



CSG Impacts

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Coal Seam Gas: A Summary of Impacts

This document provides a summary of the impacts of coal seam gas. Further information and links are available through the Stop CSG! Sutherland website www.stop-csg-sutherland.org/.

Threats to Water

Mining coal seam gas (CSG) draws contaminated water out of the ground and damages aquifers that we rely on for our drinking water; and fracking uses and directly contaminates large quantities of fresh water.

Coal seams contain water as well as methane gas. So to mine the methane, water has to be drawn out of the coal seam. This *produced water* is contaminated – it is usually high in salt and can contain toxic and radioactive compounds as well as heavy metals. Further, research shows the concentration of methane in the water can be so high that the water becomes flammable. Indeed, an article in the 2011 Proceedings of the National Academy of Sciences in the United States of America recognised that it can reach concentrations that pose a potential explosion hazard.

Hydraulic fracturing or *fracking* is a stimulation process used in CSG mining. It involves the high-pressure injection of large volumes of water (containing sand and chemicals) into the ground to fracture coal. This expands cracks in the coal seams through which the gas can flow.

The CSG industry says a single well takes more than 11 million litres of water to fracture. With 40,000 CSG wells proposed in Queensland alone, and estimates that 80% of wells will be fracked, CSG mining will be an enormous user of freshwater reserves.

Reports also reveal that more than 750 different chemicals and compounds are known to have been used in fracking; most of these are not disclosed by the CSG industry. In Australia there is no requirement for CSG companies to say what compounds will be added, and the Australian Petroleum Production and Exploration Association lists only 20 of the chemicals in use in Australia.

However, contamination cases provide some information about what is in the fracking fluid. For example, this year the Queensland government found the toxic chemicals benzene, toluene and xylene in 14 CSG wells run by Arrow Energy.

Much of this fracking fluid is released into the environment during stimulation. Duke University research found the recovery of fracking fluids varies – it discovered that 20% to 85% of contaminated fracking fluids are not recovered.

Combined, produced water and the recovered drilling fluids amount to enormous quantities of contaminated water that must be managed. Vegetation and surface and ground water are at real risk of being contaminated. The National Water Commission estimates that the Australian CSG industry will extract about 7500 gigalitres (or 7500 billion litres) of co-produced water from underground systems over the next 25 years. To put this in perspective, that's more than 13 times the capacity of Sydney Harbour.

Furthermore, when water is drawn out of coal seams, it reduces water levels in surrounding groundwater systems. These changes in groundwater quantity reduce fresh water supplies and can damage ecosystems.

Potential will always remain for contamination of aquifers. Not yet widely appreciated and rarely mentioned is the fact that abandoned exploration and production wells (working life of 10 to 20 years) are an ongoing threat – a ticking time bomb for our water supplies. No well-casing or concrete will last forever. No company will monitor and repair wells into the indefinite future. Failure of the concrete exposes the steel casing to ground water which will corrode the steel that is otherwise the last barrier preventing movement of water between aquifers and between surface water and lower aquifers. Good water could become contaminated with bad water. If there is residual gas, or if it's an old exploration well not taken further, failure of the plug will allow methane to escape into the atmosphere. In questioning by Senator Heffernan at the Senate inquiry, the industry has admitted that, no matter how good the engineering, these potentials remain.

Threats to Climate

Methane has a global warming potential 72 – 105 times that of carbon dioxide over a 20 year period. (NASA research suggests the green house impact of methane is significantly higher than accepted by the Intergovernmental Panel on Climate Change in 2007.)

Recent research suggests the greenhouse gas benefit of gas relative to coal is undermined by fugitive emissions of methane. Indeed, when it comes to global warming, coal seam gas is worse than coal, over a 20 year period. Support for the CSG industry flies in the face of government commitments to reduce greenhouse gas emissions. NSW should be leading the renewables way, not tagging meekly along behind the fossil fuel industry. Renewables are a cheap alternative when environmental costs are factored in.

Threats to Agriculture and Landscapes

When CSG mining is in full swing, well-heads will be 400 to 900 metres apart. This above ground industrialisation will entail massive land clearing for the well pads and the roads and pipes that will criss-cross farming lands; tanks and/or storage ponds will accompany each well-head. The visual impact will be devastating.

In addition, there is the risk of spillage or deliberate and inappropriate management of the produced water. AGL Energy has already exposed its intentions by dumping hundreds of thousands of litres of contaminated water onto agricultural land rather than trucking it away for treatment.

Such foul treatment of lands reduces property values and impacts on tourism. And in a world where food production is becoming increasingly important, CSG mining will reduce productivity and leave contaminated water and soils for many years beyond its short-term activity and minimal, transient employment opportunities.

De-watering and fracking processes can trigger subsidence and, potentially, mini-earthquakes. Fugitive methane emissions can increase the risk of fire.

Threats to Biodiversity

Preliminary findings of the NSW Scientific Committee recommend listing the Upland Swamps of the Woronora Plateau as an Endangered Ecological Community. The swamps are key habitat for 12 of the region's most threatened animal species. The threat posed by CSG mining is explicitly recognised by the Scientific Committee, described as having impacts similar to longwall coal mining.

The Southern Sydney Metropolitan Catchment Management Authority (SMCMA) areas contain some of the region's most pristine parcels of native bushland, and these areas are home to some 80 threatened fauna and flora species. Several vegetation communities have been recognised as endangered ecological communities (EECs) under the Threatened Species Conservation Act 1995.

Threats to Human Health

Noise, chemicals released by the mining processes, fine particulates, intrusion onto one's land and into one's community, and variable remunerations, and uncertainty all have adverse effects on the physical and mental health of individuals and communities. Helplessness in the face of an industry steam-rolling its way across landscapes and through communities generates stress, divides communities and reduces social cohesion.

Quick Facts

- CSG mining exploration has been approved in the Sydney Catchment Authority (SCA) Special Areas, threatening the supply of high quality drinking water for

more than 5 million people. If production follows, fracking or similar stimulation techniques will almost certainly be used.

- AGL used fracking in its operations at Camden and it plans to use it in the future.
- Mining might also be possible under Engadine and throughout the Sutherland Shire. AGL wants to expand its Camden project into nearby suburban Sydney.
- Subsidence is a concern for Campbelltown City Council, the National Water Commission and the Sydney Catchment Authority. Subsidence would lower water quality and quantity, and it is made more likely by the existing damage in the region to the Waratah Rivulet and the Cataract and Georges Rivers. The existing subsidence 'stress' will take years to dissipate. Anything that increases that stress (e.g. de-watering or fracking) must be avoided.

A Full Investigation

CSG mining threatens catchments, human health, prime agricultural, high conservation value land, important ecosystems and habitats with land clearing, produced water spillage and leakage, aquifer contamination and draw-down, fracking chemicals, de-watering and fracking-triggered subsidence, mini-earthquakes, and fugitive methane emissions risking fires and compounding climate change. Yet research into the impacts of CSG – particularly in an Australian context – is very limited. CSG mining has been given the green light by state governments, but its full impacts are still unknown.

The CSG industry has a record of accidents, failure, obfuscation and denial that have had negative impacts on communities. Damage has already been caused in the Sydney Catchment Authority Special Areas by mining. Further risk is not appropriate or acceptable. The Precautionary Principle of Ecologically Sustainable Development should be applied, as provided for by The Environmental Planning and Assessment Act 1979 (NSW). That is, coal seam gas mining should be excluded from these key areas in the interest of water and food security, conservation and biodiversity. We need an immediate moratorium and a Royal Commission into all aspects of the industry.

*This Summary was prepared by **Phil Smith** and **Tony Markham**, Stop CSG Sutherland. It is based on research by **Jess Moore** & **Chris Williams**, Stop CSG Illawarra (www.stop-csg-illawarra.org/), and material prepared by **Peter Turner**, Northern Illawarra Sustainability Alliance (www.n-i-s-a.org/), for the submission to the NSW Upper House Enquiry into coal seam gas on behalf of 18 community groups.*

Link to Stop CSG Illawarra submission:

www.parliament.nsw.gov.au/Prod/parlment/committee.nsf/0/9764FB0822C0ADC4CA25791B0013961A

Link to the submission supported by 18 groups:

www.parliament.nsw.gov.au/Prod/parlment/committee.nsf/0/D09ECAA5E441E887CA257924007AA666

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