



Independent Pricing and Regulatory Tribunal

# Landholder benchmark compensation rates

Gas exploration and production in NSW

**Energy — Issues Paper**  
April 2015





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## Invitation for submissions

IPART invites written comment on this document and encourages all interested parties to provide submissions addressing the matters discussed.

**Submissions are due by 29 May 2015.**

We would prefer to receive them electronically via our online submission form <[www.ipart.nsw.gov.au/Home/Consumer\\_Information/Lodge\\_a\\_submission](http://www.ipart.nsw.gov.au/Home/Consumer_Information/Lodge_a_submission)>.

You can also send comments by mail to:

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Independent Pricing and Regulatory Tribunal  
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Late submissions may not be accepted at the discretion of the Tribunal. Our normal practice is to make submissions publicly available on our website <[www.ipart.nsw.gov.au](http://www.ipart.nsw.gov.au)> as soon as possible after the closing date for submissions. If you wish to view copies of submissions but do not have access to the website, you can make alternative arrangements by telephoning one of the staff members listed on the previous page.

We may choose not to publish a submission—for example, if it contains confidential or commercially sensitive information. If your submission contains information that you do not wish to be publicly disclosed, please indicate this clearly at the time of making the submission. IPART will then make every effort to protect that information, but it could be disclosed under the *Government Information (Public Access) Act 2009* (NSW) or the *Independent Pricing and Regulatory Tribunal Act 1992* (NSW), or where otherwise required by law.

If you would like further information on making a submission, IPART's submission policy is available on our website.



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# 1 | Introduction

On 13 November 2014, the NSW Government released the NSW Gas Plan which sets out its strategic framework for regulating the onshore gas industry in NSW.<sup>1</sup> One of the priority areas in this plan is ensuring that landholders and communities share in the benefits of gas exploration and development. The NSW Government has committed to:

- ▼ providing landholders with independent expert advice on benchmark compensation rates for hosting gas exploration and production, and
- ▼ establishing a Community Benefits Fund with contributions from both the NSW Government and gas companies to fund local projects where gas exploration and production occurs.

The Premier has asked the Independent Pricing and Regulatory Tribunal of NSW (IPART) to review and provide advice on benchmark compensation rates.

This paper sets out our proposed approach for this review and outlines our preliminary views on some issues. It also explains how stakeholders can provide input to the review, and identifies the issues on which we particularly seek stakeholder comment.

## 1.1 What has IPART been asked to do?

Our terms of reference for this review (see Appendix A) ask us to recommend appropriate compensation benchmarks to guide landholders in negotiating agreements with gas companies for hosting gas exploration and production. In particular, we are to develop an analytical framework for setting compensation benchmarks that can be updated annually.

The NSW Government intends that NSW landholders receive compensation that is at least as good as that received by other landholders in Australia who host gas development.

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<sup>1</sup> NSW Government Trade & Investment website: NSW Gas Plan <http://www.resourcesandenergy.nsw.gov.au/energy-supply-industry/legislation-and-policy/nsw-gas-plan>.

In conducting this review, we are to have regard to:

- ▼ the economic benefits over the lifecycle stages of a project, considering the associated risks and probabilities of a project progressing
- ▼ the structure of compensation arrangements (eg, fixed, rental or other methodologies) taking into account the different phases of a project, the varying value of production systems in agricultural enterprises, and the implications for encouraging exploration
- ▼ the landholder compensation arrangements currently applied by industry in NSW, other Australian states and territories and internationally, including identifying industry best practice
- ▼ similar arrangements in other industries (eg, wind farms) across other Australian and international jurisdictions
- ▼ relevant legislation on gas/petroleum exploration and production, as well as measures announced as part of the NSW Gas Plan, and
- ▼ any other matters we consider relevant.

The purpose of the compensation benchmarks we are to recommend is a framework to **guide landholders** when negotiating compensation arrangements with gas companies. Landholders are in the best position to determine what compensation is appropriate for them given their unique circumstances – including how the gas company proposes to use their land, the value of their land, and the extent to which the gas company is able to work with them to mitigate the impacts of its exploration and production activities. While there is provision for landholder compensation under NSW legislation<sup>2</sup>, our preliminary view is that this should be broadened to include all relevant impacts of coal seam gas exploration and production.

We consider the benchmarks we recommend should include **both compensation payments and benefits payments**. As noted above, our terms of reference require us to have regard to the NSW Gas Plan, which states that landholders should ‘share the benefits’ of gas exploration and production. They also require us to have regard to the ‘economic benefits over the lifecycle stages of a project, considering the associated risks and probabilities of a project progressing’. In our view, these terms indicate that landholders should receive not only compensation for loss, damage or inconvenience caused by hosting gas exploration and production, but also a share of the benefits generated by this exploration and production.

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<sup>2</sup> Section 109(1) of the *Petroleum (Onshore) Act 1991* (NSW).

## 1.2 What matters are outside the scope of our review?

IPART recognises that there are many differing opinions and strong views in the community regarding onshore gas development. Under the terms of reference we have determined that the following issues are outside the scope of this review:

- ▼ whether a licence should be granted for gas exploration and production in a particular location
- ▼ environmental controls, monitoring and reporting arrangements
- ▼ techniques used to extract gas, including ‘fracking’, and
- ▼ impacts of gas development on local communities.

These are matters for the NSW Government, and we will not be considering them as part of our review. Under the NSW Gas Plan the NSW Government has committed to working with community and industry to develop a Strategic Release Framework for gas exploration. There will also be separate consultation on the Community Benefits Fund.

## 1.3 How will we conduct the review?

For this review, we will undertake our own research and analysis and conduct a public consultation process. This issues paper is the first step in our consultation process, and identifies the key issues on which we seek stakeholder input.

We invite all interested parties to make submissions in response to the issues paper by 29 May 2015. (See page iii for information on how to make a submission.) We also plan to consult directly with landholders, the gas industry, and other stakeholders to gather further information. In addition, we will hold public hearings in the Sydney area and in relevant country areas in September/October 2015 – to give stakeholders a further opportunity to provide input. Further details will be made available on our website.

We will release a draft report and draft recommendations in early September 2015, and seek further submissions before making our final recommendations and providing our final report to the Minister for Industry, Resources and Energy. Table 1.1 sets out the indicative timetable for the review. We will update this timetable on our website as the review progresses.

**Table 1.1 Timetable for the landholder compensation review**

Milestone	Date
Release issues paper	20 April 2015
Submissions due	29 May 2015
Release draft report	Early September 2015
Hold public hearings	September/October 2015
Submissions due	October 2015
Provide final report to the Minister	By 30 November 2015

## 1.4 The structure of this paper

The remainder of this paper provides more information on the review, our proposed analytical approach, the issues we will consider and, in some cases, our preliminary views on these issues:

- ▼ Chapter 2 outlines the context for the review, including information on the coal seam gas (CSG) industry and current legislative provisions for landholder compensation
- ▼ Chapter 3 outlines our proposed analytical approach for the review
- ▼ Chapters 4 to 7 discuss each of the key steps in our proposed approach, including what we will consider in each step and the issues on which we particularly seek stakeholder comment
- ▼ Appendixes A to G provide more background information and Appendix H contains a glossary of terms.

## 1.5 What issues do we seek comment on?

The issues on which we particularly seek stakeholder comment are highlighted in the following chapters. For convenience, they are also listed below. Please feel free to comment on any or all of the issues, or provide other information or comments you consider relevant to the review and our terms of reference.

- 1 Do you agree with our proposed principles of transparency, adaptability and practicability to guide our recommendations for this review? Are there other principles that we should apply in making our recommendations? 16
- 2 Do you agree with the four key steps in our proposed approach for this review (identify impacts, estimate compensation for these impacts, estimate benefit payments and make recommendations)? If not, what are your concerns? 16
- 3 Do you agree with our preliminary view on the relevant heads of compensation for hosting CSG exploration and production (value of land occupied and loss due to severance, injurious affection and disturbance)?

	Are there other temporary impacts of CSG exploration and production on landholders that we should consider?	24
4	Should we consider any 'special value' of land and 'loss of opportunity to make planned improvements on the land' in recommending compensation for CSG exploration and production?	24
5	Are there any permanent impacts on the market value of land arising from hosting gas exploration and production that we should consider?	24
6	Do you agree with our preliminary view that NSW legislative provisions for landholder compensation for gas exploration and production should be broadened? If so, how? If not, why?	25
7	Do you agree with our preliminary view that our recommendations on compensation should be limited to landholders who host CSG activities and their neighbours who are directly affected? If not, why?	25
8	Are gross margin and market rental approaches appropriate for estimating compensation for the value of land occupied? Are there other approaches that we should consider?	33
9	Do you agree with our preliminary view that because severance is site-specific and highly variable, providing benchmark compensation would be of limited use to landholders? If not, how should we estimate and structure compensation for severance?	33
10	Do you agree with non-market valuation and relocation cost approaches for estimating compensation for injurious affection? Are there other approaches that we should consider?	33
11	Do you agree with our proposed approaches for estimating compensation, or passing through costs, for disturbance? Are there other approaches that we should consider?	33
12	Do you agree with our preliminary view that benefit payments should apply during the production phase for those landholders hosting gas development on their land? If not, why?	37
13	Do you agree that the costs of benefit payments should be shared between the gas company and the NSW Government? If so how? If not, why?	37
14	Should funds for benefit payments be pooled and divided among a group of landholders that have signed access agreements? If so, how?	37

## 2 Context for the review

At present, onshore exploration and production of gas in NSW is focussed on coal seam gas (CSG) and therefore we propose to concentrate our review on CSG. However, our recommended framework for setting and annually updating benchmark compensation and benefit payments (discussed in Chapters 3-7) could also be applied to other types of mineral/petroleum development.

As context for this review, the sections below provide background information on CSG, the gas industry in NSW, and existing legislative arrangements for landholder compensation. More detailed information on these topics is provided in the appendices to this paper.

### 2.1 What is coal seam gas?

CSG is a naturally occurring gas found in coal seams hundreds of metres below the earth's surface. Like conventional natural gas, CSG mostly comprises methane and is a type of petroleum formed from the remains of plants compressed over millions of years.<sup>3</sup>

While chemically similar, CSG differs from conventional gas in terms of the type of rock it is found in, and how it is extracted:

- ▼ Australia's conventional gas reserves are mostly offshore. They are found in porous sandstone formations capped by impermeable rock, where the gas is stored at high pressure. The gas flows to the production well and then to the surface under high pressure.
- ▼ Australia's CSG reserves are mostly onshore. They are found in coal seams trapped underground by water pressure. To extract CSG, water in the coal seam needs to be pumped out to release the gas.<sup>4</sup>

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<sup>3</sup> <http://www.resourcesandenergy.nsw.gov.au/landholders-and-community/coal-seam-gas/the-facts> accessed 18 March 2015.

<sup>4</sup> <http://www.csiro.au/en/Research/Energy/Hydraulic-fracturing/What-is-unconventional-gas> accessed 18 March 2015.

As with conventional natural gas, CSG is used for heating, cooking, hot water systems, industrial processes and electricity generation. In Queensland, CSG is being converted into liquefied natural gas (LNG) and exported overseas.<sup>5</sup>

## 2.2 CSG exploration and production

Developing CSG typically involves four stages – exploration, pilot testing, production and decommissioning.<sup>6</sup>

### 2.2.1 Exploration

The exploration stage involves ascertaining the location and size of prospective CSG deposits. This may involve seismic surveying and drilling core holes:

- ▼ Seismic surveys involve generating artificial soundwaves that bounce off underground rock formations and are recorded at the surface. Analysing the time it takes for sound waves to return to the surface provides information about rock formations and potential gas reserves. Specialised trucks are used, which carry a heavy plate that is vibrated to generate a seismic signal.<sup>7</sup>
- ▼ Core holes are drilled to obtain coal and rock samples for testing. Holes are typically between 100 millimetres and 300 millimetres in diameter and are lined with steel casing. This casing is cemented to the side of the hole, both for safety reasons and to protect aquifers.

### 2.2.2 Pilot testing

If exploration activities identify CSG deposits that may hold sufficient gas, pilot testing will be conducted. This involves:

- ▼ **Drilling up to five production-sized wells through the layers of rock and into the coal seams.** These wells are typically spaced up to one kilometre apart. To protect groundwater from being contaminated, the wells are lined with three cement and steel casings. Individual wells can take from three days to three weeks to set up, drill and complete.<sup>8</sup>
- ▼ **Pumping the water in the coal seam to the surface through these wells,** and then testing the water and any gas that flows to the surface.

<sup>5</sup> LNG is natural gas that has been cooled to approximately -162° Celsius so that it converts to liquid form for ease of storage and transport. In liquid form it takes up about 1/600th of the volume of natural gas in a gaseous state.

<sup>6</sup> Unless otherwise stated, information on stages of CSG development in this section is based on information obtained from Santos, [http://www.santos.com/library/CSG\\_About.pdf](http://www.santos.com/library/CSG_About.pdf) accessed 25 March 2015.

<sup>7</sup> <http://www.seismicsurvey.com.au/> accessed 25 March 2015.

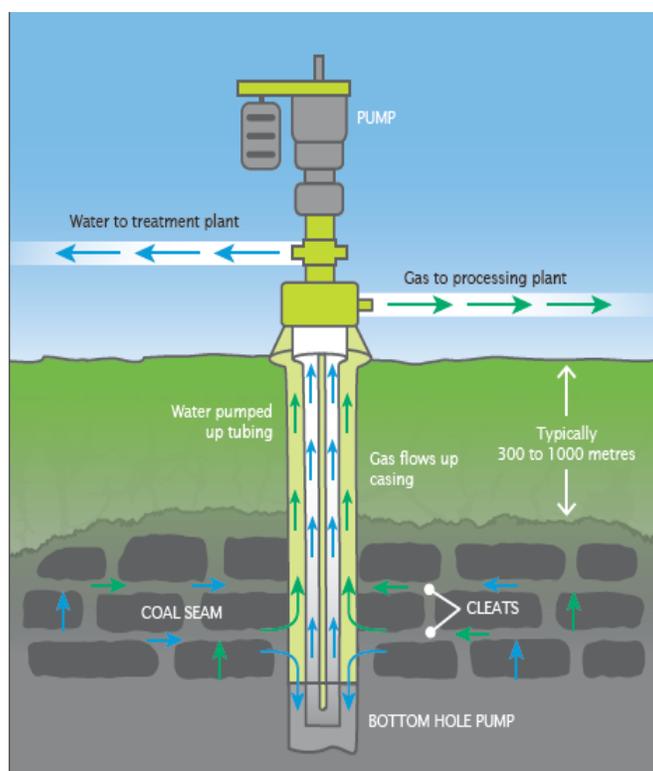
<sup>8</sup> <http://www.csiro.au/en/Research/Energy/Hydraulic-fracturing/What-is-unconventional-gas> accessed 25 March 2015.

### 2.2.3 Production

If the pilot testing leads to commercial production, further wells are drilled to extract water and gas. The distance between the wells varies, but is typically between 500 metres and 1.5 kilometres. Underground gas and water pipelines are laid to connect the wells, and to transport the gas and water produced from the landholder's property to centralised processing and treatment plants (see Figure 2.1). It is then delivered to markets through a buried high-pressure pipeline. In some instances hydraulic fracturing (or fracking) is used to increase the flow of gas from a coal seam. This is discussed in Appendix B. The water produced is treated to remove salts and other chemicals and then either re-used or disposed of according to NSW Government regulations.<sup>9</sup>

Once operational, a CSG well may produce gas for around 10 to 20 years.

**Figure 2.1** CSG production process



**Source:** CSIRO, *What is coal seam gas?*, Fact Sheet, August 2014, <http://www.iesc.environment.gov.au/publications/csg-extraction-and-co-produced-water> accessed 16 April 2015.

<sup>9</sup> <http://www.csiro.au/en/Research/Energy/Hydraulic-fracturing/What-is-unconventional-gas> accessed 25 March 2015.

## 2.2.4 Decommissioning

When work is finished at a specific location, the well hole is filled with cement and the area is rehabilitated to an appropriate standard. Gas companies need to hold an environment protection licence that contains legally enforceable conditions to prevent pollution and safeguard the environment. This includes remediating the land that is used for CSG activities.<sup>10</sup>

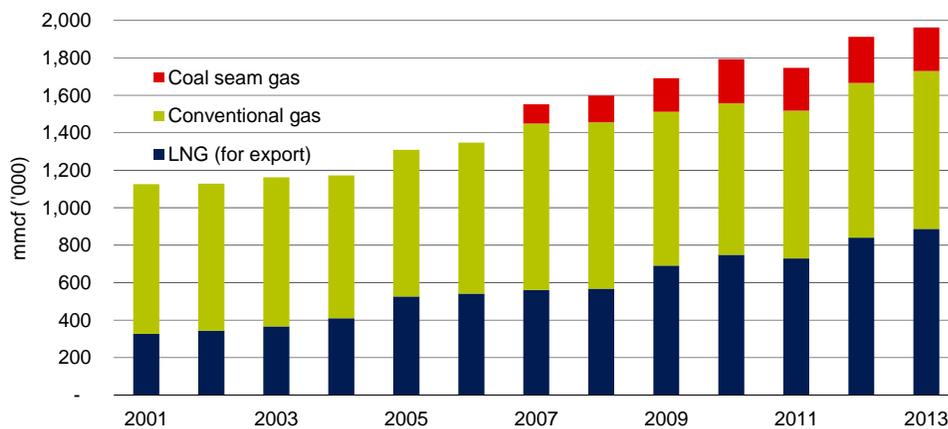
## 2.3 CSG reserves and production in Australia

Australia's major CSG reserves are found in the Bowen and Surat basins in Queensland. In NSW, CSG reserves have been proven in the Sydney, Gunnedah, Clarence-Moreton and Gloucester basins.<sup>11</sup>

### 2.3.1 CSG production levels

Currently, CSG production levels are small compared to those of conventional gas and conventional gas converted into liquid natural gas (LNG) for export (Figure 2.2). Around 99% of CSG production takes place in Queensland.

**Figure 2.2 Gas production in Australia (2001-2013)**



**Note:** mmcf = million cubic feet. The graph includes production from Commonwealth Waters adjacent to each state or territory and excludes production from the Joint Petroleum Development Area (JPDA) situated in the Timor Sea between Australia and Timor-Leste.

**Data source:** APPEA 2013 Annual Production Statistics.

<sup>10</sup> <http://www.epa.nsw.gov.au/licensing/coalseamgas.htm> accessed 25 March 2015.

<sup>11</sup> Geoscience Australia, <http://www.ga.gov.au/scientific-topics/energy/resources/petroleum-resources/coal-seam-gas> accessed 25 March 2015.

Major CSG producing companies in Australia include Santos, Queensland Gas Company, Origin Energy and Arrow Energy. In NSW, the main CSG producing company is AGL.<sup>12</sup>

### 2.3.2 Royalty arrangements for CSG

Gas companies are required to pay royalties to the NSW Government for the gas that they recover in NSW.<sup>13</sup> Currently, the prescribed annual rate for CSG production is 10% of the value at the well-head.<sup>14</sup> In 2013/14, the total royalty revenue generated by the NSW mineral sector was \$1.32 billion. Non-coal minerals (including CSG) accounted for around 7% of this total.<sup>15</sup>

In addition to the State royalty, CSG producers are subject to the Commonwealth Government's Petroleum Resource Rent Tax (PRRT). More information about the PRRT, how it interacts with the State royalty payment, and a summary of the CSG royalties in other jurisdictions is provided in Appendix C.

## 2.4 Land access for CSG development

Mineral resources in NSW are mostly owned by the Crown. Section 6(1) of *Petroleum (Onshore) Act 1991* (NSW) (the Act) states that:

All petroleum, helium and carbon dioxide existing in a natural state on or below the surface of any land in the State is the property of the Crown, and is taken to have been so always.

Landholders do not have a legal right to deny a petroleum titleholder access to their land for the purpose of mineral exploration or extraction in NSW.<sup>16</sup> However, before entering a property a gas company must:

- ▼ hold a prospecting title (such as a Petroleum Exploration Licence), and
- ▼ enter into a written access arrangement with the landholder(s).<sup>17</sup>

<sup>12</sup> APPEA Annual Production Statistics – 2013, [http://www.appea.com.au/?attachment\\_id=5432](http://www.appea.com.au/?attachment_id=5432) accessed 25 March 2015.

<sup>13</sup> Section 85(2) of the *Petroleum (Onshore) Act 1991* (NSW).

<sup>14</sup> Part 7 of the *Petroleum (Onshore) Regulation 2007* (NSW). Section 89 of the *Petroleum (Onshore) Act 1991* (NSW) states that the value at the well-head is 'the amount determined by the Minister as being that value'.

<sup>15</sup> The NSW royalty revenue data is available for coal and non-coal categories only. Given that the non-coal category includes numerous types of minerals, the royalty revenue from CSG is likely to be far less than 7%. <http://www.resourcesandenergy.nsw.gov.au/miners-and-explorers/enforcement/royalties> accessed 18 March 2015.

<sup>16</sup> In March 2014, the *Landholders' Right to Refuse (Gas and Coal) Bill 2013* was debated and negatived in the NSW Parliament. The bill sought to grant Australian landholders the right to refuse the undertaking of gas and coal mining activities by corporations on food producing land without prior written authorisation. <http://parlinfo.aph.gov.au/parlInfo/search/display/display.w3p;query%3DId%3A%22legislation%2Fbillhome%2Fs940%22>

<sup>17</sup> <http://www.resourcesandenergy.nsw.gov.au/landholders-and-community/coal-seam-gas/the-facts/land-access> accessed 16 April 2015.

### 2.4.1 Prospecting titles

CSG titles under the Act are approved and administered by the Office of Coal Seam Gas (OCSG).<sup>18</sup> There is currently a freeze on new Petroleum Exploration Licences. The NSW Government has not issued any of these licences since April 2011.<sup>19</sup> More information on licences relevant to CSG exploration and production is provided at Appendix D.

### 2.4.2 Land access arrangements

Gas companies do not need large areas of land for CSG exploration and production and therefore do not usually purchase land outright. Instead, they enter into access arrangements to occupy part of a landholder's land. These arrangements cover matters such as:

- ▼ the periods during which access may be permitted
- ▼ the parts of the land on which prospecting may be undertaken
- ▼ the kinds of prospecting that may be undertaken, and
- ▼ the compensation to be paid to the landholder.<sup>20</sup>

If an access arrangement cannot be agreed within 28 days, an arbitrator will be appointed to make a determination.<sup>21</sup> If either party is not satisfied with the arbitrator's determination, it can apply to the Land and Environment Court which will issue an order.<sup>22</sup> Such an order will be binding on all parties to the dispute, but there is a right of appeal.<sup>23</sup> CSG companies that fail to pay the landholders the amount of compensation determined by the Court will risk having their title cancelled or revoked.<sup>24</sup>

Recently AGL and Santos publicly stated that they will not enter a landholder's property to conduct drilling operations where that landholder has clearly expressed the view that operations on their property would be unwelcome (see the Agreed Principles of Land Access in Appendix D).<sup>25</sup>

<sup>18</sup> <http://www.resourcesandenergy.nsw.gov.au/landholders-and-community/coal-seam-gas/office-of-coal-seam-gas> accessed 16 April 2015.

<sup>19</sup> NSW Gas Plan, p 4, <http://www.resourcesandenergy.nsw.gov.au/energy-supply-industry/legislation-and-policy/nsw-gas-plan>.

<sup>20</sup> More information on land access agreements is provided at Appendix D.

<sup>21</sup> Section 69F of the *Petroleum (Onshore) Act 1991* (NSW).

<sup>22</sup> Section 69R of the *Petroleum (Onshore) Act 1991* (NSW).

<sup>23</sup> Section 112 states that an appeal may be brought against an assessment made by the Land and Environment Court under this Act.

<sup>24</sup> Section 110(4) states that if the petroleum title may be cancelled or revoked if the titleholder fails to pay the determined amount of compensation.

<sup>25</sup> <http://www.resourcesandenergy.nsw.gov.au/landholders-and-community/coal-seam-gas/community/land-access-agreement>, accessed 9 April 2015.

## 2.5 Legislative provisions for landholder compensation

NSW landholders are entitled to compensation for loss suffered or likely to be suffered as a result of the exploration activities on their land. Landholders' right to compensation is protected under section 107 (1) of the Act, which states:

The holder of a petroleum title, or a person to whom an easement or right of way has been granted under this Act, is liable to compensate every person having any estate or interest in any land injuriously affected, or likely to be so affected, by reason of any operations conducted or other action taken in pursuance of this Act or the regulations or the title, easement or right of way concerned.

Compensation is negotiated between the landholder and the gas company. It will depend on many things, such as the value of the land, improvements to the land, duration of land occupation and the area of land required. The purpose of this review is to provide recommendations that support landholders in this negotiation process.

Section 109 of the Act provides a list of factors, or heads of compensation, that the Land and Environment Court will take into account when assessing the value of loss suffered or likely to be suffered by a landholder (Box 2.1). These heads of compensation may guide negotiations between landholders and gas companies, but only apply prescriptively if agreement on compensation can't be reached and the Land and Environment Court is called on to make a decision. The Walker review of the land access arbitration framework noted that there had been no arbitrations with respect to land access agreements for petroleum exploration in NSW between 2011 and 2014.<sup>26</sup> In Appendix E we compare these legislative provisions with those in other jurisdictions in Australia.

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<sup>26</sup> Walker B, SC, 2014, *Examination of the Land Access Arbitration Framework - Mining Act 1992 and Petroleum (Onshore) Act 1991*, p 3, available at [http://www.resourcesandenergy.nsw.gov.au/\\_\\_data/assets/pdf\\_file/0018/527112/Brett-Walker-Examination-of-the-Land-Access-Arbitration-Framework.pdf](http://www.resourcesandenergy.nsw.gov.au/__data/assets/pdf_file/0018/527112/Brett-Walker-Examination-of-the-Land-Access-Arbitration-Framework.pdf), accessed 1 April 2015.

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**Box 2.1 Compensation under Section 109(1) of the *Petroleum (Onshore) Act 1991 (NSW)***

If compensation is assessed under this Act by the Land and Environment Court, the assessment is to be of the loss caused or likely to be caused:

- a) by damage to the surface of land, and damage to the crops, trees, grasses or other vegetation on land, or damage to buildings and improvements on land, being damage which has been caused by or which may arise from prospecting or petroleum mining operations, and
  - b) by deprivation of the possession or of the use of the surface of land, and
  - c) by severance of land from other land of the landholder, and
  - d) by surface rights of way and easements, and
  - e) by destruction or loss of, or injury to, or disturbance of, or interference with, stock on land,
  - f) by damage consequential on any matter referred to in paragraphs (a)-(e).
- 

## 2.6 Industry regulators

There are four main bodies responsible for regulating onshore gas exploration and production in NSW – Office of Coal Seam Gas, Environment Protection Authority, Department of Planning and Environment and NSW Office of Water. We have summarised the roles of these four regulators and the related responsibilities of gas companies in Table 2.1.

In addition, the NSW Government has created the Land and Water Commissioner. The Land and Water Commissioner provides guidance to landholders, industry and the community on the implementation of new land access agreements.

Information about environmental protections in relation to CSG is provided in Appendix G.

**Table 2.1 CSG industry regulators and company responsibility**

<b>Body</b>	<b>Role</b>	<b>Company responsibility</b>
Office of Coal Seam Gas (OCSG)	The OCSG regulates all non-environmental aspects of the industry, including granting exploration approvals, administering petroleum titles and workplace health and safety issues. It also administers hydraulic fracture stimulation and compliance with the Well Integrity Code of Practice.	CSG companies must apply to the OCSG for a petroleum title to undertake petroleum activities from exploration through to production.
Environment Protection Authority (EPA)	The EPA is the lead regulator for the environmental and health impacts of CSG activities with responsibility for ensuring compliance with environmental legislation and licence conditions.	CSG companies must hold an environment protection licence issued by the EPA and comply with the conditions of the licence.
Department of Planning and Environment	The Department of Planning and Environment is responsible for delivering the Strategic Regional Land Use Policy, establishing CSG exclusion zones, resourcing the Gateway panel and assessing development applications for major CSG projects.	CSG companies must hold a development approval where required and comply with the development conditions.
NSW Office of Water (NOW)	NOW assesses each CSG project application to determine any potential impacts on waters. This includes the potential risk of groundwater movement between aquifers, impacts on the water table, water pressure levels and water quality changes in different types of groundwater systems.	Companies must apply to NOW for a water access licence for any activity extracting more than 3 megalitre (ML) per year from groundwater sources.

Source: <http://www.epa.nsw.gov.au/licensing/csgfaqs.htm> accessed on 18 March 2015.

## 3 Proposed approach for this review

Our terms of reference for this review ask us to recommend appropriate compensation benchmarks for landholders hosting gas exploration and production in NSW. We need to develop an analytical framework for setting compensation benchmarks that can be updated annually.

As Chapter 1 noted, the framework and benchmarks we are to recommend are only intended to guide landholders in negotiating compensation agreements with the gas industry. We recognise that landholders will be in the best position to determine what compensation is appropriate for them given their unique circumstances.

The sections below outline the principles we propose to apply in making our recommendations, and our proposed approach for making our recommendations. Chapters 4-7 discuss the key steps of this approach in more detail.

### 3.1 Proposed principles

We will adopt a set of overarching principles to guide us in making our recommendations. Our proposed principles include:

1. **Transparency:** stakeholders should be able to understand our recommendations and how we arrived at them. For example, they should be able to understand what impacts are accounted for, the basis on which compensation has been calculated, and what trade-offs we have made in making recommendations (for example, between simplicity and accuracy).
2. **Adaptability:** our recommendations need to be reasonably adaptable and scalable for landholders in different circumstances – for example, in terms of the size, location and potential uses of their land.
3. **Practicability:** to be useful to landholders, our recommendations need to be able to be implemented easily. Our aim is that it will be easy for landholders to use our recommendations to estimate fair and reasonable levels of compensation and benefit payments for someone in similar circumstances to theirs. Landholders can use our recommendations (for example) in assessing an offer they receive from a gas company, or negotiating changes to this offer.

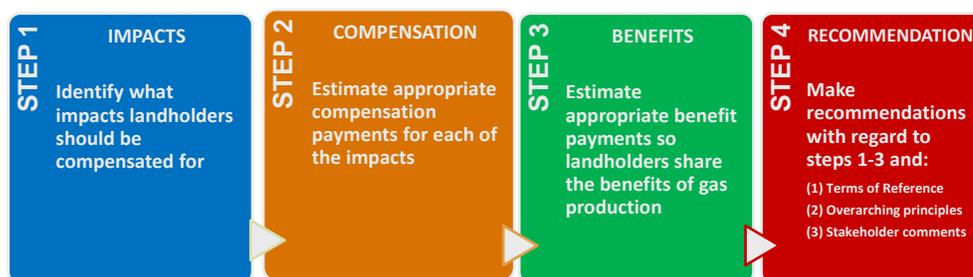
### 3.2 Overview of our proposed approach for this review

Our proposed approach consists of four main steps:

1. **Identify what impacts landholders should be compensated for (or the ‘heads of compensation’)**. This will involve considering all relevant impacts of CSG exploration and production. As the starting point, we will consider the heads of compensation for compulsory land acquisitions in NSW.
2. **Estimate an appropriate payment to compensate for the loss associated each impact**, and consider how the payment should be structured (eg, upfront or annual payment per land area). This will involve considering the nature of each impact, and how it may change over the stages in the life of a project.
3. **Estimate an appropriate payment to share the benefits of CSG development with landholders**, and consider how the payment should be structured. This will involve considering the risks and probabilities of a project progressing, and the implications of benefit payments for encouraging CSG exploration.
4. **Develop and recommend a framework for setting benchmark landholder compensation and benefit payments** using the findings from the previous three steps, and having regard to:
  - a) our terms of reference for the review
  - b) our overarching principles for the review, and
  - c) stakeholder comments.

Figure 3.1 summarises our proposed approach for this review.

**Figure 3.1 Proposed approach for this review**



IPART seeks comment on the following

- 1 Do you agree with our proposed principles of transparency, adaptability and practicability to guide our recommendations for this review? Are there other principles that we should apply in making our recommendations?
- 2 Do you agree with the four key steps in our proposed approach for this review (identify impacts, estimate compensation for these impacts, estimate benefit payments and make recommendations)? If not, what are your concerns?

## 4 Identifying what impacts landholders should be compensated for

The first step in our proposed approach is to identify what impacts landholders hosting CSG exploration and production should be compensated for, or the relevant 'heads of compensation'.

To form our preliminary view, we have reviewed the compensation arrangements that apply when land is compulsorily acquired for public purposes in NSW. These arrangements are not directly applicable, as compulsory land acquisitions are permanent whereas CSG occupation is for a temporary, but unknown period of time (potentially 20 years or more). Nevertheless, we consider that the legislation and case law on compulsory acquisitions provide a useful starting point for identifying the impacts landholders should be compensated for.

We have also reviewed the gas industry's current arrangements and the legislative provisions for CSG compensation in NSW and other jurisdictions, to identify what impacts are included and compare these with our preliminary view. In addition, we have considered whether there are impacts on neighbours or the broader community that should be compensated for.

The sections below provide an overview of our preliminary view, and then discuss these issues in more detail.

### 4.1 Overview of preliminary view on relevant heads of compensation

Our preliminary view is that landholders hosting CSG exploration and production should be compensated for four main impacts:

- ▼ **the value of the land occupied** by CSG activities and infrastructure
- ▼ **loss due to severance** (the reduction in the value of the landholder's residual land caused by its division or reduction in area due to the CSG activities and infrastructure)
- ▼ **loss due to injurious affection** (other impacts on the landholder's residual land, such as nuisance from noise and dust due to certain activities, or the loss of visual amenity due to CSG infrastructure)

- ▼ **loss due to disturbance** (for example, this includes the landholder's time in engaging with the gas company on the access agreement, any legal and professional fees incurred in negotiating this agreement, and any physical damage to landholder's property caused by CSG activities).<sup>27</sup>

These impacts align with the heads of compensation for compulsory land acquisitions that we think are relevant to hosting CSG exploration and production, given the impacts of CSG activities,<sup>28</sup> and the temporary nature of these activities. We have little information at this stage on whether there are any **permanent** impacts of CSG activities that landholders should be compensated for.

Our preliminary view broadly aligns with the impacts considered under the gas industry's current CSG compensation arrangements. However, it covers a broader range of impacts than provided for under NSW legislation. Therefore, our preliminary view is that the current legislative provisions need to be broadened to address all relevant impacts.

## 4.2 Compensation arrangements for compulsory acquisitions

In NSW, the *Land Acquisition (Just Terms Compensation) Act 1991* (Just Terms Act) is intended to ensure that fair compensation is provided to landholders when part or all of their land is compulsorily acquired by the State for a public purpose, such as building a road or installing power lines. Section 10(1) of the Just Terms Act guarantees that when this occurs, the amount of compensation will be not less than the market value of the land acquired (unaffected by the proposal) at the date of acquisition.

### 4.2.1 Impacts considered in determining compensation amounts

Section 55 of the Just Terms Act lists the relevant matters to be considered in determining the amount of compensation for compulsory acquisitions. These are:

- ▼ **The market value of the land** on the date of its acquisition.
- ▼ **Any special value of the land** to the landholder, which means the financial value of any advantage (in addition to market value) to the landholder which is incidental to their use of the land.

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<sup>27</sup> Similar heads of compensation are outlined in Fibbens, M., Mak, M., and Williams, A., 2013, *Coal seam gas extraction: Does landholder compensation match the mischief?*, 19th Pacific Rim Real Estate Society Conference, January 2013, Melbourne.

<sup>28</sup> More discussion on the impacts of CSG is contained in Fibbens, M., Mak, M., and Williams, A., 2014, *Assessing compensation for landholders affected by coal seam gas occupation*, *Pacific Rim Property Research Journal*, pp 161-170; and Fibbens, M., Mak, M., and Williams, A., 2014, *Compensation for coal seam gas occupation: assessing the harms*, 20th Pacific Rim Real Estate Society Conference, 19-22 January 2014, Lincoln University, Christchurch, New Zealand.

- ▼ **Any loss attributable to severance**, which means any reduction in the market value of any other land owned by the landholder due to that land being severed from the land being acquired.
- ▼ **Any loss attributable to disturbance**. For example, this covers reasonable legal costs, valuation fees, financial costs for relocation, stamp duty, mortgage costs and other financial costs relating to the compulsory acquisition.
- ▼ **Solatium**, which means compensation to the landholder for non-financial disadvantage due to having to relocate their principal place of residence as a result of the acquisition.
- ▼ **Any increase or decrease in the value of any other land** of the person at the date of acquisition which adjoins or is severed from the acquired land by reason of the carrying out of, or the proposal to carry out, the public purpose for which the land was acquired. A decrease in the value of this land is often referred to as 'injurious affection'.

#### 4.2.2 Applying these heads of compensation to CSG hosting

The matters considered in determining compensation for compulsory acquisitions are not directly applicable to our purpose. There is an obvious difference between the situations of a person whose land is compulsorily acquired and one whose land is used to host CSG activities. In the second situation, the gas company is not permanently taking the land, but is occupying it for a temporary, but unknown period of time (potentially 20 years or more).

This difference means not all the heads of compensation for compulsory acquisitions are relevant to CSG hosting. In particular, we consider that 'solatium' and some losses due to disturbance are not relevant as they typically relate to financial and non-financial costs of relocating the landholder's principal place of residence, which is not likely to be necessary for CSG activities.

However, the four other heads of compensation can be readily adapted to summarise the main impacts that landholders hosting CSG exploration and production should be compensated for. In our preliminary view, these include the value of the land occupied, loss due to severance, loss due to injurious affection and loss due to disturbance.

### Value of land occupied

CSG activities usually involve the construction of infrastructure, including wellheads, access roads, and water and gas pipelines on a landholder's property. The amount of land occupied by this infrastructure (and therefore unavailable to the landholder for the period of occupation) can change through the stages of CSG development. The loss to the landholder will depend on:

- ▼ the amount of land occupied by the gas company during different stages of CSG development, and
- ▼ the market value of this land.

Special value is any financial value above the market value of land. We understand that gas companies often work with landholders to locate CSG infrastructure to minimise its impact on landholders. Therefore, there is scope to avoid locating infrastructure on land that has special value. We invite comment from stakeholders on the relevance of special value to CSG occupation.

### Loss due to severance

Severance is the reduction in the value of the landholder's residual land caused by its division into two or more parts or its reduction in area, due to the CSG infrastructure (eg, access roads or wellheads).

Severance is highly site-specific and the impact on landholders can vary substantially. For example, in some cases, the access roads and wellheads are located on the edge of a property. This may mean they may have little or no impact on the landholder's remaining land.

In other cases, CSG infrastructure may result in some or all of the residual land being too small to use for its original purpose, and the alternative use for the land may have a lower value. Or, CSG activity may temporarily disrupt normal farming activity on the residual land, resulting in a loss to the landholder for the period of the disruption. In these cases, the impact of severance may be significant.

### Loss due to injurious affection

Injurious affection refers to all impacts on a landholder's residual land, with the exception of severance. In relation to hosting CSG exploration and production, loss due to injurious affection is likely to involve temporary impacts, including nuisance from noise and dust associated mainly with the construction of CSG infrastructure, and loss of visual amenity due to the location of the infrastructure.

### Loss due to disturbance

Disturbance relates to a wide range of inconveniences associated with establishing and maintaining the access agreement and the CSG activities. For example, it may include physical damage to landholder's property, the landholder's time in engaging with the gas company on the access agreement, lost production, and legal and professional fees.

#### 4.2.3 Are there permanent impacts on landholders?

As discussed above, CSG occupation is temporary (though may last for 20 years or more) and therefore the impacts on landholders are also temporary. When we estimate compensation payments (Chapter 5) we will need to take into account the temporary nature of landholder impacts.

However, it is also possible that landholders experience a permanent change in the market value of their land as a result of CSG activities. For example, even after CSG exploration and production has finished and land appropriately rehabilitated, there may be ongoing stigma attached to the land.

A recent study for the NSW Valuer General assessed whether the presence of the CSG industry has a material impact on land values. While the findings were that no impact on land values was evident, this was based on a small number of property sales transactions and the report noted that this limits the conclusions from the study.<sup>29</sup>

We invite stakeholder comment on this issue.

### 4.3 Gas industry arrangements for CSG compensation

We have reviewed the current compensation arrangements for some of the major gas companies to compare how these arrangements align with our preliminary view on the relevant heads of compensation outlined above.

We found that:

- ▼ AGL's CSG compensation principles state that AGL will:
  - pay for landholder's time and reasonable legal costs associated with establishing the access agreement
  - compensate landholders for disturbance during the initial works (eg, due to construction noise), and

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<sup>29</sup> NSW Land & Property Information (2014), *Study on the impact of the Coal Seam Gas Industry on land values in NSW - Report for NSW Valuer General*, February, p 4, available at: [http://www.valuergeneral.nsw.gov.au/about\\_us/announcements/?a=197003](http://www.valuergeneral.nsw.gov.au/about_us/announcements/?a=197003).

- pay annual compensation for landholder time and 'rental' for the use of land for wellheads, pipelines, access roads and other infrastructure.<sup>30</sup>
- ▼ Arrow Energy in Queensland provides compensation for land used for CSG activity, management time, professional fees, disturbance and loss of amenity.<sup>31</sup>
- ▼ Santos provides compensation for reasonable legal costs and land used for CSG activity, and also makes an annual 'fee for service' payment.<sup>32</sup>
- ▼ Gas companies generally agree to remediate land and repair any damage as a result of their activities.

We did not find specific instances where gas companies provide compensation for severance. This may be because severance is highly site-specific and will not necessarily impact all landholders. However, we understand one gas company in Queensland uses independent valuers to do a 'section 532 valuation'. Section 532 of the *Petroleum and Gas (Production and Safety) Act 2004* identifies compensatable effects, which includes severance. We also understand that gas companies often work with landholders to find the most mutually agreeable location for CSG infrastructure. This means there is scope to limit any loss due to severance.

We also found that in addition to compensation, landholders may receive benefits from CSG exploration and production. In particular, if gas companies may need to upgrade roads, fences and gates they will generally pay for these works to the mutual benefit of landholders and the gas company. Landholders may also receive a share of production bonuses or financial benefit which are not specifically compensation for any sort of loss or inconvenience (this is discussed further Chapter 6).

#### 4.4 NSW legislative provisions for CSG compensation

We have reviewed legislation for CSG compensation in NSW, and compared it to our preliminary view on the relevant heads of compensation and the provisions in other jurisdictions in Australia.<sup>33</sup>

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<sup>30</sup> <http://www.agl.com.au/about-agl/how-we-source-energy/natural-gas/landholders/compensation-principles>, accessed 1 April 2015.

<sup>31</sup> [http://www.arrowenergy.com.au/\\_data/assets/pdf\\_file/0012/9021/Landholder-Compensation-fact-sheet.pdf](http://www.arrowenergy.com.au/_data/assets/pdf_file/0012/9021/Landholder-Compensation-fact-sheet.pdf), accessed 1 April 2015.

<sup>32</sup> [http://www.santos.com/library/Fact\\_sheet-Working\\_with\\_landholders\\_web.pdf](http://www.santos.com/library/Fact_sheet-Working_with_landholders_web.pdf), accessed 1 April 2015.

<sup>33</sup> See Appendix E for a summary of the relevant sections of legislation in other jurisdictions.

The legislative provisions for compensation for CSG exploration and production in NSW are outlined in section 109 (1) of the Act (see Box 2.1). Relative to the four heads of compensation and to the legislation in other jurisdictions<sup>34</sup>, the NSW legislation:

- ▼ Identifies **severance** in section 109(1)(c), but contains no definition of severance. This may limit the application of claims under this section of the Act.
- ▼ Mentions **injurious affection** in section 107(1), but does not list this as a compensation item in section 109(1) of the Act. Loss of amenity (including recreation and conservation values) is included in legislation in Victoria and Tasmania.
- ▼ Does not specifically include **disturbance** in section 109(1), but mentions some disturbance items, including damage to stock, crops, buildings and land. In addition, section 69D (2A) provides for the gas company to pay for reasonable legal costs of the landholder in obtaining initial advice about the making of the access arrangement. However, landholder's time and other professional fees are not mentioned. In the Queensland legislation, accounting, valuation and legal fees are identified.
- ▼ Does not include any **loss in market value of the land** (mentioned in the legislation in Queensland, Victoria and Tasmania).
- ▼ Does not include **loss of opportunity to make planned improvements on the land** (mentioned in the legislation in Queensland, Victoria and Tasmania).<sup>35</sup>

Based on the above, our preliminary view is that the legislative provisions for CSG compensation in NSW do not adequately address all the relevant impacts of gas exploration and production. We invite stakeholder comment on whether and how the NSW legislation should be broadened to capture all relevant impacts and ensure that:

- ▼ the legislation supports NSW landholders receiving compensation that is at least as good as other landholders in Australia, and
- ▼ NSW has best practice compensation arrangements in place.

#### 4.5 Compensation for neighbours and the broader community

In the sections above we have discussed compensation for landholders who are hosting CSG exploration and production. However, CSG activities can also affect neighbours and the broader community.

<sup>34</sup> See Appendix E for the legislation in other jurisdictions in Australia.

<sup>35</sup> These findings are similar to those outlined in Fibbens, M., Mak, M., and Williams, A., 2013, *Coal seam gas extraction: Does landholder compensation match the mischief?*, 19th Pacific Rim Real Estate Society Conference, January 2013, Melbourne.

#### 4.5.1 Neighbouring landholders

Some landholders do not directly host gas exploration and production but may be affected by this activity as they are located close to where it takes place. There are no consistent arrangements in terms of whether gas companies compensate these neighbouring landholders. Based on our discussions with gas companies, we understand that at least one company pays the equivalent of transport and accommodation costs for neighbours affected by noise to be away during the construction/drilling periods. In other cases, gas companies do not pay compensation to these landholders, but work with them to limit the impacts of their CSG activities.

In our preliminary view, if neighbouring landholders are affected by noise or other impacts from gas exploration and production then they should receive fair compensation for these impacts. We expect that such landholders will be able to use our recommendations as a guide when negotiating compensation for the impacts of CSG activities relevant to them.

#### 4.5.2 Broader communities

Our preliminary view is that our recommendations for compensation should be limited to landholders hosting CSG exploration and production on their land and affected neighbours. There are other arrangements in place to address the impacts of CSG on the broader community. For example, under the NSW Gas Plan, the NSW Government is creating a Community Benefits Fund with contributions from it and gas companies. In addition, some gas companies have voluntarily made contributions to local communities, for example through sponsorships.<sup>36</sup>

IPART seeks comment on the following

- 3 Do you agree with our preliminary view on the relevant heads of compensation for hosting CSG exploration and production (value of land occupied and loss due to severance, injurious affection and disturbance)? Are there other temporary impacts of CSG exploration and production on landholders that we should consider?
- 4 Should we consider any 'special value' of land and 'loss of opportunity to make planned improvements on the land' in recommending compensation for CSG exploration and production?
- 5 Are there any permanent impacts on the market value of land arising from hosting gas exploration and production that we should consider?

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<sup>36</sup> For example, see Santos, Narrabri Gas Project, p 17, [http://www.santos.com/library/Narrabri\\_Gas\\_Project\\_brochure\\_2014.pdf](http://www.santos.com/library/Narrabri_Gas_Project_brochure_2014.pdf) accessed 16 April 2015.

- 6 Do you agree with our preliminary view that NSW legislative provisions for landholder compensation for gas exploration and production should be broadened? If so, how? If not, why?
- 7 Do you agree with our preliminary view that our recommendations on compensation should be limited to landholders who host CSG activities and their neighbours who are directly affected? If not, why?

## 5 | Estimating compensation payments

In the second step in our proposed approach, we will take each of the impacts identified in Step 1, and estimate an appropriate amount or range of compensation for this impact, and decide how the compensation payment should be structured – for example, as an up-front payment, or annual payments.

In our view, the ‘appropriate’ amount of compensation is one that makes the landholder no better or worse off than if the gas exploration and production had not occurred. However, it is also appropriate for the landholder to share in the benefits of gas development, as intended under the NSW Gas Plan. We will consider the appropriate amount for such benefit payments as a separate step in our approach (see Chapter 6).

We have identified some possible approaches to estimate and structure compensation payments for each of the main impacts of CSG exploration and production discussed in Chapter 5. In identifying these approaches, we considered the nature of each impact, how the magnitude of the impact may vary across landholders, and whether publicly available data can be used to estimate the magnitude of the impact for individual landholders.

The section below provides an overview of these possible approaches, and the subsequent sections discuss the approaches for each impact in more detail.

### **5.1 Overview of possible approaches for estimating and structuring compensation payments**

Table 5.1 summarises possible approaches to estimate and structure compensation payments for hosting CSG exploration and production.

**Table 5.1 Possible approaches for estimating and structuring CSG compensation payments**

Head of compensation	Estimating amount or range of payments	Structuring payments
Value of land occupied	<ul style="list-style-type: none"> <li>▼ Gross margin per hectare</li> <li>▼ Rental based on improved or unimproved land value</li> </ul>	<ul style="list-style-type: none"> <li>▼ Payment per land area per annum</li> <li>▼ Payment per well head per annum</li> </ul>
Severance	<ul style="list-style-type: none"> <li>▼ Expert valuation advice</li> </ul>	<ul style="list-style-type: none"> <li>▼ Expert valuation advice</li> </ul>
Injurious affection – noise, dust and loss of amenity	<ul style="list-style-type: none"> <li>▼ Non-market valuation approaches (stated preference/revealed preference studies)</li> <li>▼ Transport &amp; accommodation costs for landholders to relocate during drilling/construction activities</li> </ul>	<ul style="list-style-type: none"> <li>▼ Payment per annum</li> <li>▼ Payment during construction period</li> <li>▼ Reimbursement of reasonable temporary relocation costs</li> </ul>
Disturbance – professional fees	<ul style="list-style-type: none"> <li>▼ Estimate of reasonable professional fees</li> <li>▼ ‘Pass through’ of reasonable professional fees</li> </ul>	<ul style="list-style-type: none"> <li>▼ Upfront payment</li> <li>▼ Fixed payment in first year and for any subsequent professional fees incurred</li> <li>▼ Reimbursement for reasonable professional fees</li> </ul>
Disturbance – landholder’s time & inconvenience	<ul style="list-style-type: none"> <li>▼ Estimate of average time spent by landholders in first year and subsequent years, multiplied by a value of time</li> </ul>	<ul style="list-style-type: none"> <li>▼ Upfront payment</li> <li>▼ Payment in first year and ongoing annual payment</li> </ul>
Disturbance – damage to land/property	<ul style="list-style-type: none"> <li>▼ Access agreements to provide for all damage to be remediated/repaired to a suitable standard</li> </ul>	<ul style="list-style-type: none"> <li>▼ Agreements to provide for pass through of reasonable professional fees as required</li> </ul>

## 5.2 Value of land occupied

All CSG projects are different, but most involve the construction of wellheads, access roads and other infrastructure. Landholders may be dispossessed of part of their land and not able to carry on their usual activities on that land for the term of the CSG occupation.

Estimating compensation for land occupied for CSG activities is challenging because the amount of land required for these activities changes over the stages of exploration and production. For example, an area of around 100m x 100m (one hectare) is needed when a well is being constructed but this reduces to around 10m by 5m once the well reaches the production stage.<sup>37</sup> In addition, the land used for CSG activities can have different market values, depending largely on what the land can otherwise be used for. We expect that these factors will

<sup>37</sup> Santos, 2011, *GLNG Arcadia Valley Project Area Environmental Management Plan*, pp 6-7, [https://www.santos.com/library/Arcadia\\_Valley\\_Project\\_Area\\_Environmental\\_Management\\_Plan\\_secure.pdf](https://www.santos.com/library/Arcadia_Valley_Project_Area_Environmental_Management_Plan_secure.pdf), accessed 16 April 2015.

mean we need to estimate compensation for these payments based on a range of land values.

### 5.2.1 Possible approaches for estimating the value of land occupied

We have identified two possible approaches to estimate the value of land occupied – a gross margin approach and a lease payment approach.

#### Gross margin approach

A gross margin is the annual gross income from an enterprise less the variable costs incurred in generating this income. Estimating compensation for the value of land occupied using a gross margin approach would be fair because the resulting amount would reflect the profits (approximated by gross margins) that the land occupied by CSG activities could have generated for the landholder under normal conditions.

The NSW Department of Primary Industries (DPI) publishes gross margins per hectare for a range of grazing and cropping activities. Gross margins for cropping activities are published in different ‘zones’ in NSW. For example, Table 5.2 shows some gross margins for cotton production published by DPI.

**Table 5.2 Gross margins for cotton production in NSW (\$2012-13)**

Zone	Classification	Gross margin (\$/ha)
North East	Dryland north-east summer crop gross margins	\$449.22
Northern Zone	Irrigated northern summer crop gross margins	\$1,580.40
North West	Dryland north-west summer crop gross margins	\$50.74
Southern Zone - Murrumbidgee & Lachlan Rivers	Irrigated Murrumbidgee summer crop gross margins	\$2,181.49
Southern Zone - Murrumbidgee & Lachlan Rivers	Irrigated southern summer crop gross margins	\$791.97

Source: <http://www.dpi.nsw.gov.au/agriculture/farm-business/budgets/summer-crops> accessed 16 March 2015.

Implementing this approach would involve:

- ▼ identifying the highest-value potential agricultural use for the land occupied by CSG infrastructure, and
- ▼ relating this information to the DPI’s gross margin estimates (or a similar proxy for gross margins).<sup>38</sup>

<sup>38</sup> Agricultural uses include grazing, dairying, pig farming, poultry farming, viticulture, orcharding, beekeeping, horticulture, vegetable growing, the growing of crops of any kind, forestry, or any combination of such purposes.

Arrow Energy's current compensation arrangements include a payment for land use, which is 100% of the gross margin of the directly impacted land area.<sup>39</sup>

This approach is discussed further in Appendix F.

### Market rent approach

Another way to estimate the value of land occupied is based on a rental payment for leasing the land. Under this approach, the compensation would reflect the market rent the landholder could have earned for the land occupied.

Market rents are determined by supply and demand. In some cases, they are based on a percentage of the market value of the land – for example, an annual payment of 8% of the market value. As the market value of land will depend on what it can be used for (eg, its agricultural uses) we expect that this approach may produce similar estimates to the gross margin approach. This approach may require specialist advice.

### 5.2.2 Possible approaches for structuring compensation for the value of the land occupied

We identified two options for structuring compensation payments for the value of the land occupied. Both are suited to either a gross margin or a market rent approach to estimating the compensation amount.

The first option is to calculate the payment based on the land area occupied per annum (or another period) – eg, \$ per hectare or square metre per annum. Under this approach, if the land area occupied by CSG activities or infrastructure changes as the project moves through the exploration and production stages, the compensation payment would also change.

The second option is to calculate the payment using a proxy for the land area occupied per annum – for example, \$ per wellhead per annum. Under this approach, the compensation payments may not necessarily change as the project develops. This may be an advantage, as it would be simpler and more predictable for landholders.

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<sup>39</sup> [http://www.arrowenergy.com.au/\\_\\_data/assets/pdf\\_file/0012/9021/Landholder-Compensation-fact-sheet.pdf](http://www.arrowenergy.com.au/__data/assets/pdf_file/0012/9021/Landholder-Compensation-fact-sheet.pdf), accessed 31 March 2015.

### 5.3 Loss due to severance

As discussed in Chapter 4, severance is the reduction in the value of residual land caused by its division into two or more parts, or its reduction in area. This impact is highly site-specific, so its magnitude varies widely. Gas companies and landholders may be able to work together to locate CSG infrastructure that mitigates loss due to severance.

Because it is so site-specific and variable, attempting to estimate benchmark compensation for severance is likely to result in an extremely wide range of compensation amounts – which is likely to be of limited use to landholders. Therefore, our preliminary view is that where CSG activity is likely to have an impact on the value of the residual land through severance, the landholder should seek specialist legal and valuation advice on appropriate compensation payments for this impact.

### 5.4 Loss due to injurious affection

Loss due to injurious affection includes all impacts on the landholder’s residual land with the exception of severance. These impacts are most likely to include nuisance from noise and dust when infrastructure is being constructed, and loss of visual amenity due to the location of infrastructure.

#### 5.4.1 Possible approaches for estimating loss due to injurious affection

We have identified two possible approaches we could use to estimate compensation payments for injurious affection – a non-market valuation approach and a relocation cost approach.

##### Non-market valuation approach

There are generally no market values attached to impacts such as nuisance from noise and dust and loss of visual amenity. Therefore, we propose to consider well established non-market valuation approaches to estimate the monetary value of nuisance, including:

- ▼ **Stated preference methods.** These methods typically involves surveys to estimate what people would be willing to pay to avoid an outcome, such as nuisance from noise, or how much they would ask as compensation.

- ▼ **Revealed preference methods.** These methods use observations of purchasing decisions and other behaviour to estimate non-market values. For example, this method could estimate the impact of noise and dust from a mine on house prices.<sup>40</sup>

We do not propose to undertake an original study or survey ourselves, but to examine the existing literature to find values that could provide reasonable proxies for the value of nuisance from CSG activities. As an example, a stated preference study based in central Queensland found that the value of having a good buffer against mining noise and dust was \$494 per household per year (\$2007).<sup>41</sup>

#### Relocation cost approach

Another way to estimate compensation for injurious affection is to estimate the costs of relocating landholders during periods when nuisance is most severe. This is likely to be during construction of CSG infrastructure. These costs could comprise reasonable transportation and accommodation costs for the relevant period. In this regard, the Australian Taxation Office provides information on reasonable travel expenses. We understand that not all landholders will be able to temporarily relocate, however this approach may still provide a reasonable estimate of fair compensation. Through our discussions we are aware of at least one gas company that provides compensation for nuisance in this manner.

#### 5.4.2 Possible approaches for structuring compensation for loss due to injurious affection

Given the nature of these impacts, we consider a payment corresponding to the period when nuisance is experienced is likely to be appropriate. For example, as noise and dust impacts are likely to occur during the construction phase, it makes sense for compensation payments for these impacts to correspond with this phase. For ongoing nuisance such as loss of visual amenity, annual payments are more appropriate.

### 5.5 Loss due to disturbance

Loss due to disturbance includes a range of inconveniences including landholder time and professional fees, and damage to land and property.

<sup>40</sup> For more information on stated preference and revealed preference methods see Baker, R. and Ruting, B. 2014, *Environmental Policy Analysis: A Guide to Non-Market Valuation*, Productivity Commission Staff Working Paper, Canberra.

<sup>41</sup> Ivanova, G., Rolfe, J., 2011, *Assessing development options in mining communities using stated preference techniques*, Resources Policy 36(3), 255-264.

### 5.5.1 Possible approaches for landholders' time and professional fees

Landholders will incur costs associated with their time establishing an access agreement and their ongoing engagement with the gas company about the agreement. This cost is likely to be much higher in the first year. We propose to obtain more information about the number of hours it takes landholders to engage with gas companies, and estimate compensation based on this number of hours multiplied by an appropriate value of time per hour. It would be reasonable to structure compensation as a payment per annum, with a higher initial payment.

Landholders also incur costs for professional fees including legal, valuation and accounting fees in relation to their access agreement. Compensation for professional fees could be provided upfront to the landholder, based on an estimate of reasonable costs of obtaining these services. The gas company could also agree to cover the reasonable cost of professional fees incurred on behalf of the landholder (ie, a pass through of reasonable costs).

### 5.5.2 Preliminary view on approaches for damage to land and property

CSG activities may result in damage to the landholder's land and property, for example to fences and paddocks. Our preliminary view is that any damage to land and property is most appropriately addressed through access agreements whereby the gas company agrees to remediate damage to land or property to a standard at least as good as its original condition. This is our preferred approach as the incidence and severity of any damage related to CSG activity will vary significantly from case to case.

AGL's standard access agreement<sup>42</sup> includes a clause that aligns with this approach. It states that:

AGL will carry out the Rehabilitation Works .... so as to repair any damage caused by the construction of the Well or Infrastructure or the upgrade or construction of Access Roads, and restore the Land .... to a standard that is equal to or better than the condition it was in prior to the construction....

## 5.6 Upfront and annual payments

In some cases outlined above, the structure of compensation is suited to an annual payment, for example an annual payment for the value of land occupied. However, annual payments could also be provided as a lump sum upfront payment. An upfront compensation payment would be set equal to the present value of all expected future payments.

<sup>42</sup> AGL Access Principles and Land Access and Compensation Agreement, clause 7.1, [http://www.agl.com.au/~media/AGL/About%20AGL/Documents/How%20We%20Source%20Energy/Landholders/20140321\\_Template%20Principles%20and%20Access%20Compensation%20Agreement\\_PDF.pdf](http://www.agl.com.au/~media/AGL/About%20AGL/Documents/How%20We%20Source%20Energy/Landholders/20140321_Template%20Principles%20and%20Access%20Compensation%20Agreement_PDF.pdf), accessed 31 March 2015.

Upfront payments may be appealing to some landholders because this would provide more certainty or flexibility for the landholder to spend the lump sum. However, this may involve more risk to the gas company and would likely be reflected in the discount rate used to determine the present value of the upfront payment. In general, risk should be borne by the party most able to manage it efficiently. If a landholder who had received an upfront payment sells their property during a land access agreement then the new landholder may not receive compensation, this would instead be reflected in the purchase price of the property.

As our role is to assist landholders to negotiate compensation with gas companies, where relevant we propose to also estimate an upfront equivalent for annual payments. This would enable our benchmarks to be relevant to landholders that prefer for both annual and upfront payments.

IPART seeks comment on the following

- 8 Are gross margin and market rental approaches appropriate for estimating compensation for the value of land occupied? Are there other approaches that we should consider?
- 9 Do you agree with our preliminary view that because severance is site-specific and highly variable, providing benchmark compensation would be of limited use to landholders? If not, how should we estimate and structure compensation for severance?
- 10 Do you agree with non-market valuation and relocation cost approaches for estimating compensation for injurious affection? Are there other approaches that we should consider?
- 11 Do you agree with our proposed approaches for estimating compensation, or passing through costs, for disturbance? Are there other approaches that we should consider?

## 6 Estimating benefit payments

The third step in our proposed approach is to estimate an appropriate payment to share the benefits of CSG development with landholders, and decide how this payment should be structured. Whereas the outcomes of Step 2 are likely to include dollar figures (or ranges) for compensation payments, we think the outcome of this step is likely to be a formula or approach for determining appropriate benefit payments.

The sections below explain why we propose to include benefit payments in our recommended framework for setting CSG compensation benchmarks, outline our preliminary views on when benefit payments should apply, and discuss some of the issues we will consider in deciding how benefit payments should be structured.

### 6.1 Why do we propose to include benefit payments?

As discussed in Chapter 1, under the terms of reference for this review, we are required to have regard to the NSW Gas Plan. This plan states that landholders should 'share the benefits' of gas exploration and production. We are also required to have regard to the 'economic benefits over the lifecycle stages of a project, considering the associated risks and probabilities of a project progressing'. In our view, these terms indicate that landholders should receive not only compensation for loss, damage or inconvenience caused by hosting gas exploration and production, but also a share of the benefits generated by this exploration and production.

We note that the Productivity Commission recently released a research paper on gas markets where it discussed sharing the benefits of gas exploration and production with landholders. This paper appears not to support benefit payments to landholders, noting that such payments 'may allocate some of the benefits associated with the property right in the gas resource (owned by the Crown and leased to the gas producer) to the landholder'. It also suggests such payments may be inefficient.<sup>43</sup>

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<sup>43</sup> Productivity Commission, 2015, *Examining Barriers to More Efficient Gas Markets*, Commission Research Paper, Canberra, pp 83-84.

We do not agree with the Productivity Commission's findings on benefit payments. In our view, it is not inefficient for the NSW Government to allocate a share of its property rights to landholders through benefit payments. Rather, this would promote a more efficient allocation of resources by encouraging all parties to take into account the value of gas resources. Sharing the benefits of gas development with landholders would lead to more land access agreements being reached and more gas being produced in NSW. This would increase benefits for the wider community (for example more employment opportunities). We expect that over time it will result in additional royalty revenue for the NSW Government.

## 6.2 When should benefit payments apply?

Our preliminary view is that benefit payments should apply only:

- ▼ in the production stage of CSG development, and
- ▼ to landholders who are directly hosting gas development.

### 6.2.1 Benefit payments during the production phase of gas development

At the outset of a CSG project it is uncertain whether the project will proceed to commercial production. It is possible that a gas company invests considerable capital into a project and then receives no return on its investment. For this reason, we consider that benefit payments to landholders should apply when a well on their land starts producing gas, as this is when the gas company will start to benefit from gas development.

We consider that including benefit payments in the production stage of CSG development is consistent with our terms of reference, which states we should have regard to the 'economic benefits over the lifecycles stages of a project, considering the risks and probabilities of a project progressing'. In addition, benefit payments that commence in the production stage of CSG development may help to limit any implications for encouraging CSG exploration.

### 6.2.2 Benefit payments for landholders hosting gas development

The coal seams from which gas is produced may extend under the surface of many landholders' properties. However, our preliminary view is that benefit payments should apply only to landholders who directly host gas exploration and production on their land.

The benefit payment is part of the compensation arrangements for landholders who provide access to their land so that resources can be extracted for the benefit of the broader society. For this reason, we consider that the nexus for the benefit payment should be the landholder who is facilitating access to the resource.

Note that we support neighbours who do not directly host gas exploration and production but are affected by noise etc from these activities to receive some compensation (see more discussion in Chapter 4).

### 6.3 How should benefit payments be shared?

An important issue related to landholder benefit payments is who should pay for them. We consider that it is reasonable for the costs to be shared between the gas company and the NSW Government. In this regard, determining the structure of benefit payments is related to how these costs should be shared.

One approach to share the costs of benefit payments would be for half the payment to come from the NSW Government's royalty revenue and the other half from the gas company. Currently gas companies pay royalties to the NSW Government that are equivalent to ten per cent of the value of the gas at the wellhead. For example, one percent of the value of the gas at the wellhead could be paid to the landholder (leaving nine percent in royalties) and another one percent of the value of the gas at the wellhead could be paid by the gas company.

We recognise that such an arrangement would mean a lower rate of royalty payment to the NSW Government. However, we expect that over time overall royalty revenue would increase as the benefit payment would encourage more landholders to participate in gas development. We invite comment on this issue.

As part of the NSW Gas Plan, the NSW Government has committed to reviewing royalty arrangements.<sup>44</sup>

#### 6.3.1 Pooling benefit payments among landholders

The amount of gas that is produced from different wells can vary significantly, even for wells located close together. This could result in vastly different benefit payments being made to individual landholders. One approach to address this issue would be to pool funds for benefit payments among a group of landholders and divide it fairly between them.

#### 6.3.2 Upfront benefit payments

In section 5.6 we discussed the option of converting annual compensation payments to equivalent upfront payments. Benefit payments made by gas companies could also be made through an upfront payment at the beginning of the production stage. These would be based on a forecast of the value and duration of CSG production.

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<sup>44</sup> NSW Government Trade & Investment website: NSW Gas Plan, p 14, <http://www.resourcesandenergy.nsw.gov.au/energy-supply-industry/legislation-and-policy/nsw-gas-plan> accessed 16 April 2015.

Upfront benefit payments would involve more risk to the gas company, as future gas production and gas prices are highly uncertain – some of these factors are also outside the control of the gas company. This would be reflected in the discount rate used to determine the present value of the upfront benefit payment. In general, risk should be borne by the party most able to manage it efficiently.

IPART seeks comment on the following

- 12 Do you agree with our preliminary view that benefit payments should apply during the production phase for those landholders hosting gas development on their land? If not, why?
- 13 Do you agree that the costs of benefit payments should be shared between the gas company and the NSW Government? If so how? If not, why?
- 14 Should funds for benefit payments be pooled and divided among a group of landholders that have signed access agreements? If so, how?

## 7 Making our recommendations

The final step in our proposed approach is to make our recommendations having regard to the findings from the first three steps and:

- ▼ our terms of reference
- ▼ our overarching principles for the review, and
- ▼ issues raised in stakeholder submissions.

We expect the findings from the first three steps will produce a range of possible compensation and benefit payments for landholders. However, we will need to consider more than just these findings to make our recommendations.

The terms of reference contain some important requirements that we need to address, for example, that compensation for NSW landholders is at least as good as other landholders in Australia. In making our recommendations we may also need to trade-off between factors like simplicity, predictability and accuracy. We expect that our proposed overarching principles will help us make these trade-offs. We will also have regard to stakeholders' views made in submissions and at public hearings.

The issues are discussed in more detail in the sections below.

### 7.1 Requirements in the terms of reference

Our recommendations need to meet the requirements set out in the terms of reference (Appendix A). We will address some of these requirements in Steps 1 to 3, for example, by having regard to the different phases of a CSG project and to ensure landholders share the benefits of gas exploration and production. However, it will be better to address other requirements in in this final step.

#### 7.1.1 Compensation at least as good as other landholders in Australia

We need to ensure that our recommendations support NSW landholders receiving compensation that is at least as good as that received by other landholders in Australia who host gas development. This is likely to be difficult to confirm, as there is very little public information on what payments landholders are receiving. However, we consider at the minimum the legislative

provisions for compensation in NSW should be at least as broad as other jurisdictions in Australia.

### 7.1.2 Industry arrangements and best practice

The terms of reference ask us to have regard to current industry compensation arrangements, identify industry best practice, and consider similar arrangements in other industries (including wind farms) across Australia and internationally. We will review these arrangements and take them into account in making our recommendations – for example – to help identify best practice compensation arrangements.

Our preliminary review of current industry compensation arrangements for CSG indicates that gas companies can take quite different approaches. The compensation arrangements outlined for Santos' Narrabri Gas Project are separated into two stages – exploration/appraisal and production. Payments include an annual 'fee for service' payment of \$30,000 in each year of both stages, plus either an annual land-based payment or incentive payment.<sup>45</sup> The advantage of this framework is its simplicity and predictability for landholders.

AGL's compensation framework distinguishes between landholder time payments, initial works payments, annual compensation payments, final rehabilitation payments and annual production bonuses. A schedule of payments, or range of payments, is provided for each of these categories.<sup>46</sup> This approach appears more amenable to the changing nature and scale of CSG activity throughout the life of a project.

## 7.2 Our overarching principles

As discussed in Chapter 3, we propose to have regard to three overarching principles in making our recommendations:

1. **Transparency:** stakeholders should be able to understand our recommendations and how we arrived at them. For example, they should be able to understand what impacts are accounted for, the basis on which compensation has been calculated, and what trade-offs we have made in making recommendations (for example, between simplicity and accuracy).
2. **Adaptability:** our recommendations need to be reasonably adaptable and scalable for landholders in different circumstances – for example, in terms of the size, location and potential uses of their land.

<sup>45</sup> [http://www.santos.com/library/Fact\\_sheet-Working\\_with\\_landholders\\_web.pdf](http://www.santos.com/library/Fact_sheet-Working_with_landholders_web.pdf), accessed 31 March 2015.

<sup>46</sup> [http://www.agl.com.au/~media/AGL/About%20AGL/Documents/How%20We%20Source%20Energy/Landholders/20140321\\_Template%20Principles%20and%20Access%20Compensation%20Agreement\\_PDF.pdf](http://www.agl.com.au/~media/AGL/About%20AGL/Documents/How%20We%20Source%20Energy/Landholders/20140321_Template%20Principles%20and%20Access%20Compensation%20Agreement_PDF.pdf), accessed 16 April 2015.

3. **Practicability:** to be useful to landholders, our recommendations need to be able to be implemented easily. Our aim is that it will be easy for landholders to use our recommendations to estimate fair and reasonable levels of compensation and benefit payments for someone in similar circumstances to theirs. Landholders can use our recommendations (for example) in assessing an offer they receive from a gas company, or negotiating changes to this offer.

### 7.3 Stakeholder submissions

In making our recommendations we will consider comments and views put forward by stakeholders. As indicated in Chapter 1, we invite all interested parties to provide written submissions on this issues paper, and will invite further submissions on our draft report. We will also conduct consultations with the gas industry, landholders and community and industry representatives to gather further information.

We will hold public hearings to ensure that key stakeholders and the general public are given the opportunity to provide input into our consultation process.

### 7.4 What might our recommendations look like?

Our aim is that it will be easy for landholders to use our recommendations to estimate fair and reasonable levels of compensation and benefit payments when assessing an offer they receive from a gas company.

One approach would be to provide a range of compensation benchmarks for the different impacts as part of a checklist that landholders could use to help assess a gas company's offer. Where possible, landholders could refer to the compensation benchmark that most closely relates to their circumstances. We propose to seek landholders' views on how we could structure our recommendations to be most useful for them.



## **Appendices**



## A Terms of reference

### **LANDHOLDER BENCHMARK COMPENSATION RATES FOR GAS EXPLORATION AND PRODUCTION**

Under the NSW Gas Plan, the NSW Government has committed to landholders receiving independent expert advice on benchmark compensation rates for gas exploration and production from the Independent Pricing and Regulatory Tribunal (IPART).

These benchmarks are to guide landholders in their compensation agreements with industry.

To support landholders negotiating agreements with industry, IPART is to recommend appropriate compensation benchmarks for landholders. The NSW Government intends that landholders receive compensation that is at least as good as that received by other landholders in Australia who host gas development. The benchmark arrangements will influence the competitiveness of NSW as an investment destination for petroleum exploration and production projects. Agreements will be negotiated on a commercial basis.

IPART is requested to develop an analytical framework for setting compensation benchmarks that can be updated annually.

#### **Conduct of review**

In conducting this review IPART should have regard to:

- The economic benefits over the lifecycle stages of a project, considering the associated risks and probabilities of a project progressing.
- The structure of compensation arrangements (e.g. fixed, rental or other methodologies) taking into account the different phases of a project, the varying value of production systems in agricultural enterprises and the implications for encouraging exploration.
- Landholder compensation arrangements currently applied by industry in NSW and in other Australian states and territories and internationally, including identifying industry best practice.
- Similar arrangements in other industries (e.g. wind farms) across other Australian and international jurisdictions.
- Relevant legislation on gas/petroleum exploration and production, as well as measures announced as part of the NSW Gas Plan.
- Any other matters it considers relevant.

#### **Consultation**

IPART's review will include a public consultation process through which IPART will invite submissions from stakeholders on an issues paper and a draft report. Public hearing(s) will also be held as part of this process.

#### **Timing**

IPART is to publish a draft report by September 2015. A final report is to be provided to the Minister for Resources and Energy by 30 November 2015.

## B Coal seam gas

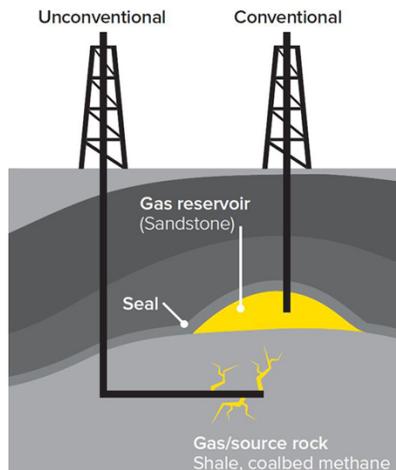
Coal seam gas (CSG) is natural gas found in coal seams at depths of 300-1000 metres. CSG is a mixture of gases but is mostly made up of methane (95% to 97%).<sup>47</sup>

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### Box B.1 Different forms of natural gas

Natural gas is generally categorised as either 'conventional' or 'unconventional' based on the geology of the reservoirs from which they are produced:

- ▼ **Conventional gas** is obtained from reservoirs largely consisting of porous sandstone capped by a seal of impermeable rock. The gas is trapped by buoyancy and can often move to the surface through gas wells without the need to pump.
- ▼ **Unconventional gas** is generally produced from complex geological systems that prevent or significantly limit the migration of gas. Extracting unconventional gas may involve hydraulic fracturing or horizontal drilling. CSG is an unconventional gas, but differs from other unconventional gas including shale gas in terms of the underlying geology and methods of extraction.



**Image source:** <http://www.sanleoneenergy.com/about-us/briefing-note-on-unconventional-exploration-and-production.aspx>.

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<sup>47</sup> <http://www.csiro.au/en/Research/Energy/Hydraulic-fracturing/What-is-unconventional-gas> accessed 16 April 2015.

CSG was made over 200 million years ago when coal was being formed, and has been held in small fractures in the coal since then by water pressure. To access the gas you first need to remove the water. This reduces the pressure in the coal seam enabling the gas to flow.<sup>48</sup>

### B.1 How CSG is extracted

To extract CSG, wells about the diameter of a dinner plate are drilled down through the rock layers into the coal seams. After the hole is drilled to the required depth, steel casing is installed and cement is pumped to fill the space between the casing and the well bore. When the cement hardens it provides a barrier between the extraction process and outlying areas (including aquifers).

Extracting CSG involves drilling a well into a coal seam and ‘dewatering’, or pumping out the water held in the coal seam. Through dewatering, the water pressure is reduced and gas is released from the coal seam. Horizontal or angled wells may be drilled into and along the coal seam from a vertical well. If the flow of gas is insufficient, hydraulic fracturing may be used to increase the permeability of the coal and allow the gas to flow more freely.<sup>49</sup>

### B.2 Hydraulic fracturing

Hydraulic fracturing (‘fraccing or fracking’) is the most common method used to increase the flow of water and gas (ie, to increase production from a CSG well). However, not all CSG wells require hydraulic fracturing. Generally, only wells that intersect low permeability coal seams require hydraulic fracturing and these are usually deeper seams. In Australia, the technique is used in approximately 20% to 40% of CSG wells.<sup>50</sup>

To gain access to the coal, the well casing is perforated at specific intervals where the fracture treatment is to be carried out. Hydraulic fracturing typically involves injecting fluid made up of water, sand and chemical additives under high pressure into the cased well. The pressure caused by the injection typically creates a fracture in the coal seam where the well is perforated. For a large CSG treatment, the fracture might typically extend to a distance of 200 to 300 metres from the well.

<sup>48</sup> <http://www.gisera.org.au/publications/faq/faq-csg-extraction-fraccing.pdf> accessed 16 April 2015.

<sup>49</sup> <http://www.csiro.au/en/Research/Energy/Hydraulic-fracturing/What-is-unconventional-gas> accessed 16 April 2015.

<sup>50</sup> <http://www.csiro.au/en/Research/Energy/Hydraulic-fracturing/a-What-is-hydraulic-fracturing> accessed 18 March 2015.

After the fracturing is complete, most of the hydraulic fracturing fluid is, over time, brought back to the surface and treated before being used again or disposed of. The fracturing fluid is around 99% sand and water, with the remainder various chemicals.<sup>51</sup> The NSW Government has banned the use of harmful chemicals known as BTEX (benzene, toluene, ethylbenzene and xylene compounds).<sup>52</sup>

### B.3 Horizontal drilling

More recent techniques such as horizontal drilling are emerging as an alternative to hydraulic fracturing. Horizontal drilling occurs at deep levels underground and reduces the number of visible vertical wells located above ground. Once the coal seam has been located, the well bore is encased and pressure-cemented at ground level. Smaller holes are drilled horizontally into the coal seam to stimulate pathways through which the gas can flow into the well.

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<sup>51</sup> [www.csiro.au/en/Research/Energy/Hydraulic-fracturing/a-What-is-hydraulic-fracturing](http://www.csiro.au/en/Research/Energy/Hydraulic-fracturing/a-What-is-hydraulic-fracturing), accessed 25 March 2015.

<sup>52</sup> <http://www.trade.nsw.gov.au/policies/items/ban-on-use-of-btex-compounds-in-csg-activities>, accessed 16 April 2015.

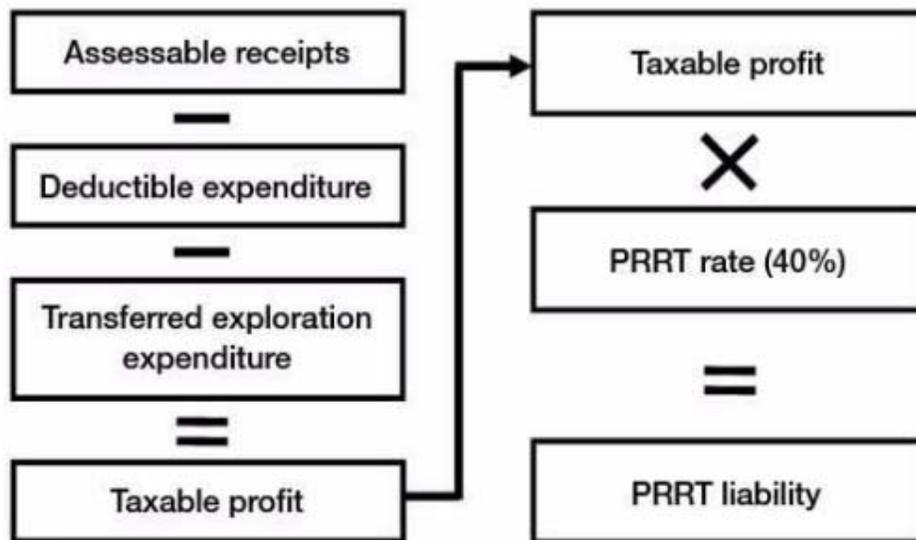
## C Royalty arrangements

Gas producers in NSW are subject to the petroleum resource rent tax (PRRT) imposed by the Commonwealth as well as a State-based royalty.

### C.1 Petroleum resource rent tax

The PRRT is a profit-based tax which is payable at the rate of 40% on the taxable profit of petroleum projects. Taxable profits are calculated by deducting eligible project expenses from the assessable revenues derived from the project (Figure C.1).

**Figure C.1 Framework for calculating PRRT liability**



**Source:** Australian Taxation Office, [https://www.ato.gov.au/Business/Petroleum-resource-rent-tax/In-detail/PRRT-in-detail/Work-out-PRRT/How-to-work-out-PRRT/?page=2#Framework\\_for\\_calculating\\_PRRT\\_liability](https://www.ato.gov.au/Business/Petroleum-resource-rent-tax/In-detail/PRRT-in-detail/Work-out-PRRT/How-to-work-out-PRRT/?page=2#Framework_for_calculating_PRRT_liability).

Previously the PRRT only applied to offshore projects, but on 1 July 2012 it was extended to all on/offshore oil and gas projects.<sup>53</sup>

<sup>53</sup> The Australian Government, *GST Distribution Review*, Second Interim Report, Ch. 4, June 2012 <http://www.gstdistributionreview.gov.au/content/Content.aspx?doc=reports/interimjune2012/07Chapter4.htm> accessed 27 March 2015.

Under the PRRT, royalty and excise payments are not refundable, but are taken into account in determining the PRRT liability of a project through allowing a credit for royalties paid. The royalty payments actually made are converted to pre-PRRT equivalent by dividing the PRRT rate of 40% (ie, royalties are grossed up at the PRRT rate).<sup>54</sup> The resulting royalty allowance then reduces the size of the project's profit that is subject to the PRRT. More information on the PRRT is available on the Australian Taxation Office website.<sup>55</sup>

## C.2 CSG royalties

Gas companies are required to pay royalties to the NSW Government for the gas that they recover in the state. Currently, the prescribed annual rate for CSG production is 10% of the value at the wellhead.<sup>56</sup>

Table C.1 summarises other CSG royalty rates in Australia. With the exception of Tasmania, the royalty rate is 10% of well-head value.

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<sup>54</sup> For example, see King & Wood Mallesons, *Taxing Australia's Wealth – Guide to the taxation of Australian Resource Projects*, available at <http://www.kwm.com/en/au/knowledge/downloads/taxing-australias-wealth-a-guide-to-the-taxation-of-australian-resource-projects-20140501> accessed 27 March 2015.

<sup>55</sup> <https://www.ato.gov.au/Business/Petroleum-resource-rent-tax/>

<sup>56</sup> Part 7 of the Petroleum (Onshore) Regulation 2007. Section 89 of the Act states that the value at the well-head is 'the amount determined by the Minister as being that value'.

**Table C.1 CSG royalties in Australia**

State	Royalties
NSW	10% of wellhead value. <sup>a</sup>
QLD	10% of wellhead value. <sup>b</sup>
VIC	10% of the value of the petroleum at the wellhead. Where offshore this rate may be substituted with a rate prescribed by the Minister or under the licence in certain circumstances. <sup>c</sup>
WA	10% of wellhead value. In certain circumstances the rate payable may be determined by the Minister or under the licensee. <sup>d</sup>
NT	10% of the gross value at the wellhead of all petroleum produced from the licence area. <sup>e</sup>
SA	10% of the value at the well head. <sup>f</sup>
TAS	12% of the gross value of petroleum at the wellhead. <sup>g</sup>

<sup>a</sup> Clause 23 of the *Petroleum (Onshore) Regulation 2007*.

<sup>b</sup> Section 147(3) of the *Petroleum and Gas (Production and Safety) Regulation 2004*.  
<https://www.legislation.qld.gov.au/LEGISLTN/SLS/2004/04SL309.pdf> accessed 17 March 2015.

<sup>c</sup> Section 150 of the *Petroleum Act 1998* [http://www.legislation.vic.gov.au/Domino/Web\\_Notes/LDMS/PubStatbook.nsf/f932b66241ecf1b7ca256e92000e23be/a6db1c8dd79ead78ca256e5b00213d4f/\\$FILE/98-096a.pdf](http://www.legislation.vic.gov.au/Domino/Web_Notes/LDMS/PubStatbook.nsf/f932b66241ecf1b7ca256e92000e23be/a6db1c8dd79ead78ca256e5b00213d4f/$FILE/98-096a.pdf) accessed 17 March 2015.

<sup>d</sup> Section 142(2) of *Petroleum and Geothermal Energy Resources Act 1967*. There are separate regimes with respect to the North West Shelf area and Barrow Island area. [http://www.slp.wa.gov.au/pco/prod/FileStore.nsf/Documents/MRDocument:26656H/\\$FILE/Petroleum%20and%20Geothermal%20Energy%20Resources%20Act%201967%20-%20\[07-h0-01\].html?OpenElement](http://www.slp.wa.gov.au/pco/prod/FileStore.nsf/Documents/MRDocument:26656H/$FILE/Petroleum%20and%20Geothermal%20Energy%20Resources%20Act%201967%20-%20[07-h0-01].html?OpenElement) accessed 17 March 2015.

<sup>e</sup> Division 5, Part III of the *Petroleum Act* <http://notes.nt.gov.au/dcm/legislat/legislat.nsf/linkreference/PETROLEUM%20ACT> accessed 17 March 2015.

<sup>f</sup> [http://www.petroleum.dmitre.sa.gov.au/licensing/resource\\_royalties/royalties\\_and\\_fees](http://www.petroleum.dmitre.sa.gov.au/licensing/resource_royalties/royalties_and_fees) accessed 17 March 2015.

<sup>g</sup> <http://www.mrt.tas.gov.au/portal/en/royalties> accessed 17 March 2015.

## D Accessing land for CSG development

Mineral resources in NSW are owned by the Crown and all rights to mineral exploration and extraction are reposed in the Crown.<sup>57</sup> Before a CSG company can access private land to undertake exploration activity, it must:

- ▼ hold a prospecting title (section D.1), and
- ▼ enter into a written access arrangement with the landholder (section D.2).<sup>58</sup>

### D.1 Petroleum titles

There are four types of petroleum titles in NSW:

- ▼ *Petroleum special prospecting authority* gives the holder the exclusive right to explore for petroleum using low-impact methods over the designated area.
- ▼ *Petroleum exploration licence (PEL)* gives the holder the exclusive right to explore for petroleum within the exploration licence area during the term of licence.
- ▼ *Petroleum assessment lease (PAL)* allows the holder to maintain a title over a potential project area without having to commit to further exploration (ie, between exploration and production phases).
- ▼ *Petroleum production lease (PPL)* gives the holder the exclusive right to extract petroleum within the production lease area during the term of the lease.<sup>59</sup>

#### D.1.1 Petroleum special prospecting authority

A petroleum special prospecting authority gives the holder the exclusive right to conduct desktop surveys using existing research or other low-impact scientific investigations to determine the occurrence of petroleum over the designated area.

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<sup>57</sup> Section 6(1) of the *Petroleum (Onshore) Act 1991* (NSW) states that all petroleum, helium and carbon dioxide existing in a natural state on or below the surface of any land in the State is the property of the Crown.

<sup>58</sup> <http://www.resourcesandenergy.nsw.gov.au/landholders-and-community/coal-seam-gas/the-facts/land-access> accessed 16 April 2015.

<sup>59</sup> <http://www.resourcesandenergy.nsw.gov.au/miners-and-explorers/applications-and-approvals/about-petroleum-titles> accessed 17 March 2015.

### **D.1.2 Petroleum exploration licence (PEL)**

A petroleum exploration licence gives the holder the exclusive right to explore for petroleum (including conventional gas and CSG) within the exploration licence area, during the term of the licence.

The purpose of exploration is to locate areas where resources may be present and establish the quality and quantity of those resources. Next comes establishing the viability of extracting the resource.

Granting an exploration licence does not carry entitlement for production, nor does it guarantee a production lease will be granted within the exploration licence area.

Local communities have the opportunity to comment on exploration licences through a public consultation process. Local communities have 28 days from the publication of the notice of application to comment on the granting of petroleum exploration licences.

### **D.1.3 Petroleum assessment lease (PAL)**

A petroleum assessment lease caters for situations between exploration and production. The lease allows the holder to maintain a title over a potential project area, without having to commit to further exploration. The holder can, however, continue exploration to further assess the viability of commercial production.

### **D.1.4 Petroleum production lease (PPL)**

A petroleum production lease gives the holder the exclusive right to extract petroleum within the production lease area during the term of the lease.

Before a CSG company can begin production, it must obtain Development Consent from the Department of Planning and Environment. The process involves the following steps:

- ▼ Where the project is located on Strategic Agricultural Land - the applicant will be required to go through the Gateway Process; an independent, scientific and upfront assessment of the potential impacts of a mining or CSG production proposal on strategic agricultural land.
- ▼ Where the project is not located on Strategic Agricultural Land, or has obtained a Gateway Certificate, the applicant will apply to the Director-General of Planning and Environment to issue Director-General requirements for the preparation of an Environmental Impact Statement (EIS).

- ▼ The Development Application and EIS are lodged and publicly exhibited for at least 30 days to allow the local community and other key stakeholders to lodge submissions.
- ▼ The Department of Planning & Environment will consult with the local council and relevant agencies to discuss possible conditions on the application.
- ▼ The Minister for Planning, or the Planning Assessment Commission under delegation from the Minister, determines whether or not to grant consent.
- ▼ Once development approval is granted, the Minister for Industry, Resources and Energy grants a Petroleum Production Lease.<sup>60</sup>

## D.2 Accessing private land to undertake exploration activity

A CSG company holding a prospecting title needs to enter into an access arrangement with the landholder before carrying out prospecting activities on the land.<sup>61</sup>

### D.2.1 Land access agreements

Land access agreements must be in writing and can be entered into before or after the grant of the title. The NSW Government has a guideline to assist landholders in negotiating access agreements and covers the types of issues listed above.<sup>62</sup>

If an access arrangement cannot be agreed within 28 days, the CSG company may request the landholder to appoint a mutually agreeable arbitrator. If either party is not satisfied with the arbitrator's determination, they can apply to the Land and Environment Court for a review of the determination.

Section 109 of the *Petroleum (Onshore) Act 1991 (NSW)* provides a list of factors that the Court will take into account when assessing the value of loss suffered or likely to be suffered by the landholder (see Box 2.1). A compensation order issued by the Court is binding on all parties to the dispute, but there is a right of appeal.<sup>63</sup> CSG companies that fail to pay the landholders the amount of

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<sup>60</sup> NSW Trade & Investment – Resources & Energy, Coal Seam Gas Fact Sheet 7, *Land Access*, [http://www.resourcesandenergy.nsw.gov.au/\\_\\_data/assets/pdf\\_file/0003/516144/Land-Access-CSG-Fact-Sheet-7.pdf](http://www.resourcesandenergy.nsw.gov.au/__data/assets/pdf_file/0003/516144/Land-Access-CSG-Fact-Sheet-7.pdf), accessed 16 April 2015.

<sup>61</sup> Section 69C of *Petroleum (Onshore) Act 1991 (NSW)*.

<sup>62</sup> Department of Primary Industries (2012), *Tips for negotiating coal seam gas access agreements*, December 2012.

<sup>63</sup> Section 112 states that an appeal may be brought against an assessment made by the Land and Environment Court under this Act. Parties to the dispute have a right of appeal.

compensation determined by the Court will risk having their petroleum exploration licence cancelled or revoked.<sup>64</sup>

### D.2.2 Agreed principles of land access

In March 2014, the 'Agreed Principles of Land Access' was signed by gas companies, Santos and AGL, and landholder representatives NSW Farmers, Cotton Australia and the NSW Irrigators Council.

All parties have agreed to the following principles:

- ▼ Any landholder must be allowed to freely express their views on the type of drilling operations that should or should not take place on their land without criticism, pressure, harassment or intimidation. Any landholder is at liberty to say "yes" or "no" to the conduct of operations on their land.
- ▼ Gas companies confirm that they will respect the landholder's wishes and not enter onto a Landholder's property to conduct drilling operations where that landholder has clearly expressed the view that operations on their property would be unwelcome.
- ▼ The parties will uphold the landholder's decision to allow access for drilling operations and do not support attempts by third party groups to interfere with any agreed operations. The parties condemn bullying, harassment and intimidation in relation to agreed drilling operations.<sup>65</sup>

### D.2.3 Draft Code of Practice for Land Access for CGS and petroleum exploration

The NSW Government released a draft Code of Practice<sup>66</sup> (the draft Code) which sets out a best practice framework for how CSG companies can initiate and negotiate land access arrangements with landholders. The draft Code specified a list of mandatory provisions that are included in all access arrangements unless expressly excluded or varied between the parties.

The mandatory provisions reflect current regulatory requirements, for example the CSG exploration company is required to promptly pay any agreed compensation and the reasonable legal costs of the landholder, as well as treating any information obtained about the landholder's property or operations as confidential.

<sup>64</sup> Section 110(4) of the *Petroleum (Onshore) Act 1991* (NSW) states that the petroleum title may be cancelled or revoked if the titleholder fails to pay the determined amount of compensation.

<sup>65</sup> [http://www.nswfarmers.org.au/\\_\\_data/assets/pdf\\_file/0008/35567/Agreed-Principles-of-Land-Access-280314.pdf](http://www.nswfarmers.org.au/__data/assets/pdf_file/0008/35567/Agreed-Principles-of-Land-Access-280314.pdf) accessed 20 February 2015.

<sup>66</sup> This Code is the prescribed code for the purpose of s 69DB of the *Petroleum (Onshore) Act 1991*.

In addition, the mandatory provisions cover the following issues that need to be addressed before, during and after the exploration activities. This is summarised in Box D.1.

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**Box D.1 The common issues covered in a land access agreement may include:**

- ▼ **reasonable notice and access periods:** reasonable hours of CSG operation on the landholder's property and minimum notice period of 5 business days before start of operation
  - ▼ **access points, roads and tracks:** exploration activities should be conducted in a manner that minimise potential for any damage to the Landholder's property, for example, use existing roads if possible or negotiate a suitable location for new roads that are needed for heavy vehicles and machinery
  - ▼ **camps:** location and management plan of any camps that the CSG company intends to establish on the landholder's property
  - ▼ **infrastructure and equipment:** conditions relating to any items the CSG company brings on to the landholder's property
  - ▼ **home and other buildings:** distance between the well pads and the landholder's home and farm buildings
  - ▼ **livestock and property:** minimises disturbance to existing land uses (including crops), livestock and property, specifies the manner and timeframe for repairing any damage caused to landholder's property
  - ▼ **water regulation:** CSG company must provide any available monitoring/testing results carried out under the water regulation requirements on request
  - ▼ **fracture stimulation:** if required, an approved Fracture Stimulation Management Plan must be provided prior to commencement
  - ▼ **cropping:** traffic damage to cropping activities eg, water capture efficiency and erosion
  - ▼ **rehabilitation and make good process:** rehabilitate the land, in consultation with the landholder, to a standard that is equal to or better than its original condition
  - ▼ **compensation:** payments for the range of activities to be performed on the landholder's property
  - ▼ **dispute resolution:** the manner of resolving any dispute arising in connection with the agreement, eg, mediation or arbitration process
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## E | Legislative provisions for compensation

We have compared legislative provisions for landholder compensation in Australia. Table E.1 sets out relevant sections of legislation. Some key differences are that, contrary to NSW:

- ▼ The legislation in Queensland, Victoria and Tasmania provides for a reduction in market value of land and loss of opportunity to make planned improvements on the land.
- ▼ The legislation in Victoria and Tasmania provides for loss of amenity including recreation and conservation values. In Victoria, the maximum amount of compensation that a Court or Tribunal may order to be paid for loss of amenity is \$10,000.

**Table E.1 Summary of legislative provisions for compensation**

Jurisdiction	Relevant sections of legislation
<b>New South Wales</b> <b><i>Petroleum (Onshore) Act 1991</i></b> Section 109 Measure of compensation	The Land and Environment Court is to assess the loss caused or likely to be caused: <ol style="list-style-type: none"> <li>a) by damage to the surface of land, and damage to the crops, trees, grasses or other vegetation on land, or damage to buildings and improvements on land, being damage which has been caused by or which may arise from prospecting or petroleum mining operations, and</li> <li>b) by deprivation of the possession or of the use of the surface of land, and</li> <li>c) by severance of land from other land of the landholder, and</li> <li>d) by surface rights of way and easements, and</li> <li>e) by destruction or loss of, or injury to, or disturbance of, or interference with, stock on land.</li> </ol> Section 69D (2A) An access arrangement must (if the landholder so requests) specify that the holder of the prospecting title is required to pay the reasonable legal costs of the landholder in obtaining initial advice about the making of the arrangement.

Jurisdiction	Relevant sections of legislation
<p><b>Queensland</b>  <b><i>Petroleum and Gas (Production and Safety) Act 2004</i></b>  <i>Section 532 General liability to compensate</i></p>	<p>The holder of each petroleum authority is liable to compensate each owner or occupier of private land or public land in the area of, or access land for, the authority (an eligible claimant) for any compensatable effect the eligible claimant suffers that is caused by relevant authorised activities.</p> <ul style="list-style-type: none"> <li>a) Compensatable effect means all or any of the following: <ul style="list-style-type: none"> <li>i. deprivation of possession of land surface;</li> <li>ii. diminution of land value;</li> <li>iii. diminution of the use made or that may be made of the land or any improvement on it;</li> <li>iv. severance of any part of the land from other parts of the land or from other land that the eligible claimant owns;</li> <li>v. any cost, damage or loss arising from the carrying out of activities under the petroleum authority on the land;</li> </ul> </li> <li>b) Accounting, legal or valuation costs reasonably incurred by the landholder to negotiate or prepare a Conduct and Compensation Agreement, other than costs involved to resolve disputes via independent alternative dispute resolution (ADR)</li> <li>c) Consequential damages the eligible claimant incurs because of a matter mentioned in paragraph a) or b).</li> </ul>
<p><b>Victoria</b>  <b><i>Mineral Resources (Sustainable Development) Act 1990</i></b>  <i>Section 85 What compensation is payable for</i></p>	<p>Compensation is payable by the licensee to the owner or occupier of private land that is land affected for any loss or damage that has been or will be sustained as a direct, natural and reasonable consequence of the approval of the work plan or the doing of work under the licence including:</p> <ul style="list-style-type: none"> <li>a) deprivation of possession of the whole or any part of the surface of the land;</li> <li>b) damage to the surface of the land;</li> <li>c) damage to any improvements on the land;</li> <li>d) severance of the land from other land of the owner or occupier;</li> <li>e) loss of amenity, including recreation and conservation values;</li> <li>f) loss of opportunity to make any planned improvement on the land;</li> <li>g) any decrease in the market value of the owner or occupier's interest in the land; and</li> <li>h) loss of opportunity to use tailings disposed of with the consent of the Minister under section 14(2).</li> </ul>
<p><b>South Australia<sup>a</sup></b>  <b><i>Petroleum and Geothermal Energy Act 2000</i></b>  <b><i>Section 63 Right to compensation</i></b></p>	<ol style="list-style-type: none"> <li>1. The owner of land is entitled to compensation from a licensee who enters the land and carries out regulated activities under this Act.</li> <li>2. The compensation payable to an owner of land must be directly related to the owner and will be to cover: <ul style="list-style-type: none"> <li>a) deprivation or impairment of the use and enjoyment of the land; and</li> <li>b) damage to the land (not including damage that has been made good by the licensee); and</li> <li>c) damage to, or disturbance of, any business or other activity lawfully conducted on the land; and</li> <li>d) consequential loss suffered or incurred by the owner on account of the licensee entering the land and carrying out regulated activities under this Act.</li> </ul> </li> <li>3. The compensation is not to be related to the value or possible value of regulated resources contained in the land.</li> </ol>

Jurisdiction	Relevant sections of legislation
	<p>(3a) The compensation may include an additional component to cover reasonable costs reasonably incurred by an owner of land in connection with any negotiation or dispute related to:</p> <ul style="list-style-type: none"> <li>a) the licensee gaining access to the land; and</li> <li>b) the activities to be carried out on the land; and</li> <li>c) the compensation to be paid under subsection 2.</li> </ul>
<p><b>Western Australia<sup>b</sup></b>  <b><i>Petroleum and Geothermal Energy Resources Act 1967<sup>c</sup></i></b>  <i>Section 17</i>  <i>Compensation for owners and occupiers of private land</i></p>	<p>1. A permittee, holder of a drilling reservation, lessee or licensee may agree with the owner and occupier respectively of any private land comprised in the permit, drilling reservation, lease or licence as to the amount of compensation to be paid for the right to occupy the land.</p> <p>... the compensation to be made to the owner and occupier shall be compensation for being deprived of the possession of the surface or any part of the surface of the private land, and for damage to the surface of the whole or any part thereof, and to any improvements thereon, which may arise from the carrying on of operations thereon or thereunder, and for the severance of such land from other land of the owner or occupier, and for rights-of-way and for all consequential damages.</p>
<p><b>Tasmania<sup>d</sup></b>  <b><i>Mineral Resources Development Act 1995 (No. 116 of 1995)</i></b>  <b><i>Section 3</i></b>  <b><i>Interpretation</i></b></p>	<p>Compensable loss means:</p> <ul style="list-style-type: none"> <li>a) damage to the surface of the land; or</li> <li>b) damage to crops, trees, grasses, fruit, vegetables or other vegetation on the land; or</li> <li>c) damage to buildings, structures or works on the land; or</li> <li>d) damage to any improvement on the land; or</li> <li>e) loss of opportunity to make any planned improvement on the land; or</li> <li>f) deprivation of possession or use of the whole or part of the surface of the land; or</li> <li>g) severance of the land from other land of the owner or occupier of that land; or</li> <li>h) destruction or loss of, or injury to, disturbance of, or interference with, stock; or</li> <li>i) loss of amenity, including recreation and conservation values; or</li> <li>j) any decrease in the market values of the owner's or occupier's interest in the land; or</li> <li>k) surface rights of way and easements.</li> </ul>

<sup>a</sup> CSG exploration is in its infancy in South Australia. (200–300 scf/t in Scott, 2002).

<sup>b</sup> Western Australia currently has no known, economically significant, coal seam gas resources due to the State's geology and character of its coals. Source: Government of Western Australia, Department of Mines and Petroleum Response to Report: 'Regulation of Shale, Coal Seam and Tight Gas Activities in Western Australia' 31 October 2011.

<sup>c</sup> The Act did not refer specifically to CSG, questionable that they apply to CSG activities.

<sup>d</sup> At the time of writing, Tasmania has no known active coal seam gas operations. The last exploration licence granted to explore Tasmania's potential - to Pure Energy - expired in 2009. The exploration was unsuccessful.

## F Value of land taken

In Chapter 5 we discussed two possible approaches for estimating compensation for the value of land taken for CSG activity. These include a gross margin and a lease payment approach. In this appendix we provide more information about the gross margin approach.

### F.1 What is a gross margin?

A gross margin is the annual gross income from an enterprise less the variable costs incurred in achieving it. The rationale for this approach is that fair compensation would reflect the profits (approximated by gross margins) that the occupied land could have generated for the landholder under normal conditions.

For example, if the land occupied for CSG activities could have been used for grazing (ie, grazing is the highest value alternative land use), then fair compensation would reflect the gross margin that could have been earned for grazing.

### F.2 How could we implement this approach?

Implementing this approach will involve:

- ▼ identifying the highest value potential agricultural use for land occupied by CSG infrastructure, and
- ▼ relating this information to the NSW Department of Primary Industry's (DPI's) gross margin estimates (or a similar proxy for gross margins).

Because we are recommending benchmark compensation, we need to estimate gross margins relevant for a range of different landholders. We could either use a range of gross margins for different types of agriculture and in different areas, or estimate a weighted-average gross margin for agricultural activities in a selected area (for example, in a local government area or a geological basin where CSG is located).

Estimating a weighted-average gross margin would require information on agricultural land use in a selected area. There are two ways we could approach this.

Firstly, we could use agricultural production data. The Australian Bureau of Statistics (ABS) publishes agriculture census data every five years which shows the total value of agricultural production in each Local Government Areas across NSW. Since the agricultural production census data are provided by local government area, the level of agricultural production for a geological basin would need to be approximated by its main local government areas.

For example, Table F.1 shows the value of agricultural production for Gloucester.

**Table F.1 Value of agricultural production data for Gloucester**

<b>Agricultural commodities produced</b>	<b>\$ Value of Agriculture</b>	<b>% of all agriculture in Gloucester</b>
Cereal crops	4,545	0.0%
Other broadacre crops	11,004	0.0%
Nurseries, cut flowers and cultivated turf	14,616	0.1%
Crops for hay	1,918,972	6.7%
Vegetables	52,550	0.2%
Citrus Fruit	103	0.0%
Grapes (wine and table)	1,740	0.0%
Stone Fruit	1,271	0.0%
Other Fruit	-	-
Berry Fruit	-	-
Plantation Fruit	-	-
Nuts	221	0.0%
Wool	3,530	0.0%
Milk	8,173,037	28.5%
Eggs	2,549	0.0%
Honey	-	-
Meat	18,491,442	64.5%
<b>Total agricultural commodities</b>	<b>28,675,580</b>	<b>100%</b>

**Source:** 2010-11 Agriculture Census, Australian Bureau of Statistics,  
<http://www.abs.gov.au/AUSSTATS/abs@.nsf/DetailsPage/7503.022010-11?OpenDocument>

Using the production percentages from the census data, and corresponding gross margin estimates for the relevant commodity and area, we could estimate a weighted average gross margin. One of the drawbacks of this approach is that agricultural production by value may not necessarily represent the most common agricultural land use by area.

Secondly, we could use NSW Agriculture's agricultural land classification. Agricultural land is classified into five classes based on the number of biophysical social and economic factors that may constrain the use of land for agriculture. In general, the fewer the number of constraints on the land, the more valuable the land is for agricultural purpose.<sup>67</sup>

**Table F.2 Agricultural land classification classes**

Class	Description
Class 1	Arable land suitable for intensive cultivation where constraints to sustained high levels of agricultural production are minor or absent.
Class 2	Arable land suitable for regular cultivation for crops, but not suited to continuous cultivation. It has a moderate to high suitability for agriculture but edaphic (soil factors) or environmental constraints reduce the overall level of production and may limit the cropping phase to a rotation with sown pastures.
Class 3	Grazing land or land well suited to pasture improvement. It may be cultivated or cropped in rotation with sown pasture. The overall production level is moderate because of edaphic or environmental constraints. Erosion hazard, soil structure breakdown or other factors, including climate, may limit the capacity for cultivation and soil conservation or drainage works may be required.
Class 4	Land suitable for grazing but not for cultivation. Agriculture is based on native pastures or improved pastures established using minimum tillage techniques. Production may be seasonally high but the overall production level is low as a result of major environmental constraints.
Class 5	Land unsuitable for agriculture or at best suited only for light grazing. Agricultural production is very low or zero as a result of severe constraints, including economic factors which prevent land improvement.

**Source:** NSW Agriculture, *Agricultural Land Classification – Agfact AC. 25, 2002*, p 4.

We could obtain information about NSW Agriculture's agricultural land classification for Sydney, Gunnedah and Gloucester Basins and relate this to DPI's gross margins.

<sup>67</sup> NSW Agriculture, *Agricultural Land Classification – Agfact AC. 25, 2002*, pp 3-5. Available at [http://www.dpi.nsw.gov.au/\\_\\_data/assets/pdf\\_file/0004/189697/ag-land-classification.pdf](http://www.dpi.nsw.gov.au/__data/assets/pdf_file/0004/189697/ag-land-classification.pdf) accessed 9 March 2015.

## G Environmental protections

### G.1 Environment protection license

The Environment Protection Authority (EPA) is the lead environmental regulator for CSG. All exploration, assessment and production titles and activities, once approved, are required to hold an environment protection licence issued by the EPA. An environment protection licence contains legally enforceable conditions, which holders must comply with in order to prevent pollution, and safeguard the environment. This includes air, water, waste and noise requirements.

A licence may also include requirements to undertake monitoring for pollution. All pollution monitoring data that is required to be collected under a licence condition must be made available to the community on the licensees' website.

Licence holders are required to notify the EPA if there is an environmental incident or a breach of licence conditions. The EPA investigates and takes appropriate compliance action for all incidents and breaches. Significant penalties exist for companies that fail to provide notification of breaches.

The EPA regularly inspects industry sites to assess environmental performance, check compliance with licence conditions and legislative obligations, respond to environmental incidents and undertake detailed compliance audits if needed. This may require access across private lands.<sup>68</sup>

### G.2 Protections related to water

To address the impact of CSG development on water, the NSW Government:

- ▼ banned the use of BTEX chemicals (Benzene, Toluene, Ethylbenzene and Xylene compounds) in CSG fracking fluids and banned the use of evaporation basins for the disposal of CSG produced water – this condition is included in environmental protection licenses.
- ▼ introduced the NSW Aquifer Interference Policy whereby:
  - water licences are required for the water taken from water sources through CSG and other mining activities. This is to ensure that the amount of water

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<sup>68</sup> <http://www.epa.nsw.gov.au/licensing/coalseamgas.htm> accessed 16 April 2015.

taken from each water source does not exceed the extraction limit set in a water sharing plan.

The NSW Office of Water assesses CSG and other mining projects to determine their potential impacts on water resources in terms of the potential risk of ground water movement between aquifers, impacts on the water table, water pressure levels and water quality changes in different types of ground water systems.<sup>69</sup>

### G.3 Strategic Regional Land Use Policy

In 2012, the NSW Government introduced the Strategic Regional Land Use Policy to better manage the potential conflicts arising from the proximity of mining and CSG activity to our high quality agricultural land in some parts of the State.

Under the Policy, the NSW Government has introduced safeguards which will protect five million hectares of residential and strategic agricultural land across the State from the impacts of mining and CSG activity.

The Gateway process (effective from 4 October 2013) adds an additional level of scrutiny to new State significant mining and CSG proposals on high quality agricultural land (BSAL) and the Upper Hunter equine and viticulture critical industry clusters (CICs).

The NSW Government has introduced CSG exclusion zones to restrict new CSG activities in residential areas. Currently, CSG exclusion zones apply to 2.7 million hectares of existing and future residential land across NSW and the equine and viticulture critical industry clusters in the Upper Hunter. The exclusion zones ban new CSG activity within a two kilometre buffer around existing and future residential areas.<sup>70</sup> New CSG activity is not permitted within the CICs in the Upper Hunter.<sup>71</sup>

### G.4 Biophysical Strategic Agricultural Land Mapping

Biophysical Strategic Agricultural Land (BSAL) is land with high quality soil and water resources capable of sustaining high levels of productivity.<sup>72</sup> Across NSW, a total of 2.8 million hectares of BSAL has been identified and mapped. Around 10% of the 2.8 million hectares of BSAL covers a known mining or CSG resource.

<sup>69</sup> <http://www.water.nsw.gov.au/Water-management/Law-and-policy/Key-policies/Aquifer-interference> accessed 18 February 2015.

<sup>70</sup> Pipelines associated with CSG development are now also banned within the exclusion zones, but are permitted within the 2km buffer zones, subject to development approval. <http://www.planning.nsw.gov.au/coal-seam-gas-exclusion-zones> accessed 18 February 2015.

<sup>71</sup> The department has identified where the equine and viticulture industries are concentrated in the Upper Hunter, and mapped these locations as “Critical Industry Clusters” (CICs). CICs are concentrations of highly productive industries within a region that are related to each other, contribute to the identity of that region and provide significant employment opportunities.

<sup>72</sup> BSAL plays a critical role sustaining the State’s \$12 billion agricultural industry.

Any State significant mining or CSG proposal on BSAL is subject to the Gateway process, where an independent panel of scientific experts conduct scientific assessment of the land and water impacts of the proposal (see glossary of terms).<sup>73</sup>

## G.5 Insurance

In general, insurance provides cover for the payment of costs for clean-up action, and for claims for compensation and damages resulting from pollution in connection with the activity or work authorised or controlled by the license. Under NSW legislation, the holding of insurance is not mandatory, although conditions of a licence may require the licence holder to take out and maintain an insurance policy.

- ▼ Part 9.4 of the *Protection of the Environment Operations Act 1997* relates to financial assurance which is used to secure or guarantee funding for, or towards the carrying out of, works or programs such as remediation work or pollution reduction programs. However, financial assurance is not a mandatory condition. The conditions of a licence may require the licence holder to provide financial assurances.
- ▼ Under the *Petroleum (Onshore) Act 1991*(NSW), an application for a petroleum title must be accompanied by evidence of the applicant's financial standing. This can often simply constitute a letter of an endorsement from a chartered accountant.

## G.6 Security deposits

Under the *Petroleum (Onshore) Act 1991* (NSW) the current process in NSW includes the requirement that all titleholders, engaged in mineral and petroleum exploration, assessment and production activities, lodge a security deposit with the Government on issue of title. The security deposit is to cover the Government's full costs of rehabilitation of the land subject to the title and includes any dams or roads under the title.

In CSG activities, the rehabilitation work undertaken by titleholders during and at the end of activities is usually limited to plugging and abandonment of wells, and maintenance and removal of surface infrastructure associated with the extraction operations. The rehabilitation security deposit process does not apply to pollution events.

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<sup>73</sup> <http://www.planning.nsw.gov.au/biophysical-strategic-agricultural-land-mapping> accessed 16 April 2015.

## Glossary

This glossary is based on information from NSW Trade & Investment, Resources & Energy.

Access arrangement	Coal seam gas explorers must hold an appropriate title before entering a landholder's property. The titleholder cannot undertake any activity on the title unless they have entered into an access arrangement with the property holder.
Aquifers	Saturated geological formations capable of yielding water in usable quantities. They are not underground rivers or streams.
Biophysical Strategic Agricultural Land (BSAL)	Has the best quality soil and water resources and is capable of sustaining high levels of productivity. It represents only 3.5% of the State, but it plays a critical role in sustaining the State's \$12 billion agricultural industry. CSG activities may be approved on these lands based on the decision of an independent panel.
Cleats	The naturally occurring cracks in coal seams (millimetres or less in width) which hold natural gas.
Coal bed methane	See coal seam gas.
Coal seam gas (CSG)	A natural gas comprising mostly methane and occurring in coal seams located hundreds of metres below the earth surface. CSG is used in domestic cooking, heating, by industry for fuel and chemical production and in electricity generation.

Critical Industry Cluster (CIC)	A concentration of highly productive industries within a region that are related to each other, contribute to the identity of that region, and provide significant employment opportunities. Two types of Critical Industry Clusters have been identified - equine (horse breeding and training) and viticulture (grape cultivation) industries. CSG activities are not allowed within these clusters.
Exclusion zones (Residential)	CSG exclusion zones prohibit new coal seam gas activity within a 2 kilometre buffer around existing and planned residential areas. These areas include 152 councils across NSW and the North West and South West Growth Centres of Sydney.
Exploration	Locating CSG resources and reserves to establish quality, quantity and producibility. The first stage of exploration is geologists identifying prospective areas in an office using desktop geological studies and geophysical surveys before they move into the field, subject to Government approvals.
Environmental Impact Statement (EIS)	Evaluating potential impacts of CSG activities on the environment. The EIS also looks at potential social and economic impacts and evaluates the cumulative effects of the project and possible alternatives.
Fracking/Fracking	See "Hydraulic Fracturing".
Gateway Process	An independent, scientific and upfront assessment of how a mining or CSG proposal may affect the agricultural values of the land on which it is proposed to be located. The process considers proposals at a very early stage, before a development application can be lodged. The Gateway Process assessment is undertaken by an independent panel of experts from fields such as agricultural science, hydrogeology, mining and petroleum.

Hydraulic Fracturing	A method of extracting natural gas from coal seams. The method has been used in Australia for around 50 years. Sand and fluid are injected from a gas well into the naturally-occurring cracks (cleats) in the coal seam. The sand remains in the cracks to prop them open to improve gas flow into the well.
Methane (CH <sub>4</sub> )	A naturally occurring and odourless gas which is the main component of natural gas in coal seams. It is not toxic and traces of CH <sub>4</sub> are in the air we breathe.
Permeability	A measure of the ability of a material (such as rocks) to transmit fluids.
Petroleum	A naturally occurring carbon-based fuel derived from dead plant or marine life trapped in sediment for millions of years beneath the earth surface. Forms of petroleum include coal seam gas and crude oil.
Petroleum (Onshore) Act 1991 (NW)	NSW legislation which regulates both exploration and production of petroleum on land.
Petroleum Assessment Lease (PAL)	Once exploration is complete and sufficient resources have been found in an area, a company may apply for an assessment lease. Assessment Lease activities include development of markets and capital for the resources or product, initial design of production and evaluation of production areas.
Petroleum Exploration Licence (PEL)	A company is given the legal right to explore a defined area for petroleum. This title is granted first and allows the company exclusive right to the area to conduct activities such as soil samples, desktop studies and in later stages taking samples and ultimately drilling.

Petroleum Production Lease (PPL)	Allows a company exclusive rights to extract the resource in the granted area. A PPL will only be granted once a company has demonstrated to the NSW Government that the resource is of benefit to the State and can be extracted safely without endangering any people, environmental/heritage areas and infrastructure.
Porosity	A measure of the void (ie, "empty") spaces in a material, and is a fraction of the volume of voids over the total volume, between 0 and 1, or as a percentage between 0 and 100%.
Produced water	Pumping groundwater from a coal seam reduces the pressure that keeps the natural gas in place. Reducing the pressure allows the gas and 'produced' groundwater to flow into the well and up to the surface. The water contained in coal seams may be brackish, salty or fresh. If necessary, the water is treated and recycled for use in industry or irrigation.
Shale gas	Is another form of natural gas occurring in shale formations. It is commonly extracted in the United States. There are no proven shale gas reserves in NSW. Shale gas is generally extracted from a clay-rich sedimentary rock which has naturally low permeability. Shale gas wells are generally a lot deeper than coal seams and require extensive hydraulic fracturing to extract the gas.
Statewide Biophysical Strategic Agricultural Land (BSAL)	Areas which have been designated by the Department of Primary Industries as being agricultural land with good soil for growing crops. Petroleum and CSG exploration may be approved on these lands based on the decision of an independent panel.

Strategic Agricultural Land	Is highly productive land that has both unique natural resource characteristics (such as soil and water resources) as well as socio-economic value (such as high productivity, infrastructure availability and access to markets.) Based on this definition, two categories of strategic agricultural land have been identified: biophysical strategic agricultural land and critical industry clusters.
Strategic Regional Land Use Policy (SRLUP)	Is a suite of initiatives designed to balance growth in the mining and CSG industries with the protection of important agricultural land and water resources.
Title	A licence issued by the Minister of Mineral Resources to grant a company exclusive rights to explore or mine minerals and petroleum within a defined area. A title (tenement) will only be granted once a company has demonstrated that the resource is a benefit to the State and can be extracted safely without endangering people, environmental/heritage areas and infrastructure.
Well	A CSG well is created by drilling through layers of earth and rock up to 1km or more below the land surface. Multiple layers of steel casing and cement are inserted through which gas can safely flow to the surface and be stored and piped.
Well casing	Multiple layers of steel and cement that are cemented to the surrounding rock to contain the gas and water produced from the well.