-Gunnedah region.^v
- Petroleum titles and applications cover approximately three quarters of NSW, most of which are for CSG exploration and production.^{vi} Exploration and production activities are or will be proximate to communities and rural properties.^{vii}
- Shale gas deposits are known to exist in vast basins across all Australian States and Territories (excepting Tasmania and the Australian Capital Territory (**ACT**)).^{viii} Several of these, including the Sydney and Perth Basins, are densely populated and have significant agricultural landholdings.

EDOA therefore submits that the relationship between coal and unconventional gas activities and landholder rights is a national issue requiring national leadership and legislation. This is particularly true given that State and Territory laws generally do not allow landholders to choose whether exploration or production activities take place on their land. A selection of these laws is explored in more detail in the following section.

2. State and Territory laws concerning access to private land

Broadly speaking, the laws in each State and Territory allow mining and petroleum exploration and production titles to be granted over private land without the landholder's consent. Similarly, the laws in each jurisdiction generally do not provide landholders with clear rights to refuse access for the purposes of exploration and production activities.

Significant community concerns exist regarding notification, clear information, and local engagement in decision making processes for coal mining and unconventional gas activities. This includes initial licensing decisions, equity in negotiation of access arrangements, upfront consideration of environmental and social impacts, landholder and community appeal rights, and landholder access to compensation if activities cause damage.

It is in light of these inadequacies that EDOA supports the Bill.

The following section of this submission comprises an overview of the laws concerning landholder access in NSW and Queensland. Please note that EDOA is able to provide the Committee with more detailed information regarding the laws in these States and in other jurisdictions if necessary. We would further direct you to submissions prepared by

EDO Tasmania, EDO Northern Territory and EDO South Australia responding to public inquiries into fracking in those jurisdictions.^{ix}

NSW

a) Exploration

Generally, exploration licences can be granted over any land, including privately owned land.^x

Under the relevant legislation, an access agreement is to be signed before exploration for coal or unconventional gas can commence. However, landholders *must* negotiate and sign an agreement within 28 days of receiving notice from the mining company. If no agreement is reached, the company is entitled to force the landholder into arbitration for this purpose.^{xi}

Laws do exist to prohibit exploration from taking place within a stipulated distance of houses and gardens. For example, mining and coal seam gas (**CSG**) production activities are generally not permitted on the *surface* of land.^{xii}

- within 200 metres of a dwelling house that is the principal place of residence;
- within 50 metres of a garden for coal;
- within 50 metres of a garden, vineyard or orchard for CSG; or
- on which there is a 'significant improvement' (for example a substantial building, dam, reservoir, or levee).^{xiii}

However, these laws do not prevent coal mining and CSG exploration from being undertaken *under* these areas. Furthermore, the production activity may still take place on the landholders' property despite their objections.

b) Production

As with exploration, mining and petroleum leases can be granted over any land, including privately owned land.^{xiv}

Production may only take place on the *surface* of land beyond the stipulated distances of houses, gardens, vineyards and so on.^{xv} EDOA asserts that these distances do not constitute a significant buffer between a coal mine or cluster of fracking wells and a residential dwelling or vineyard. This is particularly true when one considers the extreme noise, dust, light and environmental impacts associated with large, open cut coal mines.

We further note that while there is no law requiring a coal mining or unconventional gas company to purchase property, consents for open-cut coal mining production often include a condition requiring the proponent to purchase all properties within the 'zone of affectation.' This in itself highlights the significant impact that such operations have on local properties, and the subsequent pressure on individuals and families within the zone to sell their homes (which in some instances are linked to their livelihoods). EDOA is aware of individuals who have been disadvantaged by unequal bargaining power in relation to the sale of their property, in particular because the protections offered by legislation such as the *Land Acquisition (Just Terms Compensation) Act 1991* (NSW) do not extend to these transactions.^{xvi} As a consequence, in the event of a dispute over the value of the property, these individuals are unable to appeal the decision of the Valuer-General in the NSW Land and Environment Court.

c) Agricultural land

In NSW coal production on agricultural land is generally subject to landholder consent.^{xvii} However, the land must first meet the strict definition of 'agricultural land', which will depend on what has happened on the land over the 10 years preceding the mining lease application.^{xviii} By way of contrast, landholder consent is not required to conduct exploration activities.

Similarly, in NSW landholder consent is generally required to conduct CSG production activities on the surface of cultivated land.^{xix} However, the Minister is empowered to define an area of cultivated land on which production activities may take place if the Minister thinks the circumstances warrant it.^{xx} Landholder consent is not required to undertake exploration activities on cultivated land.

NSW has also enacted laws concerning 'strategic agricultural land' (**SAL**). Specifically, a proponent must obtain a 'Gateway Panel certificate' if CSG or coal mining proposals affect mapped SAL.^{xxi} However, the Gateway Panel cannot refuse a certificate.^{xxii} That is, strategic agricultural land *is not* exempted under the gateway process.

Queensland

a) Exploration

Exploration for unconventional gas may be carried out 'despite the rights of an owner or occupier of land on which they are exercised.'^{xxiii} Landholders do not have veto rights under the relevant legislation.

Similarly, landholders have no statutory right to prevent coal exploration from being undertaken on their land.^{xxiv} However, consent is required to 'enter the surface of restricted land' for the purposes of carrying out exploration activities.^{xxv} These areas include land:^{xxvi}

- Within 100 metres of a permanent building used mainly as accommodation or for business purposes, or for community, sporting or recreational purposes or as a place of worship.
- Within 50 metres of a principal stockyard, a bore or artesian well, or a dam.

We note that proponents for both forms of exploration must abide by the Land Access Code, which includes mandatory criteria relating to notification, access points, repairs and so on.^{xxvii}

b) Production

Landholder consent is not required to enter private land for the purposes of carrying out unconventional gas or coal production.^{xxviii} However, a mining lease for coal cannot be granted over 'restricted land' without landholder consent.^{xxix} We note that while the Land Access Code applies to unconventional gas production,^{xxx} *it does not apply to land covered by coal mining leases.*^{xxxi} That is, it does not apply to coal mining production activities.

c) Agricultural Land

In Queensland, the *Strategic Cropping Land Act 2011* provides for the designation of certain land as 'strategic cropping land' (**SCL**).^{xxxii} Mining on SCL is not prohibited;^{xxxiii} rather, the proponent must apply for a 'protection decision' which imposes certain

conditions on the carrying out of development on the land.^{xxxiv} In other words, the Act does not confer any right on the landholder to veto resource development on their land. We further note that the Act does not extend to grazing pasture.^{xxxv}

Given these existing regulatory gaps, **we recommend that the Bill be supported to establish a requirement for landholder consent before any coal or unconventional gas mining activities can occur on private land.**

Part Two: Fracking

1. Introduction

EDOA has undertaken a review of the prevalence of fracking across Australia, as well as the environmental and health impacts that may be associated with the practice. Inadequate State and Territory legislation, the potential gravity of these impacts and persistent knowledge gaps justify national legislation which ideally prohibits, or at the very least appropriately regulates, fracking. Our concerns are outlined below.

2. Prevalence

According to the CSIRO, if CSG reaches its maximum production capacity, up to 40,000 wells may be sunk in Australia.^{xxxvi} While not all CSG wells need to be fracked, sources differ as to the number likely to require fracking in order to extract coal from the seam.

While the Australian Petroleum Production and Exploration Association (**APPEA**) indicated that six percent of the CSG wells sunk between April 2012 to June 2013 required fracking, the Queensland Department of Environment and Heritage Protection (**DEHP**) has estimated that this could increase to 10 to 40 percent as the industry expands. At a project level, companies have provided the following statistics regarding the number of wells that will require fracking:

- Australia Pacific LNG Project in the Surat Basin: approximately 30 percent;
- Gladstone LNG Project in the Bowen and Surat Basins: 50 to 70 percent;
- Bowen Gas Project in the Bowen Basin: 4 percent so far;
- Surat Gas Project in the Surat and Clarence-Morton Basins: None;
- Camden Gas Project: 117 out of 137 (approximately 85 percent).^{xxxvii}

We note that these figures exclude shale and tight gas wells, both of which (with some exceptions for shale) require fracking due to the significant depth and relative impermeability of the rocks in which these resources are held.^{xxxviii} As exploration for these two forms of unconventional gas is still in its early stages, it is difficult to estimate the number of wells that may be required over time.^{xxxix} However, if even a fraction of the vast deposits outlined in **Attachment C** are deemed economically viable, it is likely that fracking will occur in many States and Territories.

Discussion of **refracking** of wells (to increase yield over time) is notably absent from reports written by the NSW Government and Chief Scientist and Engineer (**NSW CSG Report**),^{xi} and the Australian Government and Chief Scientist (**National Fracking Report**),^{xii} respectively. A peer-reviewed article written by academics from leading universities (Jackson et al) notes that '[o]ne aspect of unconventional energy extraction that has received almost no attention is the refracturing of wells. Operators are increasingly refracturing two to four years later to stimulate gas and oil production.'^{xiii} It is entirely plausible that unconventional gas companies operating in Australia will wish to

maximise extraction by refracking their wells. It is therefore possible that this practice – which remains unaccounted for in policy and legislation – will increase the prevalence and duration of fracking. The particular environmental and health concerns associated with refracking are discussed in further detail below.

In summary, fracking is a far from obscure practice which is projected to become more commonplace across several jurisdictions. This fact, coupled with environmental impacts, knowledge gaps and inadequate regulation at State and Territory level justify national legislation which either prohibits fracking or imposes strict controls on the practice.

3. Environmental impacts and knowledge gaps

Our analysis and experience evidences key concerns about the impacts of fracking. Concerns include: water extraction and use, chemicals and contamination of surface and groundwater.

In relation to **water extraction and use**, it is well known that significant quantities of groundwater must be pumped from aquifers in order to release unconventional gas. The National Fracking Report notes that as water used for fracking is obtained from proximate bores and surface water, 'in regions where local, natural water sources are scarce or used for other purposes hydraulic fracturing could require volumes of water that deplete or stress local resources.'^{xiii} Empirical research indicates that *refracking* is more water intensive than coal extraction and processing.^{xiv} This is particularly concerning given the dearth of research, policy and legislation regulating the refracking process in Australian States and Territories. Professor of Agriculture and Resource Economics, Alan Randall, states that the cumulative impacts of water extraction for CSG at a project level are difficult to predict 'because the impacts on aquifers are likely to play out on a time-scale of many decades and perhaps centuries.' He estimates that this will ultimately undermine 'make good' provisions operating in Queensland.

Analysis of relevant literature revealed the following knowledge gaps in relation to water extraction and use:

- What are the medium to long-term impacts on aquifers and water supply where water is scarce?
- What are the cumulative impacts on water resources at a local and Basin level?
- Can reliable modelling that predicts long-term cumulative impacts of water extraction and use be developed?^{xiv}
- What are the medium to longer-term impacts on water resources associated with refracking?^{xvi}

In relation to **fracking chemicals**, a range of concerns and serious regulatory gaps exist. Chemicals have the potential to adversely affect the environment and human health during their manufacture, use and disposal.^{xvii}

According to the CSIRO, fracking fluid is 97 to 99 per cent water and sand, with chemicals making up the remaining one to three per cent.^{xviii} However, given the volumes of fluid injected into a single well head, even one to three per cent is in real terms a significant quantity. For example, an environmental risk assessment (**Golder Report**) of hydraulic fracturing associated with the expansion of CSG fields operated by Santos in the Bowen and Surat Basins determined that 18, 348 kg of chemicals were injected into each well, which amounted to 2, 621 kg per coal seam.^{xlix}

In addition to the aggregate quantities of chemicals that are injected into each well head, there is concern about the nature of these chemicals and their potential impacts on human health and the environment. This issue has been complicated by the absence of public disclosure legislation in Australian jurisdictions, with many companies declaring the specific mix of chemicals used in their operations to be 'commercial-in-confidence'. While NSW has introduced a code of practice requiring all management plans to identify chemicals 'injected as part of the fracture stimulation process', this document has no statutory basis,ⁱ and only applies to new and renewed licences.ⁱⁱ

Notwithstanding this opacity, it is often claimed that fracking chemicals are safe and include harmless substances such as guar gum, a common thickening agent used in food.ⁱⁱⁱ While it may be true that several fracking additives are non-toxic, the vast majority have not been tested by Australia's chemical regulator, the National Industrial Chemical Notification and Assessment Scheme (**NICNAS**) for use in fracking. In fact, out of 23 chemicals *known* to be used in fracking fluids in Australia, only two have been assessed by NICNAS, and neither for their use in fracking.ⁱⁱⁱⁱ While these 23 chemicals have material data safety sheets (**MSDSs**),^{liv} they are 'typically vague on the descriptions of both toxicological and ecotoxicological effects.'^{iv}

While BTEX (benzene, toluene, ethylbenzene and xylene) have been banned from use in fracking fluids in NSW since 2012^{lvi} and have been restricted in QLD since 2011,^{lvii} the ban in NSW has not been enforced under legislation. Consequently, it could be reversed without parliamentary scrutiny.

Regarding recovery of fracking fluid, the Golder Report notes that in the Surat and Bowen Basins:

Following completion of the hydraulic fracturing process, a considerable volume of the injected hydraulic fracturing fluids are recovered upon commencement of CSG production. It is conservatively assumed that 40per cent of the hydraulic fracturing fluid volume would remain in the formation and this would correspond to 7,400 kg of chemicals per injection well or 1,053 kg per seam (assuming seven coal seams intercepted).^{lviii}

While figures vary, one peer-reviewed research paper indicates that a total of 200,000 to 600,000 litres of water is pumped back to the surface,^{lix} while it has been estimated that *each* gas well in the Surat Basin in QLD produces between seven and 300 ML of water per year. Produced water is typically saline and contains other organic and inorganic constituents of the minerals found in seams.

Fracking fluids and produced water must be disposed of using an approved method. This may include reinjection into aquifers, treatment and reuse. Evaporation ponds have been banned in NSW under the Aquifer Interference Policy^{lx} and in QLD 'in all but exceptional circumstances'^{lxi} due to the threats they pose to the environment (which include poisoning native animals, soil contamination and spillage). It is not known, however, how many existing ponds are yet to be decommissioned, or how much produced water is stored in 'temporary ponds' (or for how long) before being treated or transported elsewhere.^{lxii}

As indicated in a recent report produced for the Queensland Government,

CSG water contains significant but variable concentrations of salts, with Total Dissolved Solids (TDS) values typically ranging from 1000 to more than 10 000 mg/L. It also has a high Sodium Adsorption Ratio (SAR) *and may contain other contaminants (e.g. hydrocarbons and other chemicals such as boron, fluoride and*

metals and metalloids) in concentrations that may exceed thresholds in the national water quality guideline values (ANZECC and ARMCANZ 2000) [our emphasis]. The constituents of CSG water therefore have the potential to cause environmental harm if released to land or waters through inappropriate management.^{lxiii}

Knowledge gaps in relation to fracking chemicals include:

- Which chemicals are currently being used in fracking fluid formulae in Australia?
- What happens to the chemistry of produced water when it is mixed with fracking fluid over the short and long term? Are the degradation pathways for organic constituents well understood?
- What are the naturally occurring chemicals in water in coal seams and shale formations? Which of these are harmful to the environment and human health?
- Which naturally occurring organic heavy metals and compounds are mobilised during the fracking process? Which of these are harmful to the environment and human health?
- What rates of recovery are currently being obtained for fracking fluids? What percentage of these fluids is remaining in the coal seam or being treated as produced water?^{lxiv}

Due to the potential impacts of unassessed chemicals used in fracking, there is a high level of concern regarding **contamination of groundwater and surface water** related to fracking activities. As noted by the NSW Legislative Council, General Purpose Standing Committee No. 5, Inquiry into coal seam gas, May 2012 (Report), there are case studies of pollution from CSG water discharges. For example, Bohena Creek in the Pilliga Forest had high levels of ammonia, methane, carbon dioxide, lithium, cyanide, bromide and boron after Eastern Star Gas discharged 10,000 litres of saline coal seam water in June 2011^{lxv} and was subsequently prosecuted.

Based on our analysis, State and Territory legislation more often than not fails to reflect best available science and/or international best-practice. It also fails to properly account for the considerable list of **knowledge gaps**. This necessarily means that fracking is being undertaken with insufficient insight into the medium to long-term impacts on the environment and human health.

In summary, the Bill should be supported.

As a minimum, a national **moratorium** should apply to fracking until such time as the significant list of knowledge gaps highlighted in reports and peer-reviewed literature have been properly addressed. Until these gaps are researched and understood, it is difficult to accurately predict the longer term environmental impacts associated with the widespread use of fracking. We note that moratoriums on fracking are currently in place in a number of local and international jurisdictions including Victoria,^{lxvi} Tasmania,^{lxvii} France^{lxviii} and Scotland.^{lxix}

Part Three: The Australian Government should implement leading practices

We submit that the Australian Government can and should take a lead role in regulating the significant impacts and equity issues around coal and gas mining. We refer the Committee to two relevant EDO reports:

- **Attachment 1** – *A review of NSW Coal Seam Gas Regulation and International Best Practice*. Legal Briefing Paper, November 2014.

This report identifies eight areas where other jurisdictions have developed leading regulatory measures. These measures can and should be applied to unconventional gas and coal mining activities on private land in Australia.

- **Attachment 2** - *Coal and gas mining in Australia – Opportunities for national law reform*. Technical Brief No. 24, The Australia Institute (2013).

While some issues have moved on since this report was first commissioned (for example, repeal of Clean Energy legislation and bodies such as the National Water Commission), we refer the Committee to this report as a source of nine areas for national leadership and law reform for coal and gas mining in Australia.

Attachments

Attachment 1 – *A review of NSW Coal Seam Gas Regulation and International Best Practice*. Legal Briefing Paper, November 2014.



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Regulatory analysis -

Attachment 2 - *Coal and gas mining in Australia – Opportunities for national law reform*. Technical Brief No. 24, The Australia Institute (2013).



TAI Report 2013 -
Coal and gas mining in

Attachment C – Resource Tenements

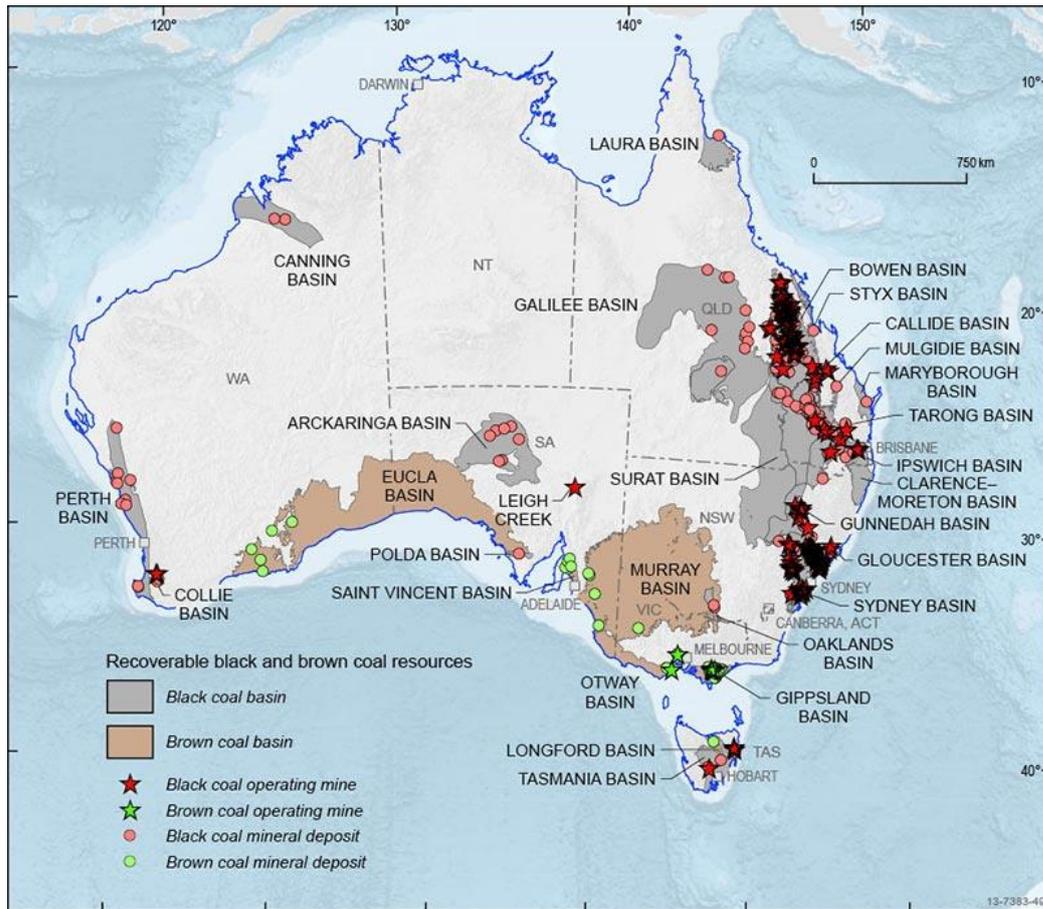


Figure 1: Australia's coal resources and mines. Source: Geoscience Australia (2012).



Figure 2: Australia's shale gas and oil reserves. Source: US Energy Information Administration (2013).

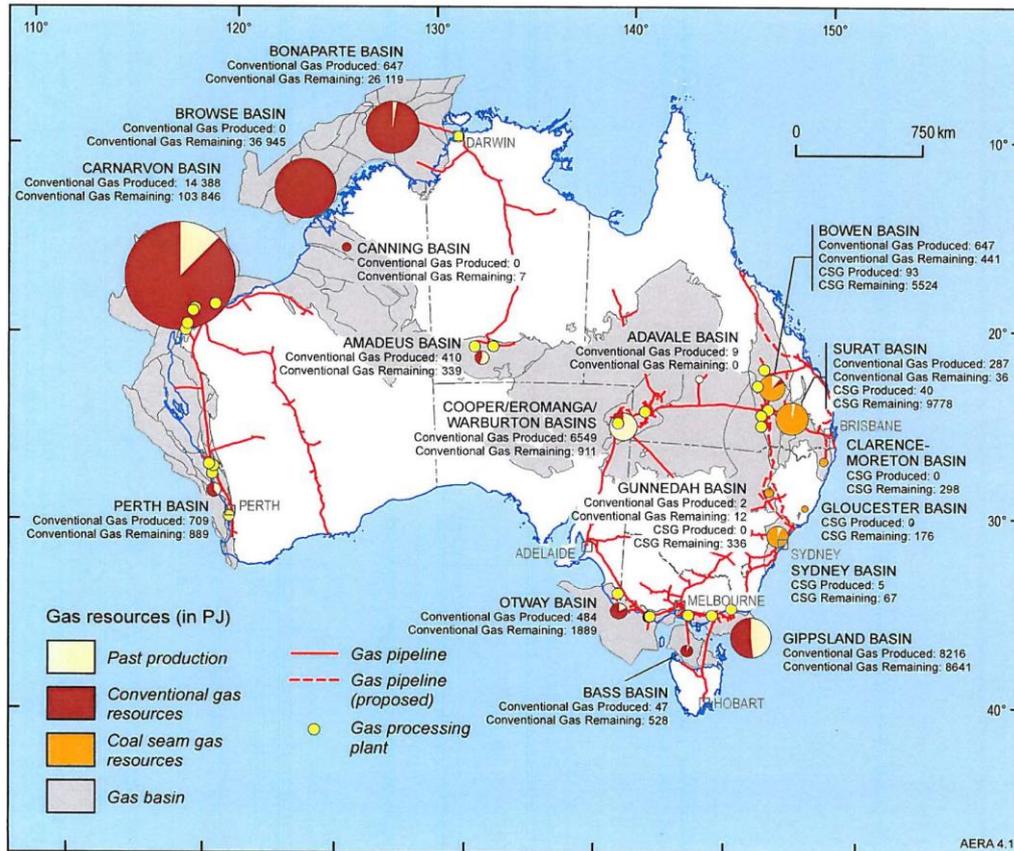


Figure 3: CSG exploration and production in eastern Australia. Source: Geoscience Australia.

ⁱ EDOA:

<http://d3n8a8pro7vhm.cloudfront.net/edonsw/pages/1110/attachments/original/1385092797/130826CoalandgasmininginAustralia.pdf?1385092797>; EDO NSW:

https://d3n8a8pro7vhm.cloudfront.net/edonsw/pages/1831/attachments/original/1418007825/141118_CSG_Regulatory_analysis_-_Briefing_Paper.pdf?1418007825; EDO Tasmania: <http://www.edotas.org.au/wp-content/uploads/2014/12/EDO-submission-Review-of-hydraulic-fracturing-in-Tasmania-FINAL.pdf>; EDO Northern Territory: <http://www.hydraulicfracturinginquiry.nt.gov.au/EDO-Recommendations.pdf>; EDO South Australia:

https://d3n8a8pro7vhm.cloudfront.net/edosa/pages/30/attachments/original/1423006416/Fracking_Inquiry_Submission_it_P_Dupont_020215.pdf?1423006416

ⁱⁱ See Geoscience Australia, *Coal Fact Sheet*. Available at: http://www.australianminesatlas.gov.au/education/fact_sheets/coal.html (accessed 8 May 2015); Geoscience Australia, *Coal Seam Gas Fact Sheet*. Available at: http://www.australianminesatlas.gov.au/education/fact_sheets/coal_seam_gas.html#resources (accessed 8 May 2015); US Energy Information Administration, *Technically Recoverable Shale Oil and Shale Gas Resources: An Assessment 137 Shale Formations in 41 Countries Outside the US*, June 2013, pp. 1-6, 1-7. Available at: <http://www.eia.gov/analysis/studies/worldshalegas/> (Accessed 8 May 2015).

ⁱⁱⁱ This area is comprised of three licences: Petragas Ltd (EL3/2013) – 3855 sq. km; Terra Tasmania (EL30/2011) – 4850 sq. km; Overseas Energy Holdings (SEL5/2005) – 6885 sq. km. See <http://www.mrt.tas.gov.au/portal/tenements-search>

^{iv} See for example *Bulga Milbrodale Progress Association Inc. v Minister for Planning and Infrastructure and Warkworth Mining Limited [2013] NSWLEC 48*.

^v See the following map of coal fields in NSW: <http://www.resources.nsw.gov.au/resources/coal/coalfields> (Accessed 8 May 2015).

^{vi} 'Petroleum exploration and production in NSW is almost entirely focussed on coal seam gas (CSG).' See NSW Department of Trade and Investment, Division of Minerals and Resources, *Petroleum activity in NSW*. Available at: <http://www.resources.nsw.gov.au/resources/petroleum/activity-in-nsw> (Accessed 20 June 2013). We note some title cancellations and buy-outs

were announced prior to the NSW election.

^{vii} See for example: Camden Gas Project; Gloucester Gas Project; Arrow (Darling Downs) Project; Arrow (Bowen) Project. See also Kerr, D, *Property rights, agriculture and the coal seam gas industry*, in Centre for Economic Development of Australia (CEDA), *Australia's Unconventional Energy Options*, September 2012, p. 42.

^{viii} Ecological Australia, *Shale Gas Development in Australia - Potential impacts and risks to ecological systems*. Final report prepared for ACOLA Secretariat Ltd, 11 January 2013, p. 5. See: <http://www.acola.org.au/PDF/SAF06Consultants/Eco%20Logical%20Risk%20and%20Impact%20Jan%202013.pdf> (Accessed 8 May 2015).

^{ix} <http://www.edotas.org.au/wp-content/uploads/2014/12/EDO-submission-Review-of-hydraulic-fracturing-in-Tasmania-FINAL.pdf>; <http://www.hydraulicfracturinginquiry.nt.gov.au/EDO-Recommendations.pdf> ; https://d3n8a8pro7vhmx.cloudfront.net/edosa/pages/30/attachments/original/1423006416/Fracking_Inquiry_Submission_it_P_Dupont_020215.pdf?1423006416

^x *Mining Act 1992* (NSW), s. 24 (3); *Petroleum (Onshore) Act 1991* (NSW), s. 9.

^{xi} *Mining Act 1992* (NSW), s. 140; *Petroleum (Onshore) Act 1991* (NSW), s. 69C.

^{xii} *Mining Act 1992* (NSW), s. 68; *Petroleum (Onshore) Act 1991* (NSW), s. 9(3).

^{xiii} *Mining Act 1992* (NSW), Dictionary; *Petroleum (Onshore) Act 1991* (NSW), s. 72 (1c).

^{xiv} *Mining Act 1992* (NSW), s. 68; *Petroleum (Onshore) Act 1991* (NSW), s. 9 (3).

^{xv} *Mining Act 1992* (NSW), s. 62; *Petroleum (Onshore) Act 1991* (NSW), s. 72.

^{xvi} This Act deals with acquisition by the State, not by private companies.

^{xvii} *Mining Act 1992* (NSW), Sch. 1, cl. 23.

^{xviii} *Mining Act 1992* (NSW), Sch. 2, cl. 1,2, 3.

^{xix} *Petroleum (Onshore) Act 1991* (NSW), s. 71 (1). The term 'cultivated land' is not explicitly defined.

^{xx} *Petroleum (Onshore) Act 1991* (NSW), s. 71 (2).

^{xxi} *State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007*, cl. 17F.

^{xxii} *State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007*, cl. 17H.

^{xxiii} *Petroleum and Gas (Production and Safety) Act 2004* (QLD), s. 31 (2).

^{xxiv} *Mineral Resources Act 1989* (QLD), s. 129.

^{xxv} *Mineral Resources Act 1989* (QLD), s. 129 (3).

^{xxvi} *Mineral Resources Act 1989* (QLD), Dictionary.

^{xxvii} *Petroleum and Gas (Production and Safety) Act 2004* (QLD), ss. 24A, 555; *Mineral Resources Act 1989* (QLD), s. 141 (i) (ii).

^{xxviii} *Petroleum and Gas (Production and Safety) Act 2004* (QLD), s. 109 (1) (c). *Mineral Resources Act 1989* (QLD), s. 235.

^{xxix} *Mineral Resources Act 1989* (QLD), s. 238 (2).

^{xxx} *Petroleum and Gas (Production and Safety) Act 2004* (QLD), ss. 24A, 555.

^{xxxi} Under the *Mineral Resources Act 1989* (QLD), the Land Access Code only applies to mineral development licenses. See s. 194.

^{xxxii} *Strategic Cropping Land Act 2011* (QLD), Part 2.

^{xxxiii} *Strategic Cropping Land Act 2011* (QLD), s. 78.

^{xxxiv} *Strategic Cropping Land Act 2011* (QLD), Part 4.

^{xxxv} *Strategic Cropping Land Act 2011* (QLD). See definition of 'cropping' in Dictionary.

^{xxxvi} CSIRO, *Coal seam gas developments – predicting impacts*. April 2012. See:

http://www.clw.csiro.au/publications/waterforahealthycountry/MM110611_CLW_CSGFactsheet_GPredictingImpacts_WEB_111031.pdf (Accessed 8 May 2015).

^{xxxvii} Commonwealth of Australia, *Hydraulic Fracturing ('fracking') techniques, including reporting requirements and governance arrangements, Background review*, 2014, pp. 21-2.

^{xxxviii} Australian Government (Department of Resources, Energy and Tourism; Geoscience Australia; Bureau of Resources and Energy Economics), *Australian Gas Resource Assessment 2012*, p.59.

^{xxxix} As noted in the following report, 'Understanding of the future tight gas and shale gas resource in Australia is very limited.' Australian Government (Department of Resources, Energy and Tourism; Geoscience Australia; Bureau of Resources and Energy Economics), *Australian Gas Resource Assessment 2012*, p. 37.

^{xl} NSW Government, Chief Scientist & Engineer, Final Report of the Independent review of Coal Seam Gas Activities in NSW, September 2014,. See: <http://www.chiefscientist.nsw.gov.au/coal-seam-gas-review>.

^{xli} Commonwealth of Australia, *Hydraulic Fracturing ('fracking') techniques, including reporting requirements and governance arrangements, Background review*, 2014.

^{xlii} Jackson, Robert B et al, The Environmental Costs and Benefits of Fracking, *Annual Review of Environment and Resources*, 2014. 39, p. 332.

^{xliiii} Commonwealth of Australia, *Hydraulic Fracturing ('fracking') techniques, including reporting requirements and governance arrangements, Background review*, 2014, p. 41.

^{xliiv} Jackson, Robert B et al, The Environmental Costs and Benefits of Fracking, *Annual Review of Environment and Resources*, 2014. 39, p. 337

- ^{xlv} See Randall, Allan, *Coal seam gas – Toward a risk management framework for novel intervention*. (2012) 29 EPLJ 152.
- ^{xlvi} Jackson, Robert B et al, The Environmental Costs and Benefits of Fracking, *Annual Review of Environment and Resources*, 2014. 39, p. 337.
- ^{xlvii} Standing Committee on Chemicals (SCOC) Secretariat (Australian Government), Review of Chemicals and Plastics Regulation Reform, November 2011 (Published 16 May 2012), p. 28.
- ^{xlviii} CSIRO, *What is hydraulic fracturing?*, April 2012, p. 2 (note pages numbers not specified in document).
- ^{xlix} Golder Associates, *Coal Seam Hydraulic Fracturing Fluid Environmental Risk Assessment: Response to the Coordinator-General Requirements for Coal Seam Gas Operations in the Surat And Bowen Basins Queensland* (prepared for Santos Ltd), October 2010, p. 2 (note page numbers not specified in report).
- ^l However, if mandatory disclosure is imposed as a condition of title, this would be enforceable under the *Petroleum (Onshore) Act 1991*. Nevertheless, the Act does not require that such a condition be imposed on titles. Specifically, the Minister may direct a title holder to comply with the conditions of the title: s. 77(1). Penalties are attached when the title holder fails to comply with the direction: s 77(2). It is an offence to contravene any conditions of a title: s. 136A (1).
- ^{li} NSW Government, *Code of Practice for Coal Seam Gas: Fracture Stimulation Activities*, p. 7; Strategic Regional Land Use Policy, *Frequently Asked Questions*. Available at: http://www.nsw.gov.au/sites/default/files/uploads/common/CSG-FAQ_SD_v01.pdf (downloaded 20 June 2013).
- ^{lii} CSIRO, *What is hydraulic fracturing?*, April 2012, p. 2 (note pages numbers not specified in document).
- ^{liii} National Toxics Network (Dr. Mariann Lloyd-Smith, Dr. Rye Senjen), *Hydraulic Fracturing in Coal Seam Gas Mining: The Risks to our Health, Communities, Environment and Climate*, September 2011, pp. 10-11.
- ^{liv} A material safety data sheet is a document that provides health and safety information about products, substances or chemicals. They are prepared by manufacturers and importers of 'dangerous goods' and 'hazardous substances'. For further information, see for example WorkSafe Victoria, *Material Safety Data Sheets*. Available at: <http://www.worksafe.vic.gov.au/safety-and-prevention/health-and-safety-topics/material-safety-data-sheets> (accessed 16 June 2013).
- ^{lv} Bately, Graeme. E., Kookana, Rai. S., Environmental issues associated with coal seam gas recovery: managing the fracking boom, *Environ. Chem. (CSIRO Publishing)*, 2012, 9, p. 426.
- ^{lvi} NSW Government, *Code of Practice for Coal Seam Gas: Fracture Stimulation Activities*, p. 7.
- ^{lvii} S. 16 of the Natural Resources and Other Legislation Amendment Act (No 2) 2010 (QLD) inserts s. 312W into the *Environmental Protection Act 1994* (QLD). This is complemented by the *Environment Protection Amendment Regulation* (No. 3), 2011, which restricts the use the four BTEX chemicals to 1, 80, 180, 75 parts per billion, respectively.
- ^{lviii} Golder Associates, *Coal Seam Hydraulic Fracturing Fluid Environmental Risk Assessment: Response to the Coordinator-General Requirements for Coal Seam Gas Operations in the Surat And Bowen Basins Queensland* (prepared for Santos Ltd), October 2010, p. 2 (note page numbers not specified in report).
- ^{lix} Ibid.
- ^{lx} NSW Aquifer Interference Policy, p. 25. The Policy states that evaporation ponds will be formally prohibited under the *Petroleum (Onshore) Regulation 2007*. At the time of writing, no such amendment had been made.
- ^{lxi} QLD Department of Environment and Heritage, *Coal seam gas water*. Available at <http://www.ehp.qld.gov.au/management/non-mining/csg-water.html> (accessed 20 June 2013).
- ^{lxii} NSW Government website regarding CSG. See: <http://www.csg.nsw.gov.au/the-facts/water#.Ub7Nz5zLnU> (accessed 16 June 2013).
- ^{lxiii} Biggs, AJW, Witheyman, SL, Williams, KM, Cupples N, de Voil CA, Power, RE, Stone, BJ, (2012). *Assessing the salinity impacts of coal seam gas water on landscapes and surface streams*. August 2012. Final report of Activity 3 of the Healthy HeadWaters Coal Seam Gas Water Feasibility Study. QLD Department of Natural Resources and Mines, Toowoomba. p. 1. Accessed on 07 May 2013 and located at: <http://www.nrm.qld.gov.au/water/health/healthy-headwaters/feasibility-study/pdf/csg-irrigation-salinity-risk-assessment.pdf>.
- ^{lxiv} Commonwealth of Australia, *Hydraulic Fracturing ('fracking') techniques, including reporting requirements and governance arrangements, Background review*, 2014, p. 51.
- ^{lxv} See also: Sydney Morning Herald, *Pilliga Contamination: Santos to be Prosecuted*, 13 June 2013. Available at: <http://www.smh.com.au/environment/weather/pilliga-contamination-santos-to-be-prosecuted-20130613-2o5rq.html> (accessed 13 June 2013).
- ^{lxvi} In place until mid-2015.
- ^{lxvii} In place until March 2020. See: http://dpipwe.tas.gov.au/Documents/Tasmanian%20Fracking%20Policy%20Statement_26-2-15.pdf
- ^{lxviii} *Code Minier*, Loi n° 2011-835 du 13 juillet 2011, article 1.
- ^{lxix} See Attachment 1.