New South Wales coal seam gas research projects: Update summary

This fact sheet provides a progress summary of research by the CSIRO's Gas Industry Social and Environmental Research Alliance (GISERA) in regional NSW. GISERA research aims to inform community, industry, and government of the opportunities and challenges of the onshore gas industry.

GISERA is a research alliance operated by the CSIRO. In 2015, it expanded its social and environmental research focus to NSW. The NSW program currently includes nine projects approved for this region. This document provides a summary of research outputs to date.

Greenhouse gas and air quality

Regional methane emissions in NSW CSG basins:

This project aims to identify and quantify methane emission sources such as coal seam gas (CSG) infrastructure, feedlots, coal mining, and legacy bore holes in the Pilliga region. The outcome of this research is a detailed baseline of the existing methane levels before possible expansion of gas extraction. These surveys, combined with earlier surveys from 2014 to 2016, have shown ambient methane concentrations mostly similar to background concentrations observed in pristine areas with no sources of human-generated methane. The report showed multiple sources of methane from a range of human activities. Overall the methane fluxes from CSG infrastructure were low, consistent with the Commonwealth's National Greenhouse Gas Inventory.

A trial has been completed to evaluate new satellite technology to determine if it's capable of identifying and locating methane sources across broad areas. A final report which includes evaluation of the data acquired from the satellite and verification of the results with the ground survey will be available by late 2017.

Major sources of methane

Source	Approximate emission in kg per day	Notes
1 Underground coal mining operation	12, 960	About the same amount of methane produced by 150,000 Narrabri cows (2.7% of the total herd in NSW). This emission rate is taken from company's publically available documents.
3 Open cut mining operations	range from 229 – 516	This emission rate is taken from company's publically available documents.
Livestock	7,320	Emissions estimated from Narrabri cattle and sheep numbers in 2010[1,2] using published per-head emission levels.
Landfill	405	From a single medium sized landfill in the Narrabri region.
CSG wells (excluding other gas infrastructure)	279	No CSG wells were measured in this project; however well emissions data are available from other CSIRO research.
		The assumptions used for this emission rate were; 72 gas producing wells in the survey area around the Pilliga gas fields, average emission rate of 3.9 kg day per well from the 2017 CSIRO study conducted on CSG wells in the Pilliga region on behalf of the NSW EPA.
Waste water treatment plant	40	Narrabri waste water treatment plant

1 Navarro, J., Bryan, B.A., Marinoni, O., Eady, S., & Halog, A. (2016). Mapping agriculture's impact by combining farm management handbooks, life-cycle assessment and search engine science. Environmental Modelling & Software, 80, 54-65

2 Eady, S.J., Havard, G., Bray, S.G., Holmes, W., & Navarro, J. (2016). Down scaling to regional assessment of greenhouse gas emissions to enable consistency in accounting for emissions reduction projects and national inventory accounts for northern beef production in Australia. The Rangeland Journal, 38, 219

Surface and groundwater

Impacts of CSG depressurisation on the Great Artesian Basin (GAB) flux: This research aims to improve the understanding of the GAB groundwater flow in the Pilliga region through integrating existing information from models, hydrochemical data and environmental tracers. The research will allow the assessment of changes in GAB groundwater flux (flow volumes) as a result of CSG development using state-of-the-art uncertainty analysis and modelling.

This project uses a groundwater model to simulate potential changes in the Pilliga Sandstone aquifer of the GAB caused by CSG development through the proposed Narrabri Gas Project. This work focusses on impacts to the groundwater resource as a whole, with the model simulating two scenarios corresponding to CSG development and no-CSG development. It aims to quantify the probability of changed flux from the Pilliga Sandstone aquifer toward the coal seams due to CSG development over a 120-year simulation period. The project also aims to improve the conceptual understanding of the groundwater system, including GAB recharge in the region, by the measurement and analysis of environmental tracer and hydrochemistry data.

The next phase of this project is to refine the groundwater models and refine the estimation of probability around potential impacts underpinned by latest datasets. This project is due for completion in mid 2018.

Spatial design of groundwater monitoring network in the Narrabri Gas Project area: This research aims to provide early detection of groundwater changes in the region by analysing and designing optimal groundwater bore networks for groundwater monitoring. The project is developing an optimal spatial design of groundwater monitoring networks to improve confidence around predicted groundwater impacts. It is expected to finish in late 2018.

Improving the representation of the impact of CSG in groundwater models: This research is developing more representative models to estimate groundwater impacts from CSG well fields. This will improve the prediction of potential groundwater impacts by ensuring accurate representation of the effects of CSG production, such as pressure changes in aquifers, in the groundwater models being developed for the Namoi region. This project is expected to finish in late 2018.

Groundwater contamination risk assessment: This research assesses the likelihood of groundwater contamination from hydraulic fracturing and wellbore damage. In NSW the research will focus in wellbore damage. This will produce a risk estimate of groundwater contamination at a basin/sub-basin scale. This will help management plans and strategies to reduce the risk of surface and groundwater contamination, and provide communities a better understanding of potential impacts to local water resources. Studies are being conducted in the in Surat and Gunnedah basins. A report outlining the findings of this project is due in late 2017.

CSG well

Social and economic

Social baseline assessment of the Narrabri region of NSW in relation to CSG development: This project aims to understand and measure attitudes, perceptions and expectations that exist in the community with respect to current levels of community wellbeing, community resilience and development of CSG. It is conducted over four phases, the first of which was a planning phase.

A Phase 2 report has been delivered which aimed to understand and document community values, perceptions, concerns, and expectations of the CSG sector in the context of the proposed Narrabri Gas project. Using interviews, this stage of the research also identified the factors underlying trust and attitudes towards CSG development.

Phase 3 of the research establishes quantitative baseline measures of community wellbeing, community resilience and adaptation, and expected future wellbeing in the context of a proposed CSG development in the Narrabri shire of NSW. In addition it measures and documents local attitudes and perceptions of CSG development and the CSG sector. The report will document the findings of a telephone survey of 400 randomly selected residents from the Narrabri shire, and is expected by late 2017.

Site tour

Aerial photo of Narrabri

Phase 4 of the research will involve feedback of the findings to community stakeholders and identify opportunities for collaborative action to maintain and enhance community wellbeing and resilience, regardless of whether or not the CSG development proceeds.

Analysing economic and demographic trajectories in NSW regions experiencing CSG development and operations: This study identifies current levels and trajectories of economic, social and demographic measures in CSG regions within NSW and the potential role of the CSG industry on these trajectories.

An interim report has been released which assesses the baseline levels of economic and demographic measures relevant to regions experiencing CSG industry activity in NSW. Specifically, the project compares the baseline levels of key economic and demographic measures to other regions with similar characteristics prior to CSG development. This report will underpin subsequent statistical analysis of the Narrabri region. The final report is expected in late 2017.

Decommissioning pathways for CSG projects: The project aims to improve the social, economic and environmental effectiveness of decommissioning CSG wells in NSW and QLD. The outcome will be recommendations for an integrated approach to improving the social, economic and environmental effectiveness of decommissioning of wells and well pads.

The project includes studying regulatory frameworks and investigating the social concerns around decommissioning wells and well pad infrastructure.

Some key factors of successful decommissioning identified through workshops to date include ensuring wells were successfully isolated, and residual surface impacts were very small without damage. To capture decommissioning faults, a framework or legislative avenue needed to be in place to resolve the issue in a timely manner.

A report detailing full outcomes of the workshops held is expected to be delivered with recommendations in late 2017.

Health

Human health effects of coal seam gas: This project, which started in early 2017, aims to develop an appropriate study design approach to investigate the possible impacts of CSG activity on human health. It is responding to the ongoing concerns raised in some communities about possible health effects related to CSG.

The project has includes an identification of gaps in the knowledge base, community consultation and an expert workshop to develop a framework that can be used to design health studies that will be:

- transparent, independent and trusted
- include quality-assured, independent and robust science
- receive community support and engagement.

The project is due for completion late 2017.

Find out more at gisera.org.au

Laboratory experiments