Senate Select Committee into Agriculture and Related Industries

Inquiry into Food Production

Santos Submission

1. INTRODUCTION

Santos' operations in Queensland, the Cooper Basin and Victoria show that agriculture and gas extraction can co-exist successfully.

Santos' business planning in the Gunnedah Basin is based on a conviction that Australia's abundant natural gas resources, combined with reliable gas-fired power generation technology, places Australia in an enviable position to maintain long-term, clean energy security. Energy security and food security are inextricably linked, and this link will become more pronounced in future.

Food security is defined as *...when all people, at all times, have physical, social, and economic access to sufficient, safe, and nutritious food to meet their dietary needs and food preferences for an active and healthy life.*[1] It is recognized that Australian agriculture has a major role in providing for the world.

Energy security is defined as…*adequate, reliable and affordable supply of energy to support the functioning of the economy and social development.*[2] At present some 1 in 2 people around the globe have no access to electricity. Natural gas is one answer to providing that energy while minimising the carbon emissions from generating it.

Just as Australia can be a major supplier in achieving global food security, natural gas means Australia potentially can be an energy powerhouse, providing safe and cleaner energy security to the Asia Pacific region.

Energy security has been a major competitive advantage for Australia, and a key to our economic development and prosperity.

Using natural gas to generate electricity is a key transition strategy that can deliver significant reductions in Australia's CO2 emissions from stationary energy whilst ensuring energy security for Australian's economic well being. Gas can fuel peak, shoulder and baseload capacity. A proven and established technology, combined cycle generating turbine (CCGT) plants emit some 60% less CO2 emissions and uses less than one third of the water needed by coal fired baseload generators while generating competitively priced energy.

Energy is a key input to food production in Australia, making up 7.6% of inputs into total broadacre farm costs[3], and is an essential consideration when investigating questions relating to the future production of food that is affordable to consumers, viable for production by farmers and of sustainable impact to the environment.

Issues that were traditionally excluded from the agricultural production chain must now be included. They include:

- Supply chain efficiencies relating to production within the agricultural industry.
- Supply chain efficiencies relating to the processing, distribution, retailing and export of agricultural products by associated industries.

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[1] http://www.ausaid.gov.au/keyaid/food_security.cfm, accessed 30 August 2009

[2] http://www.ret.gov.au/energy/Documents/Energy%20Security/National-Energy-Security-Assessment-2009.pdf, pg 5

[3] http://www.abare.gov.au/publications_html/ins/insights_09/a6.pdf, pg 7

- Effects of energy prices on agribusiness and associated industries.
- The importance of energy efficient public and private infrastructure for agribusiness and associated industries.

The Select Committee's focus on the impact of mining on prime agricultural land - with particular concern for the Liverpool Plains area of NSW – is understood by Santos to include the extraction of gas.

2. ENERGY AND FOOD PRODUCTION

2.1 ENERGY AND FINANCIALLY VIABLE FOOD PRODUCTION

The agriculture sector's demand for energy is forecast to increase by 1.1% annually between now and 2030, and demand for energy in the associated transport and storage sectors is expected to increase by 1.3% during the same period.

Climate change has been identified as a major external force affecting Australian food production, resulting in increasing global competition for land, water and energy resources. Shifts in any of these three factors may result in areas losing traditional competitive advantages.[4]

The introduction of the Carbon Pollution Reduction Scheme (CPRS) will impact agriculture (even while exempted) via associated transport and processing sectors. By 2015, it has been estimated that the CPRS will push total average farm receipts down by 0.9% due to the increased price of electricity, fuel, freight and cost of emissions.[5] The true decrease depends on how much of their carbon costs the processing sector is able to pass through to the agriculture sector.[6] Meanwhile, increased demand for energy from the agriculture sector, coupled with the increased costs associated with the CPRS, mean that affordable energy is essential for financially viable food production in Australia.

A transition to gas-fired power generation would impact existing average retail electricity prices modestly, while at the same time locking in significant carbon savings. Further information is available in Santos' *2009 Energy White Paper – Public Submission*. (Appendix 1) The increasing proportion of coal-seam gas used for electricity generation in the eastern states reflects a shift towards gas as a fuel for electricity generation[7], which can be attributed to its cost and lower carbon emissions.

Of all lower-emissions options, gas-fired electricity generation enables both reliable base load power generation (essential for agriculture and associated sectors) as well as supporting reliable integration of intermittent renewables – such as wind - into mainstream power supplies.[8]

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[4] http://www.daff.gov.au/__data/assets/pdf_file/0003/680745/foodstats2007.pdf, pg 21
[5] http://www.abare.gov.au/publications_html/ins/insights_09/a6.pdf, pg 12
[6] http://www.abare.gov.au/publications_html/ins/insights_09/a6.pdf, pg 12
[7] http://www.abareconomics.com/interactive/09ac_mar/htm/gas.htm
[8] *STO Energy White Paper*, pp 15, 19

In NSW, energy demand is forecast to increase from current use of 75,000 GWh (approx) to 86,000 (approx) GWh by 2018. Global and local growth trends indicate that multiple uses of land, rather than quarantining, are the most logical response to increased demand for food and energy. This is particularly true when both can be provided from the same land.

Coal seam gas has an important contribution to make to financially viable food production by ensuring both lower carbon emissions and future energy security for NSW.

2.2 ENERGY AND AFFORDABLE FOOD

An increasing focus on supply chain costs in the grocery retail market has placed a greater onus on suppliers to balance supply and demand.[9] One solution proposed is increased collaboration between suppliers and management of supply chain information.[10]

Supply chain information, in the form of major drivers of prices and costs in agrifood products, becomes more complex as products move through the supply chain towards the retail end point. The more refined the product is, the more complex its price becomes. The seven identified price drivers – farm production factors, value chain integration, marketing, regulation and compliance, export, technology and innovation[11] – all require reliable, affordable energy to add value to products.

Finally, the existing food chain safety and security system is critically interdependent on transport, water and energy to maintain its integrity and productive capacity. This includes the chain's ability to respond satisfactorily to natural and accidental threats, as well as deliberate attack.[12] A reliable and affordable energy supply plays a key role in ensuring domestic food security.

The industry-wide cause and effect impacts of changes in even one part of the supply chain – for example, refrigeration – show that a reliable energy supply is an essential component of an affordable food chain.

2.3 ENERGY FOR ENVIRONMENTALLY SUSTAINABLE FOOD PRODUCTION

For Santos, sustainability is a way of doing business that improves outcomes for employees, shareholders, business partners and the communities in which we operate. Put simply, sustainability means doing the right thing.[13] Santos has a commitment to lighten our environmental footprint.

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[9] http://www.abareconomics.com/interactive/Outlook08/files/day_1/Spencer_Food.pdf, pg 5
[10] http://www.abareconomics.com/interactive/Outlook08/files/day_1/Spencer_Food.pdf, pg 6
[11] http://www.daff.gov.au/__data/assets/pdf_file/0007/182455/section2.pdf, pg 16
[12] http://www.daff.gov.au/__data/assets/pdf_file/0004/183325/enhancing_safety_security_strategy.pdf, pg 2
[13] STO Sustainabilty Report 2008 http://www.santos.com/sustainability-at-santos.aspx

Nationally, environmental sustainability is focussed on mitigating the effects of climate change by reducing carbon outputs across all industries, and working with the global community to formulate an effective and equitable response.[14] The role of CSG in reducing greenhouse emissions has been discussed, however it also has an important part to play in the preservation of water resources.

Agriculture is estimated to use 12 000 gigalitres of water a year, or 66%, making it Australia's highest water use sector.[15] Combined, the electricity and gas sectors use 1330 gigalitres, or 7.4%, of all water.

Switching to gas-generated electricity would reduce water use in the electricity generation sector by up to one third, freeing up water for agricultural and other uses. Reducing water use in the electricity generation supply chain would also reduce a key vulnerability of Australia's energy security.

GAS EXTRACTION AND SURFICIAL WATER

Santos' proposed surface water management systems for associated water (as described in the EIS for our Gladstone LNG [GLNG®] project) have been designed to:

- Contain all associated water and prevent escape of salts to any surface water by any route
- Provide water for beneficial uses back to the community with a priority on the supply of water for the irrigation of crops, including leucaena, lucerne, grain crops

Santos will work with farmers to enable them to use the water that will be provided as a result of its activities for production. This extends to our appraisal activities as well.

GAS EXTRACTION AND GROUNDWATER

The production of coal seam gas (CSG) involves the extraction and treatment of large quantities of water from deep coal seams (of between 200 and 1000m below the surface). Santos is committed to ensuring that the water produced is put to safe and productive use, just as Santos is committed to ensuring groundwater resources are protected.

As outlined in the EIS for the GLNG project[16], Santos will comply with the requirements of the Environment Protection Act, Integrated Planning Act, and the Petroleum Act (Queensland) to manage and protect the groundwater resources in the following ways:

- Alluvial aquifers are protected by Santos' well design, which ensures that they are isolated behind a single or double layer of pressure cemented steel casing, preventing cross-flow between aquifers. Refer to the attached factsheet *Exploration Drilling and Core Hole Design* for a basic well design, which is adapted to suit the geological features of individual core holes.

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[14] http://www.climatechange.gov.au/index.html
[15] http://www.daff.gov.au/__data/assets/pdf_file/0003/680745/foodstats2007.pdf, pg 27
[16] GLNG EIS documents available at www.santos.com

- Aquifers below the alluvial levels are protected during drilling by well-control techniques - the use of biodegradable drilling additives and loss-control materials. At the completion of drilling, the well is pressure cemented from base to surface, ensuring that no communication between geological formations is possible.

Groundwater management

- Santos' approach to groundwater impact assessment and management is to understand the nature and potential magnitude of groundwater impacts first, then develop monitoring programmes that enhance our understanding and improve our management approach
- Whereas groundwater models are typically used to provide advance estimates of impacts, it is well designed and managed monitoring that should be used to ensure the correct management and protection of the groundwater resource (see below)
- For example, Santos has committed in the EIS for the GLNG project, to provide adaptive groundwater management based on close monitoring that, among other objectives, will ensure Santos and the regulators are informed about potential impacts long before they occur.

Groundwater monitoring

- As part of its exploration activities, Santos is conducting comprehensive groundwater and surface water monitoring.
- For the GLNG project in Queensland, a project-wide water monitoring strategy has been developed that guides the development of detailed water monitoring plans for each of the fields
- Monitoring and sampling is performed by trained environmental scientists, dedicated to this role
- An environmental data management plan has been developed for all CSG environmental monitoring activities
- Santos has committed to providing public access to key monitoring data, in particular regional trends of water levels and water quality
- All Santos' Australian soil and water sampling is done by ALS Laboratory Group (a National Association of Testing Authorities [NATA] certified laboratory company).

The smaller footprint of gas exploration, pilot testing and production comparative to other resource exploration means that it can co-exist with other primary industries such as agriculture.

Since arriving in the Gunnedah Basin, Santos has committed to being available to farmers to answer questions and address concerns raised. There has been active engagement through information sessions, briefings and updates including:

- Agquip (1500+ inquiries)
- Thirteen community briefings
- Presented to a range of community groups
- Participating in Namoi Water Study

- Regular engagement with landholders

Concerns about the environmental impacts of the Gunnedah Basin exploration drilling program have been submitted to the Select Committee and these concerns are dealt with in Appendix 2, which explains the testing protocols used at Santos' NSW sites.

Please also find attached the results from a water sample that was taken as a control sample during a site visit for community members to an exploration drilling site. We understand that the committee was presented a sample of water by a community member that was supposedly taken on the same site visit.

3. CONCLUSION

Santos' operations in the Cooper Basin, Queensland and Victoria show that agriculture and gas extraction can co-exist successfully. As the global population increases, multiple uses of land, rather than quarantining, are the best response to increased demand for food and energy. This is particularly true when both can be provided from the same land.

APPENDIX 1 – ENERGY WHITE PAPER PUBLIC SUBMISSION (Separate attachment)

APPENDIX 2 – ENVIRONMENTAL TESTING PROTOCOLS

Santos undertakes all operations in line with current Industry best practice guidelines and relevant legislative requirements. NSW legislation does not specifically cover management of drilling fluids however it does provide classification guidelines which class the waste as liquid.

If the fluids are not analysed in accordance with the guidelines then the waste need to be disposed of to a licensed facility. In the case the analysis demonstrates that waste can be disposed of through another method, such as landfill or beneficial reuse, other options can be investigated. Santos drilling wastes are analysed in NATA accredited laboratories using recognised laboratory standards.

An independent review of sump analysis and Material Safety Data Sheets (MSDS) has indicated that drilling fluid additives in the volumes and concentrations used by Santos pose no environmental threat or impact to food production. While Santos recognises there is no threat to the environment in the quantities produced, Santos currently disposes of these fluids at an EPA licensed facilities.

Drilling Fluids and Cuttings

Generally fluid volumes removed from the site are approximately 30,000 litres and metres cubed of cuttings. Cuttings are the subsurface material brought to the surface during the drilling process. Drilling fluids are made up of raw water mixed with additives to aid the drilling process through preventing clays from swelling, help with well control, control fluid losses and aid core recovery. Standard operating procedures would see the fluids in the sumps naturally evaporated in-situ, then the remaining constituents buried in the sump and the site rehabilitated.

References/Guidelines

In Australia the APPEA Code of Practice covers petroleum exploration and how the industry manages potential impacts to the environment. This code provides best practice guidance for Petroleum Industry operations (including drilling). Currently this is the only specific guideline in Australia that covers drilling wastes.

In Canada where there is a greater experience with the gas industry, drilling wastes are dealt with using specific guidelines - the Alberta Energy and Utilities Board (EUB) Drilling Waste Management Directive 050. This technique is similar to the methodology used in Australia where liquids are removed through evaporation or to a licensed facility. The remaining cuttings are then mixed with subsurface material and left in situ using that is scientifically proven. This same methodology was also adopted by the New Zealand regional council of Taranaki for drilling operations.

NSW regulations states that waste must be classified under the *Protection of the Environment Operations Act 1997* which has guidelines for classifying waste. Currently the waste is classified as liquid waste and must be removed to a licensed facility. Santos is currently removing the liquid portion of its waste to an EPA licensed facility.

Laboratory Analysis
NATA is a peak authority in Australia for accreditation of conducting tests, calibrations and measurements. Santos uses Australian Laboratory Services (ALS), a NATA Accredited laboratory, for sample analysis.

Laboratory testing of samples is strictly controlled under sampling methodology governed by Australian Standards. When the analysis of sump contents samples are undertaken these strict sampling guidelines are adhered to including documented Chain of Custody, bottle selection and sterilization and timing of delivery to the laboratory. A specified number of bottles for each sample are also required to correctly determine sample constituents.

Drilling Fluid Additives
The following drilling fluid additives are relevant for the Gunnedah drilling operations:

- Potassium Chloride (KCl)- used to prevent clay hydration and clay swelling. (KCl is also a common fertilizer)
- CR-650 and JK 261 – synthetic polymers used to aid core recovery.
- Fracseal- used to control fluid loss in shales and unconsolidated formations

Drilling fluid constituents will biodegrade into the soil resulting in no detrimental impacts to the environment or on food production. A review of the MSDS's used in the drilling process for production of drilling muds makes the following summary:

- KCl is a salt and soluble in water. Impacts from the use of this product may result in increased localized salinity around unlined sumps.
- There will be no detrimental impacts from the use of additives, CR-650 and JK-261 which will naturally biodegrade into the surrounding soils. Biodegradation takes two weeks under aerobic conditions and four weeks under anaerobic conditions.
- JK 261 is recognized by the US EPA as a product that can be used when drilling near potable water.
- Fracseal is not soluble in water therefore groundwater impacts are not expected from use of this product and it will biodegrade into the soil over time.

Sump Analysis
Analysis of Santos' drilling sumps has indicated that potential contaminants pose negligible threat to the wider issue of food production in the Gunnedah Basin. Potential environmental impacts could only occur if sump contents were to enter water ways. In reviewing the sump analysis the following points are provided:

- Water/Soil Analysis demonstrates that concentrations of metals are elevated at some sites however not to levels that would be toxic to the environment.
- As expected levels of salts are high. While the salts are high, the volumes used are considered quite low therefore do not pose a threat to the environment
- Hydrocarbons are found in small quantities in the sumps' contents. Again in the quantities found they do not pose a threat in these levels.

To determine any hydrocarbon 'fingerprint' a large sample is required in specifically coloured and treated bottles to protect the sample from breaking down and becoming unusable. These samples require analysis through a Gas Chromatograph

In the absence of background soil information in the Liverpool Plains area the NEPM *National Environment Protection (Assessment of Site Contamination) Measure (NEPM) 1999* can be used as a reference guideline. The analysis of samples from drilling sumps taken to date, demonstrate that there is no environmental impact from drilling wastes in the quantities produced.

How Santos deals with drilling wastes
While Santos recognises that there will be minimal environmental impacts from drilling wastes either removed from sites or rehabilitated *in situ*, Santos chooses to remove the fluids and cuttings from site to a licensed facility.

In all areas, sumps are imperviously lined. Once the drilling program is completed the liners and cuttings are removed. In areas not subjected to flooding as the Liverpool Plains, cuttings can be left in sumps and rehabilitated by mixing with the subsoil then covered with pre-existing topsoil stockpiled before site preparation.   However, since August this year Santos has sent all cuttings to licensed facilities for disposal.