

Supplementary Questions

AGL Energy Ltd



- 1. Many submissions to the Inquiry have criticised the way that coal seam gas companies consult with local communities. A particular concern is the way that land access agreements are negotiated. Could you explain your community consultation processes? Do you think the standard of consultation is adequate across the industry as a whole?**

AGL has an extensive program to communicate with the various communities, local councils and regulatory authorities in which it is carrying out exploration activities. AGL regularly consults with landowners, neighbours, residents, local councils and relevant government agencies during all stages of its exploration activities for two reasons:

- to ensure that factual information is available for those who need to make informed decisions about our projects; and
- to enable AGL to factor community feedback into its decisions about the project.

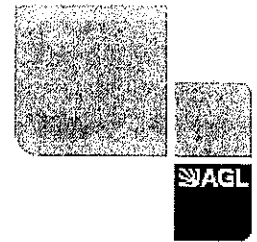
AGL's community consultation and communication activities include:

- Participation in project specific Community Consultative Committees (CCC). CCCs are made up of local community members and groups, local government and state government agencies and representatives of AGL. The purpose of CCC is to provide a forum of open discussion between AGL, government agencies and the community and to act as a channel to assist AGL in providing information about its projects to the community through the following:
 - Project newsletters and fact sheets.
 - Monthly updates in community newspapers.
 - Regular consultation with landowners and neighbours.
 - Information placed on local notice boards.
 - Consultation on exploration proposals.
 - Project specific websites.

AGL undertakes further and more detailed community consultation prior to moving into the petroleum production phase. For example, as part of the preliminary project planning for the Gloucester Gas Project:

- AGL undertook meetings with community organisations within the Project Area, including: the Rotary Club; the Barrington, Gloucester, Stroud Preservation Alliance Management Group; the Chamber of Commerce; the Gloucester Environment Group; the Gloucester Project Group; the Probus Group; the Lions Club; the NSW Farmers Association local branch; the Dairy farmers from Gloucester district; the Anglican Men's Association and members of the Town Fire Brigade.
- A Gloucester Gas Project CCC was formed voluntarily in September 2008 to provide a forum for discussion and exchange of information between the community, Government agencies and AGL.
- AGL held Information Nights at the Gloucester Country Club and Wards River Hall.

- AGL held Drop-In Sessions at the Gloucester Country Club, Stratford Hall and the Clarence Town Sport and Recreation Club.
- AGL hosted an open day at its Stratford Pilot Project in order to enable the community to visit the field under operation. The open day was successful with approximately 300 to 400 community members attending to gain a better understanding of the Gloucester Gas Project.
- In addition, AGL carried out extensive consultation with those landowners who will be potentially affected by the project.



To date consultation within the local Gloucester Community continues.

AGL recognises that communities are interested in and often concerned about petroleum exploration. For this reason, AGL supports the introduction of greater, more transparent community consultation rights in relation to the assessment of petroleum exploration; and the creation of an online register of all assessments and determinations made in relation to petroleum exploration.

2. Many submission authors have expressed concern about their interactions with coal seam gas companies, and the way that these companies have approached them for access to their land. How can the industry ensure that individual companies interact fairly and respectfully with landholders and local communities?

AGL understands that there are some concerns from the community regarding the way companies approach and interact with landowners seeking access to land. AGL has a dedicated land access and approvals team who are trained to interact with landholders and local communities in a fair and respectful manner.

AGL has adopted a corporate Code of Conduct which applies to all of AGL's activities, its directors, and all its employees and contractors and sets out a number of overarching principles of ethical behaviour.¹

AGL provides a guide to landowner's which sets out what the landowner can expect with regards to prospective AGL operations;

"We respect the importance of your land to you and your family, and we recognise that some of our exploration work may affect your normal activities and your plans. It is important we understand your situation early in discussions so that we can work with you from the start to ensure that our exploration can co-exist with your land. That's why we have a dedicated team to work one on one with landowners to guide you through the exploration process and answer your questions.

There are no one-size-fits all solutions when it comes to exploration. Each landowner has different needs and expectations and each project is different. To find the best solution to suit you, AGL will sit down with you and plan suitable times and locations for our work, to fit in and minimise our effect on your land.

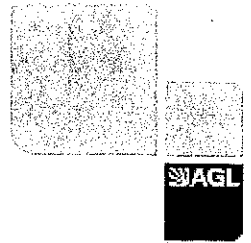
AGL undertakes to:

- Respect your privacy, property and business activities;
- Ensure our activities are well managed and cause minimal or no disruption to your daily life;
- Take the time to understand the current and future land use of the proposed area;
- Come to an agreement before any work occurs on your land;
- Keep you fully informed at each stage of the exploration work; and
- Answer any questions or concerns.

AGL is committed to helping the community understand our exploration activities

¹ A copy of the AGL Code of Conduct is attached and is also available online at <http://agl.com.au/Downloads/AGL%20Code%20of%20Conduct.pdf>

AGL strongly believes that AGL and its employees and contractors interact fairly and respectfully with landholders and local communities in negotiating access to land. AGL recognises that communities are interested in and often concerned about petroleum exploration. For this reason, AGL supports the introduction of greater, more transparent community consultation rights in relation to the assessment of petroleum exploration; and the creation of an online register of all assessments and determinations made in relation to petroleum exploration.



3. Witnesses have given evidence that it can be difficult for a landholder to negotiate an annual payment for each gas well on their property, as there is no public information on the standard payment range for a gas well. Should landholders be given guidelines on the standard payment range?

AGL does not support an approach which would see compensation based on a standard payment range contained in guidelines. This is because:

- the *Petroleum Onshore Act 1991 (NSW)* (**Petroleum Act**) gives a statutory right to compensation and contains mechanisms for this to be determined in the absence of agreement;
- the amount of compensation depends on a range of variable factors including the specific activities proposed to be carried out and their duration, the specific characteristics of the relevant property and the area of land to be utilised; and
- the amounts of payments made to individual landholders are confidential, often at the request of the relevant landholder.

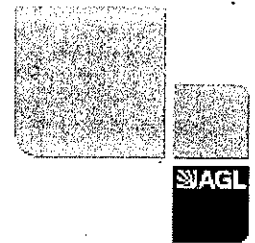
Although NSW legislation does not require AGL to cover landowner legal costs, AGL includes the provision of landholders' legal costs as part of the negotiations with landowners in order that they have access to an independent legal opinion.

It should be noted that this monetary compensation in kind work is in addition to any works in kind performed by AGL for the landowner, such as improvements to roads and gates, which is a common place element of landowner compensation.

4. Many Inquiry participants are concerned about whether there will be adequate remediation of coal gas wells and infrastructure, once a site reaches the end of its productive life. This may happen years or even decades later. What requirements are in place to ensure that appropriate remediation takes place?

Rehabilitation requirements are regulated by a number of separate mechanisms including:

- The conditions of petroleum exploration licences and the terms of approvals issued by the Department of Trade and Investment, Regional Infrastructure and Services - Minerals and Petroleum Division (**DTIRIS**) for petroleum exploration activities require petroleum explorers to carry out full rehabilitation of any land disturbed by exploration activities once the activities are complete. Compliance with these rehabilitation requirements is ensured by requirements for statutory declarations confirming compliance, regular auditing by DTIRIS, and a material financial bond which are required to be lodged with DTIRIS to cover the full estimated rehabilitation costs of activities on each petroleum exploration licences.



- The conditions of petroleum production leases also require full rehabilitation of any land disturbed by production activities once the activities are complete. Again, compliance with these rehabilitation requirements is ensured by requirements for statutory declarations confirming compliance, regular auditing by DTIRIS, and a material financial bond which are required to be lodged with DTIRIS to cover the full estimated rehabilitation costs of activities on each petroleum production lease.
- In addition, petroleum production requires separate planning approval under the *Environmental Planning and Assessment Act 1979 (EP&A Act)*. Such approvals are issued subject to detailed conditions which regulate rehabilitation requirements and standards. It is a criminal offence to fail to comply with a condition of a planning approval under the *EP&A Act*. Further, the *EP&A Act* contains open standing provisions which enable any person to commence proceedings to restrain a breach of the *EP&A Act*, including a failure to comply with a condition of an approval.
- As an illustration of this, AGL has lodged a \$5,165,000 bank guarantee in favour of the NSW Minister for Energy & Resources, to support the rehabilitation obligations for PRC 1,2,3,4,5 and 6.

5. Many submissions have suggested that there is inadequate regulation of the coal seam gas industry. What is your view of the regulatory framework, in particular the monitoring and safety requirements, and the Government's arrangements for monitoring and safety?

The coal seam gas industry is a highly regulated industry. All exploration (other than that which is very minor in impact, for example, aerial surveys) must go through a detailed assessment and determination process which includes:

- Preparation of an environmental assessment (generally via a review of environmental factors) to assess the proposal. DTIRIS is currently finalising draft Environmental Impact Assessment Guidelines which contain detailed specifications as to the high level of assessment to be included in such reviews of environmental factors, including in relation to proposed monitoring and safety measures.
- Consideration of the environmental assessment in accordance with Part 5 of the *EP&A Act* and the issue of a record of determination by DTIRIS which authorises the carrying out of the exploration activity subject to conditions.
- Obtaining all required water licences (including bore licences or water access licences for each coal seam gas exploration well) which may be issued subject to conditions requiring monitoring.

Petroleum production is regulated at an even higher level. The key approval required for a production project is planning approval under the *EP&A Act* (which, going forward will require that State significant development consent be obtained for petroleum production). Applying under the *EP&A Act* requires:

- the issue by the Director-General for Planning and Infrastructure of environmental assessment requirements which are tailored to each project and prepared after consultation with relevant agencies;
- the preparation of an environmental impact statement (**EIS**) addressing each of the environmental assessment requirements. The EIS must include details of proposed environmental safeguards, including monitoring regimes, and a quantitative risk assessment of key risks, including safety issues;

- extensive consultation with landowners, neighbours, local councils, relevant government agencies and special interest groups;
- a public exhibition and submission process;
- the preparation of formal responses to the issues raised in submission;
- independent assessment by the Planning and Assessment Commission; and
- detailed conditions regulating the manner, in which the project must be carried out in order to avoid, minimise and mitigate potential impacts on the environment.

In addition, any coal seam gas production project will also require a range of other approvals, each of which will only be issued after further consideration and assessment by the relevant government agencies including a petroleum production lease, approval under the federal *Environment, Protection, Biodiversity and Conservation Act 1999 (Cth)*, pipeline licences and water licences (including the shortly to commence aquifer interference approvals).

6. The creation of jobs in regional areas is often said to be one a key benefit of the coal seam gas industry. However Inquiry participants have expressed concern regarding the fly in fly out phenomenon, which does not create jobs in local areas. What evidence do you have regarding the contribution of the coal seam gas industry to local economies and in particular, local employment?

ACIL Tasman Pty Ltd has prepared a report entitled "the Economic significance of Coal Seam Gas in New South Wales" and dated September 2011 (**ACIL Tasman Report**). The ACIL Tasman Report was asked to address the question "What would be the effects on the New South Wales economy, employment and real wages, government revenue, greenhouse gas emissions, gas consumption and energy prices (gas and electricity) in New South Wales and throughout Eastern Australian, if there were to be no expansion of the NSW CSG production industry beyond current levels of supply?" (the **CSG Freeze Scenario**). The ACIL Tasman Report² concluded at pg 48 to 49 that:

As well as affecting long-term employment across the NSW economy, the drilling and completion of CSG wells and associated infrastructure generates a substantial number of jobs during the exploration and development period. In addition to the direct jobs generated on-site, the construction and operation phases require significant quantities of NSW sourced goods and services. Production of these inputs has further impacts on the demand for labour across the NSW economy.

...over the projection period, employment across NSW under the CSG Freeze Scenario:

- *falls by a cumulative total of 32,670 employee years compared to the Base Scenario*
 - *this is equivalent to an average of 1,361 FTE jobs each year.*

² A copy of the ACIL Tasman Report is available online at:

http://www.appea.com.au/images/stories/Policy_CSG/nsw%20csg%20stage%201%20report%20vf%2013%209%202011.pdf

AGL's own experience is best exemplified by the Camden Gas Project which has producing CSG for the Sydney region since 2001. AGL's Camden Gas Project employs approximately 70 full time employees and contractors in the area and 45% of the Project's suppliers are locally-based businesses.



7. Once a well is abandoned, what is the length of time before the metal casings and concrete located in the well, breaks down to the point where it becomes permeable by water? What factors influence this length of time?

There is no definitive answer to this question. The following explains some factors that influence the integrity of cement and steel casing over time for CSG well. It should be noted that in NSW the existing condition to Plug & Abandon under an Exploration or Production license is at a standard that exceeds other Australian States and in general most other international regulatory agencies.

Current NSW Regulations

The requirement in NSW includes:

- a. A well must not be plugged and abandoned except in accordance with the Schedule of Onshore Exploration and Production Safety Requirements.
- b. *Site Specific condition* – remove steel casing across minable coal seam and confirm with geophysical logs.
- c. All wells must be fully sealed in accordance with the DPI's "Guidelines for Borehole Sealing Requirements on Land" (EDG No.1)
- d. On completion the lease holder shall supply a report providing details on the following items:
 - Location of site
 - Termination depth of drill hole and depth to worked seam.
 - Details of drill hole diameter and casing used.
 - Gas and water makes and composition during the drilling and production test phases. The commencement of completion dates of each phase of the operation and the dates of any other significant events.
 - The estimated and actual quantities of grout used to seal the drillhole.
 - Evidence of removal of steel casing from the interval encompassing the Bulli coal seam. (This is a specific condition for AGL's Camden Gas Project)
 - A statutory declaration must be provided attesting to the accuracy of the report.

The requirement in NSW is that the well is filled with grout from the bottom of the well back to surface. The casing is then cut off, minimum 1 metre below ground level and a steel plate is welded to the top of the well, with a well identifier tag. The coordinates are surveyed and provided to the regulator.

The condition in NSW condition essentially means that the entire well is filled with cement, thus greatly reducing any potential for water cross flow or gas migration back to surface. The life of the cement which is encased would be indefinitely.

Well Construction Practices – Cementing and Casing

Portland cement is used for well cementing operations. The conditions in which Portland cements are exposed to in a well differ significantly from those encountered at ambient conditions during construction building operations.

The cement slurries designed for well cementing do not include aggregates or sand, but simply cement or cement/flyash blend, water and additives so the cement slurry and set cement can be designed specifically for the well conditions. An example would be, if you had high bottom hole temperature, you may need to add a cement retarder to ensure the cement will remain a liquid during the placement process. Comprehensive laboratory analysis is always conducted for well field conditions. The lab work would include:

- Thickening time – measures the length of time the slurry remains liquid under well conditions including pressure and temperature
- Fluid loss – measures the ability of the cement slurry to hold the water phase of the slurry under pressure and across an permeable interface
- Rheology – measures the slurry consistency and viscosity over time
- Compressive strength – measures the evolution of strength development of the cement over time under pressure at temperature
- Free water – measures the ability of cement to contain the water in the slurry

All of these measurements are done to an API (American Petroleum Institute) specification by certified laboratories. There are additional tests, but the information provided above is a typical testing regime for gas wells.

The setting and hardening of the cement occur not only if the cement/water mixture is left to stand in air, but also if it is placed in water. The set cement has very low permeability (micro-darcies) and is insoluble in water; therefore exposure to water does not destroy the hardened material. Such attributes are essential for a cement to achieve and maintain zonal isolation for many decades and beyond.

The steel tubular casing used by AGL is API certified. The casing safety factor for CSG wells is excessive due to the low pressure production from CSG wells. For example, the producing pressure from a Camden CSG well for over 95% of its life is less than 350kpa. However the casing used is generally rated between 24,000 – 32,500 kpa. Because this is over designed, and due to the fact the oxygen is not present in the tubulars during the production life of a well, corrosion cannot occur and the integrity of the casing will remain for decades if not centuries.

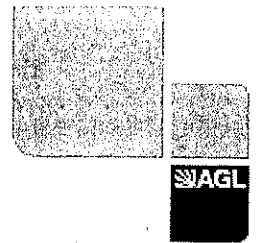
Although the water produced from CSG wells may have high salinity, the fact that oxygen is not present will not introduce corrosion. If wells experience high carbon dioxide (CO₂), then this may introduce corrosion, but CO₂ corrosion is also a function of pressure, and since CSG have minimal pressure and CO₂ is avoided when drilling, this is not an issue. If a CSG Operator wished to produce high levels of CO₂ with the methane, then special cement systems and API steel casing metallurgy resistance to CO₂ would be used.

Wells dating back many decades have confirmed that cement integrity and casing integrity has minimal degradation for wells that produced sweet gas (CSG is considered sweet gas) meaning no hydrogen sulfide or high concentrations of CO₂ and contained in the natural gas.

It is not uncommon for gas wells to produce in excess of 30 years and when the casing and cement is evaluated by geophysical logging techniques at end of life, experience has shown minimal degradation. There are numerous factors that will affect cement and casing integrity over the life of a well and beyond. They include:

- Temperature cycling
- High temperature (in excess of 110C)

- High pressure surging – cycling
- High concentration of CO₂ with pressure
- Introduction of oxygen
- Poor quality primary job
- High pressure gas channeling while the cement transitions from a liquid to a solid
- Poor casing centralization in the wellbore



Of these factors, the only factors relevant to Coal Seam Gas may be poor quality primary cement job, in other words the cement quality at the beginning of the wells life is poor or the casing has not been properly centralized, meaning the cement sheath around the diameter of the casing is compromised. CSG wells do not experience temperature cycling, high temperature (the wells are typically less than 1000metres), high pressure cycling (CSG wells are low pressure), Oxygen is not introduced and gas pressure is low so no gas channeling has been observed to date from CSG in NSW.

Summary

Although a definitive answer cannot be provided, the testing regime used for CSG cementing and the current NSW Regulations are robust and ensures that wells will be not be capable of cross flow from water or gas migration.

In addition, in NSW a new Code of Practice is currently being developed for well construction including best practice for cementing operations, this CoP will add further assurance to the practice of securing a well at the end of its life.

8.

- (a) If a moratorium was imposed on the CSG Industry and a broad scientific assessment was conducted on the industry in order to determine future viability, what would be the impact on the environment and water sources (aquifers and catchments), how long do you believe such a thorough scientific assessment would take?**

AGL does not believe a blanket moratorium on the CSG Industry pending a through scientific assessment across the whole of the State to determine future viability and impacts on the environment and water sources is either appropriate or practicable. This is because:

- The current regulatory regime (as outlined in the response to question 5 above) already requires a through scientific assessment across each relevant project area before a project is approved. This detailed assessment (which is undertaken by expert consultants and paid for by the proponent) can take up to 2 years to complete (including obtaining baseline monitoring data) for just a specific project site.

There is already extensive information available, particularly in relation to water. For example:

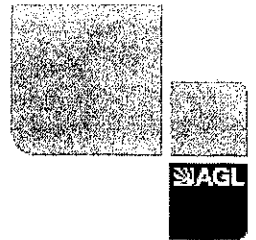
- A significant number of water studies have already been undertaken by the CSG industry and the results of these studies are either already available or will soon be available to the Government in respect of water resources and aquifer impacts/connectivity. AGL alone has published 6 studies on its website and has a further 7 reports in preparation for release in the first half of 2012.
- Substantial water resource and catchment assessments/audits have been carried out over the last decade by Government/CSIRO on stressed aquifers, catchments, allocations and long term average annual extraction limits (LTAAEL) as part of the rollout of the State's water sharing plans. CSG

produced water volumes are licensed under these water sharing plans (where applicable) and will also require licensing under the soon to be introduced Aquifer Interference Approvals which will build on this base information.



- The conditions across NSW vary from one location to another. For example, it cannot be assumed that data obtained in relation to an aquifer in one location will translate across to another aquifer. Accordingly, it would be necessary to prepare a baseline assessment of the entire state before such a study could be regarded as a "through scientific assessment" across NSW. This would necessarily require significant resourcing and take a very long time to complete.
- The dewatering volumes involved in CSG exploration and production across the Permian coal basins are very small and do not warrant major scientific assessments. For example, in the Camden Gas Project AGL's current allocation under the Greater Metropolitan Water Sharing Plan is 30ML per year. However, AGL's current usage is less than 3ML per year for the whole project. By comparison, the AGL owned vineyard in the Hunter Valley has a water allocation in excess of 200 ML per year.
- The importance of the NSW CSG industry to NSW means that imposing a moratorium on CSG for an indefinite period whilst such a study is being carried out would have significant impacts on NSW. The benefits of the NSW CSG industry have been recognised by the NSW Government in its submission to the Inquiry.
- NSW gas consumption is projected to grow significantly from its current level of around 160 Petajoules (PJ) per annum to 550PJ pa in the next 20 years. Current possible NSW CSG reserves represent over 250 years of gas supply at that level. Increased use of natural gas, including CSG, to meet an increasing proportion of future energy needs is a key component of the strategy to restart economic growth in NSW, minimise rising energy costs and the effects of climate change and facilitate the transition to a lower carbon economy.
- Currently, NSW only produces a very small percentage (approximately 6%) of its own gas demands and is heavily dependent on gas supplies from interstate, primarily from South Australia and Victoria. Evidence suggests that these sources may be depleting in the foreseeable future, therefore NSW needs to take action to maintain and increase the State's energy security whilst reducing greenhouse gas emissions.
- There are two options available to reinforce energy security by ensuring suitable future gas supplies – development of domestic NSW production and processing capacity or the construction of further transmission pipelines to access other sources such as CSG from Queensland. Industry is likely to adopt a combination of the two options.
- There are reasons to believe that CSG in NSW has a similar potential as identified in Queensland, where the industry could generate over 18,000 direct and indirect jobs, increase gross state product by over \$3 billion and provide royalty returns of over \$850 million per annum. In NSW, CSG production is currently valued at around \$34.5 million per annum, but given the current estimates of potential NSW CSG reserves are larger than total natural gas reserves for Australia, there is potential for CSG production to exceed \$1 billion per annum by 2025.
- In areas such as Gunnedah and Narrabri, the existing investment in CSG activities has led to new jobs being established, population increases and boosted the local economy. These positive developments are already being

seen from the current level of investment in the industry, and expansion is likely to see further development of this nature in a range of regions and towns across the most prospective CSG areas in the State.



- Gas, unlike most mining projects, has the potential to stimulate new industries in regional centres that could use gas as a feedstock or as a clean energy resource. These industries include fertiliser manufacturing, food processing, glass manufacturing, kiln firing and electricity generation. As a consequence, the development of a gas industry could have a much larger economic impact than the production of the gas itself.

For the reasons outlined above, AGL does not believe that a new broad scientific assessment of water resource and produced water impacts (at a catchment scale or larger across NSW) will assist communities or regulators.

AGL endorses the independent peer review and audits of CSG activities which it regards as a preferable approach to "reinventing the wheel" through broad scientific assessments of the type proposed.

(b) Does the NSW State Government have the ability to conduct such an assessment?

AGL is not in a position to form a concluded view on this issue. However, AGL notes that such a study would necessarily require significant resourcing and take a very long time to complete. Given this, in AGL's experience it is possible that the NSW State Government would, given limited resources available, have only a limited ability to undertake broad assessments.

(c) Would such a scientific assessment require Federal Government intervention or partnership to help the State Government and Industry complete an assessment?

AGL is not in a position to form a concluded view on this issue. However, AGL notes that such a study would necessarily require significant resourcing and take a very long time to complete (with the resulting economic impacts outlined above).

(d) What processes and practices does your company already put in place to assess the impact of CSG exploration drilling?

AGL (and its predecessors) have been undertaking groundwater studies across its various PELs and PPLs within NSW for more than a decade (with the first studies completed at Camden in 2001). Since 2003, site investigation programs have been developed to address local issues such as water resource impacts, connectivity of aquifers, and to establish dedicated monitoring networks.

The standard incremental and scientific approach to groundwater investigations involves desktop compilations of known geology and hydrogeological conditions (Phase 1 studies), followed by extensive site investigations (Phase 2 studies) to obtain more accurate and comprehensive data, confirm conceptual groundwater flow models, and to set up dedicated monitoring networks. Monitoring programs are then generally undertaken for a reasonable period (usually at least 12 months) so sufficient data is available to build computer models (Phase 3 studies) that can predict water level trends in different aquifers and layers as a result of different development scenarios.

AGL has spent many millions of dollars on monitoring networks for all of its production and exploration areas across NSW and has completed (or is in the

process of carrying out) substantial investigations to assess water resources impacts, establish natural trends (pre-development) and to report this information to community consultative committees (CCC) and regulators. These are all detailed investigations providing real time data (both water levels and water quality) on a local and project scale. AGL's studies have progressed beyond the stage of broad regional studies at a regional aquifer/catchment scale, so as to provide actual trend data that local communities can view and understand.



A snapshot of AGL's current groundwater activities is as follows:

- For the operating Camden Gas Project, AGL has carried out two Phase 1 (desktop) studies, has a Phase 2 (site investigation) underway, and has installed 15 groundwater monitoring locations with more planned.
- For the Hunter Gas Project, AGL has carried out two Phase 1 (desktop) studies, has completed or commenced five Phase 2 (site investigation) studies, and has installed 18 groundwater monitoring locations with more planned.
- For the approved Gloucester Gas Project (which is still in the exploratory stage), AGL has carried out two Phase 1 (desktop) studies, completed one major Phase 2 (site investigation) study and has another three site investigations ongoing, and has installed 28 groundwater monitoring locations with more planned.

In addition, AGL has been proactive in asking the relevant CCCs to commission independent peer review reports to satisfy themselves as to the investigation methods, the rigor of the site investigations and specialist testing, and to analyse the results and conclusions. This process has worked effectively in the Hunter with several peer reports completed on groundwater studies at Broke and Bulga. A similar process is now being proposed with the CCC for AGL's Gloucester project work.

All CCCs are updated on the status of groundwater investigations and the latest monitoring results. AGL is also liaising more regularly with the NSW Office of Water with two compliance reports submitted in the last 6 months, and recent meetings with staff in Parramatta and Newcastle to discuss the status of investigations, and to confirm the requirements for project Groundwater Management Plans that are to be formalised in 2012.

It is also important to note that AGL has been publishing all these reports through AGL's own project websites or via the Dept of Planning's Part 3A project information website. In addition, there have been numerous updates to CCCs across all three of our project areas, and most recently we have held the first of several public water forums in the Hunter and the first of several planned Open Days at Camden.

9. Has AGL established any partnerships with private research companies or universities to help compile and list data that would be vital for such an environmental impact assessment?

AGL has a number of relationships with specialist consultants and research facilities to collect, collate, and interpret hydrogeological data.

10. What research is AGL able to provide to a broad scale scientific assessment of the industry, if conducted?

AGL is prepared to consider any specific requests for particular data.

11. What does AGL believe is the most appropriate terms of reference that such a broad scale scientific assessment requires?

For the reasons outlined in relation to question 8(a) above, AGL does not believe a broad scale scientific assessment is appropriate or practicable.

12. If an assessment was conducted, do you believe that a broad scale assessment would represent the industry and its operations as a whole in NSW?

Different geologies across the state have different groundwater characteristics, and the beneficial uses of groundwater vary from catchment to catchment (for instance there is negligible use of groundwater in coastal catchments where rainfall and surface runoff predominates, whereas in the Murray Darling Basin, groundwater is a much more important resource even though there are still a large variations in groundwater characteristics and uses from area to area within catchments).

Given this, a broad scale assessment cannot represent groundwater systems/conditions/impacts at the local scale. Accordingly, AGL cannot see any benefits of a broad scale assessment of potential CSG developments (at catchment type scales) as communities and regulators are looking for more certainty regarding local project impacts. Broad scale assessments cannot provide any understanding or certainties at a local scale that water resources will not be impacted.

13. In relation to the number of wells:

(a) In total, how many wells has AGL drilled in NSW?

PEL2, PEL 5, and Camden Gas Project- 153 wells, PEL 4 = 7 wells, PEL 267 = 16 wells, PEL285 29 wells.

(b) How many of these were exploratory wells?

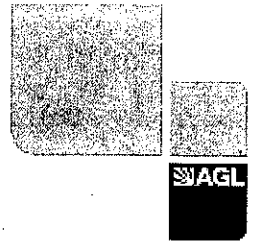
PEL 2, PEL 5, and Camden Gas Project- 12 exploration wells, All in PEL 4/267/285 exploration,

(c) How many of the exploratory wells have been capped since being drilled and how many are being used for gas production?

PEL 2, PEL 5, and Camden Gas Project - all exploration wells have been plugged and abandoned. No PEL4/267 wells have been used for production, 8 wells cased and suspended (C&S), all others plugged and abandoned, In PEL285 17 wells have been plugged and abandoned and the remaining 12 wells are currently suspended. Of the 12 wells that were used as production test wells, these wells flowed gas for approximately 6 months before being shut in and suspended.

(d) How many of these wells have been considered operational for CSG mining?

For PEL 2, PEL 5, and Camden Gas Project- no wells are considered operational as all exploration wells have been plugged and abandoned. The 8 C&S wells in PEL 4/267 could be considered for CSG production. The 12 wells that were used for production testing could be considered for CSG production in PEL 285.





(e) Was fracking used in any of the well drillings?

PEL 2, PEL 5, and Camden Gas Project – 117 wells have been fracture stimulated, 2 wells fracture stimulated in PEL 267, 12 wells in PEL 285.

(f) How many wells required fracking to access the coal seam?

AGL will drill a well to access the coal seam, AGL does not use fracture stimulation to access the coal seam. AGL uses hydraulic fracturing on its vertical well drilling programs to increase gas production from its wells. Hydraulic fracturing is a process that increases a gas well's productivity by increasing the surface area of the coal seam that is accessible from the wellbore. This access provides a pathway for CSG and water to flow.

(g) How many wells does AGL plan or have planned to drill?

AGL plans to expand the Camden Gas Project and will drill up to 6 wells from 12 separate locations (i.e. up to 72 wells). PEL 4/267 is currently unknown as exploration is still ongoing. The total number of wells will be determined by economical factors such as the size of the reserve and the reservoir characteristics that will determine the well spacing required to economically produce CSG. In the Gloucester project in PEL 285 the concept plan over the basin has 300 wells total listed. AGL is still actively exploring the area and will finalise the total number of wells as the results of the ongoing exploration are factored in.

(h) How many wells have been drilled that have now been capped?

PEL 2, PEL 5, and Camden Gas Project - all exploration wells have been plugged and abandoned (capped). 10 production wells have been plugged and abandoned (capped) at the Camden Gas Project. See question 13c.

(i) How many wells would be required to meet AGL proposed CSG operational requirements?

PEL 2 and PEL 5- see (h) above and 13(g)

14. In relation to AGL Exploration Licenses:

a) What is the total distance in kilometres² of AGL's exploration licenses?

The area of each license is:

- PEL 2- 6696km²
- PEL 4- 5076km²
- PEL 5- 400km²
- PEL 267- 4913km²
- PEL 285- 1018km²

b) How much of this area is residential and/or commercial zoned?

AGL has not, at this stage, reviewed each of the applicable environmental planning instruments, confirmed the zoning of all land subject to its petroleum exploration licences and calculated this.

- c) **Within this area, how much area/land mass consists of coal seam?**

Detailed exploration of the kind required to confirm this is not undertaken within every parcel of land which is subject to a petroleum exploration licence. It is highly probable that coal seams are located under most, if not all, of the subject land but it may not be economic or practicable to produce coal seam gas from all such coal seams.

- d) **What are the names of the coal seams?**

In the Southern Coalfield (PEL 2):

Illawarra Coal Measures (Bulli, Balgownie, Wongawilli, Upper American Creek, Lower American Creek, Tongarra, Woonona) and Clyde Coal Measures.

In the Newcastle Coal Field (PEL 5):

Griegs Creek, Hillsdale, Hobden Gully, Wylies Flat, Eyriebower, Rombo, Carramere, Alcheringa, Stafford, Abbey Green, Vales Point, Wallarah, Great Northern, Fassifern, Pilot, Hartley Hill, Australiasian, Montrose, Wave Hill, Fern Valley, Victoria Tunnel, Nobbys, Dudley, Yard, Borehole, Sandgate, Buttai, Beresfield, Donaldson, Big Ben, Buchanan, Ashtonfields, Tomago Thin, Scotch Derry, Rathluba, Morpeth

In the Hunter Coalfield (PEL 267 and PEL 4):

Homeville, Greta, Balmoral, Puxtrees, Grasstress, Brougham, Hilltop, Fleming, Hallet, Muswellbrook, St Helliers, Lewis, Loder, Lemington, Pikes Gully, Arties, Liddell, Barrett, Hebden, Wynn, Edderton, Clanricard, Bengalla, Edinglassie, Ramrod Creek, Bayswater, Broonie, Vaux, Piercefield, Mt Arthur, Warkworth, Bowfield, Arrowfield, Woodlands Hill, Glen Munro, Blakefield, Whynot, Wambo, Redbank Creek, Whybrow

In the Gloucester Basin:

(PEL 285)- Linden, Marker, JD, Bindaboo, Deards, Cloverdale, Roseville, Tereel, Fairbairns Lane, Bowens Road, Glenview, Avon, Triple, Rombo, Glen Road, Parkers Road, Valley View, Intra Mammy Johnsons, Weismantles, Clareval, Basal.

15. In relation to pipeline requirements:

- a) **For AGL future proposed/planned expansion, will it require a pipeline access for export or to a gas power plant?**

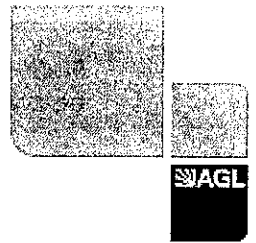
Yes.

- b) **What are the proposed pipeline routes?**

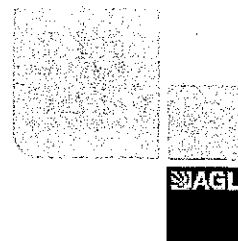
The proposed pipeline routes are determined at the project design stage and depend on a number of factors including destination, linkages with other pipelines, land access, environmental factors and constructability.

Please find attached a map showing the approved route for the pipeline to be constructed as part of the approved Gloucester Gas Project.

- c) **Do they go through any main residential and/or commercial areas?**



Please find attached a map showing the approved route for the pipeline to be constructed as part of the approved Gloucester Gas Project.



16. How many of your wells are on private property?

The total number of AGL CSG wells in NSW is 171 (suspended exploration and/or drilled for production purposes). The number of wells on private property is 121 with the remaining 50 on State or Local Government land.

17. What is the estimated royalty scheme/plan that you have arranged with land owners?

To clarify, royalties are the amount paid by the holders of petroleum production leases to the State (which owns the coal and coal seam gas) for each PJ of coal or CSG recovered. Royalties are not paid to land owners who do not own the coal or CSG under their land.

AGL has 140 successfully negotiated access and compensation agreements currently in operation with landowners. Many, if not all, include aspects specific tailored to ensure our operations are sympathetic to the landowners current and future land use plans.

AGL does not insist upon individual confidentiality agreements with landowners, although the standard form Access and Compensation ("A/C") agreement which is presented to the landowner does contain a confidentiality clause. As part of the process, this clause, along with all others, can be negotiated as to its existence, or content. It is not uncommon however for landowners to actually request confidentiality in the agreements.

AGL's current methodology for compensation consists of:

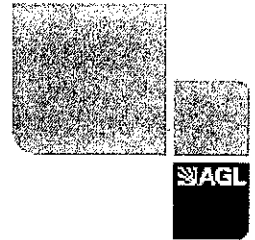
- A land valuation to provide the basis for negotiation and achieving an appropriate rate per square metre, or otherwise agreed for any land required as part of a proposed A/C Agreement. The rate per square meter is then generally applied for land which is used during the construction, commissioning and work over periods. The valuation takes into consideration existing land use.
- Adopting the rate per metre for upgraded or new access roads.
- Adopting the rate per metre for gathering lines.
- Option of leaving gathering lines on properties for farmers to use for irrigation.
- Works in kind e.g. installing new gates/fencing/cattle grids etc.
- Flexible planning of access roads to benefit the land owner.
- Flexible planning of gathering lines. We have agreed to move gathering lines to fit in with future land development if required.

(Where activities occur on Council land, AGL adopts the Council's set rate of fees, which they have adopted for standard leasing of Council land to other utilities.)

- AGL currently pays on average \$3,000 to \$5000 one off payment for short term exploration wells.
- For Production wells, total average annual compensation paid to June 2011 was \$2,382 per well.

Where activities occur on land where land values are low, an alternative approach is usually to base the compensation assessment on the impact on land use and the business, rather than land value. The amount will depend upon the disturbance or impact to the farming operation.

In summary there are many variables in establishing an appropriate compensation sum, as each individual case will be unique. The broad measures outlined above are designed to ensure a level of consistency of approach in arriving at a negotiated outcome to the satisfaction of both parties.



18. What royalties do property owners receive if they have:

- (a) 1 well on their property?**
- (b) Up to 5 wells on their property?**
- (c) 10 wells and less than 20 on their property?**
- (d) More than 20 wells on their property?**

Please refer to the response to question 17 above.

19. Have you purchased any property from a private owner to continue operations?

Yes.

20. Do you organise a legal service (law firm) that property owners can access?

No. AGL's practice is to recommend to landholders that they obtain independent legal advice. AGL's agreements contain provisions whereby AGL pays a reasonable amount towards the legal expenses incurred by property owners but AGL does not require land owners to use a legal service provider approved by AGL.

21. How many workers does AGL currently employ?

AGL employs 2082 people, total based on permanent FT/PT and max-term FT/PT employees only - Of these number, 106 people are employed with the AGL Upstream Gas division.

22. How many does it expect to employ through the expansion of its operations?

AGL's Upstream Gas Division expects to expand FT headcount by approximately 30 over the next 4 years.

23. The "precautionary principle" as understood in the community means that if an action or policy has a suspected risk of causing harm to the public or to the environment, in the absence of scientific consensus that the action or policy is harmful, the burden of proof that it is not harmful falls on those taking the action. Does AGL believe that the precautionary principle should be applied to the development of the coal seam gas industry in NSW?

The precautionary principle is enshrined in NSW legislation and is stated in 6(2) (a) of the *Protection of the Environment Administration Act 1991 (NSW)* as follows:

... if there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation.

In the application of the precautionary principle, public and private decisions should be guided by:

- (i) careful evaluation to avoid, wherever practicable, serious or irreversible damage to the environment, and*
- (ii) an assessment of the risk-weighted consequences of various options,*



The leading decision on the application of the precautionary principle is the decision of Chief Justice Preston of the NSW Land and Environment Court in *Telstra Corporation Limited v Hornsby Shire Council* [2006] NSWLEC 133 (24 March 2006). This decision stands for the following propositions:

- The precautionary principle is a mandatory relevant consideration in determining whether to grant development consent under Part 4 of the EP&A Act.
- The application of the precautionary principle and the need to take precautionary measures is triggered by the satisfaction of two conditions precedent being a threat of serious or irreversible environmental damage and scientific uncertainty as to the nature and scope of the threat of environmental damage. When both of these conditions have been satisfied, a precautionary measure should be taken but it must be proportionate to the level of the threat.
- When both conditions precedent to the precautionary principle are satisfied, there is a shift of the burden of proof. The decision-maker must assume that the threat of serious or irreversible environmental damage is no longer uncertain but is a reality, and the burden of showing that this threat does not in fact exist or is negligible effectively reverts to the proponent of the project.
- However, the shift in the burden of proof is only in relation to the question of environmental damage. The question of environmental damage is only one input into the decision making process, which is not given over-riding weight compared to other factors which must be considered.
- The precautionary principle, where triggered, does not prohibit the carrying out of a development plan, programme or project until full scientific certainty is attained. Rather, the precautionary principle permits the taking of preventative measures. The type and level of precautionary measures that will be appropriate will depend on the combined effect of the degree of seriousness and irreversibility of the threat and the degree of uncertainty. This involves assessment of risk in its usual formulation, namely the probability of the event occurring and the seriousness of the consequences should it occur.
- The more significant and the more uncertain the threat, the greater the degree of precaution required. The implementation of an adaptive management approach is one means of retaining a margin for error.

AGL believes that the precautionary principle both is and should be applied to the development of the coal seam gas industry in NSW. As outlined in the response to question 5 above, the coal seam gas industry is regulated as follows:

- Petroleum exploration requires the preparation and consideration of an environmental assessment (generally via a review of environmental factors) under Part 5 of the EP&A Act. The draft guidelines currently being finalised by DTIRIS for such environmental assessments expressly require that

environmental assessments for exploration projects include a consideration of the application of the precautionary principle to the project.

- Petroleum production requires approval under the EP&A Act, currently in the form of development consent under the State significant development provisions contained in Part 4.1 of the EP&A Act. The Telsta decision referred to above confirmed that a consent authority is required to have regard to the precautionary principle in determining whether to grant development consent under Part 4 of the EP&A Act.

By way of example, the precautionary principle was applied for the recently approved Gloucester Gas Project:

- during the environmental assessment (detailed in the EA report);
- by the Department of Planning and the Planning Assessment Commission (PAC) during their decision making process (referred to in the decision documents); and
- in the conditions of the project approval which are inherently "precautionary" in relation to groundwater (e.g., gas wells must be developed in stages, each stage must be approved by DoPI, each stage cannot progress until detailed groundwater monitoring and numerical modelling is carried out).

24. Does AGL believe that coal seam gas mining warrants its own specific legislative and regulatory framework?

The coal seam gas industry is already heavily regulated - please refer to the response to question 5 above for more information in this regard. The coal seam gas industry already has its own specific legislative and regulatory framework under the Petroleum Act.

In addition, the proposed Aquifer Interference Policy will also contain specific water licensing provisions for the coal seam gas industry. Given the heavy level of existing regulation, including coal seam gas specific regulation, AGL does not believe that the industry warrants any further specific legislative and regulatory frameworks.

As previously stated in AGL's submission to the NSW Department of Planning Coal and Gas Strategy Scoping Paper,

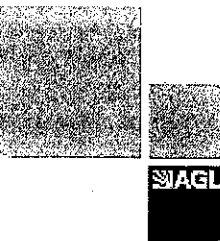
Recommendation 1: That the NSW Coal and Gas Strategy gives recognition to the distinctions between the coal and CSG industries. Further, that the NSW Coal and Gas Strategy includes separate strategies and land use policies for the CSG industry.

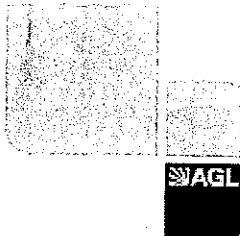
AGL notes that the Scoping Paper supports "a single strategy for both the mining and CSG industries to enable the potential interaction between the two to be properly considered and managed."

AGL strongly disagrees with this approach. Very significant distinctions between the coal industry and the CSG industry exist which outweigh the similarities. In light of these important distinctions and the resulting diverging policy considerations, separate strategies and land use policies are appropriate.

AGL acknowledges that because both the coal and the CSG industries both operate where the coal is, the two industries must exist alongside each other. However, AGL considers the CSG industry to be a far less intrusive with more flexible development than coal mining.

*The size, scale and impact of CSG extraction on local communities and the environment is far less than that of coal mining. For instance:*⁴



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1. the footprint of an individual operating CSG well can be as small as six by four metres;
 2. the location of CSG wells can be tailored and spaced to allow the primary land use to continue and avoid areas of high environmental or heritage significance; and
 3. the environmental impacts of CSG occur primarily during the temporary construction stage, rather than at the operational stage.

This contrasts dramatically with even the smallest of coal mining operations and has allowed CSG to occur even in semi-urban environments. By contrast, an open cut or underground mine has significant environmental impacts and requires a different type and scale of planning assessment and environmental management plans than would be required for a CSG project.

These differences between the coal and CSG industries reflect the very different techniques employed for CSG extraction which require different specialist inputs and regulatory responses.

The significant differences between the coal and CSG industries are reflected in the regulatory differences between the Mining Act 1992 (NSW) (**Mining Act**) under which the coal industry operates and the Petroleum (Onshore) Act 1991 (NSW) (**Petroleum Act**) under which the CSG industry operates. The differences are noted in the Scoping Paper which correctly recognises that, whilst potential land use conflicts are an issue for both industries (and, indeed, all other industries), separate issues arise in relation to coal mining as opposed to CSG and the concerns held by the community differ between the two industries.

AGL believes that the development of a separate CSG strategy and land use policy would:

1. enable a more tailored approach to the specific issues, including community concerns, relating to CSG industry;
2. meet the needs of both industries more effectively by avoiding an inappropriate "one-size-fits-all" approach; and
3. still enable sufficient integration between the coal and CSG industries to address concerns about the cumulative impacts and the operational issues associated with overlapping mining and petroleum titles.

The NSW system for overlapping tenures is relatively unstructured compared to the very structured and prescriptive system for overlapping tenures in Queensland. AGL notes that the Queensland Government is currently reviewing its regime, after several years of operational experience, to manage interaction between different tenures more effectively, including coal mining, CSG, underground coal gasification, geothermal and carbon capture and storage.

AGL suggests that the NSW Coal and Gas Strategy evaluate the need for development of a more structured overlapping title regime in NSW, perhaps through a trigger where parties cannot agree. This would have the benefit of ensuring that all title holders are provided with an incentive to negotiate co-development agreements or cooperation agreements in areas of overlapping tenure and encouraging cooperation to develop resources sensitively and sustainably for the benefit of communities and the State.