



GROUND AND SURFACE WATERS

**GISERA | Gas Industry Social and Environmental Research Alliance**

# Beneficial reuse options for brine from the Narrabri Gas Project

CSIRO scientists have completed a review of beneficial reuse and end-use options for highly saline waste water (brine) expected to be generated by the proposed Narrabri Gas Project in New South Wales.

### Key points

- Santos has been granted approval to extract coal seam gas (CSG) from the Gunnedah Basin in the Narrabri region of New South Wales.
- CSG extraction produces water from the coal seams that contains various salts and other dissolved chemicals.
- This produced water is required to be treated. The treatment process creates a highly saline brine by-product.
- The Narrabri community has expressed concern about how this brine will be managed.
- Recent technological developments raise the possibility of beneficial reuse or end-use options for brine.
- This CSIRO project evaluated a range of potential options from technical and social-economic perspectives over a 30-year timeframe.

Through collation of existing data on brine in the region; a review of existing and emerging technologies and solutions; a techno-socio-economic-analysis; and direct engagement with community and industry stakeholders, researchers evaluated a range of potential options.

The project outcomes will help address community concerns in the Narrabri region about how brine produced by the NGP will be managed should the project proceed, and will help provide an evidence base for informed decision-making by industry, community and government.

### The Narrabri Gas Project

Santos has been granted State and Federal government approval to extract CSG from the Gunnedah Basin in the Narrabri region of northern New South Wales. The NGP covers around 950 square kilometres, with a footprint of about one per cent of that area.

The project is expected to generate produced water which will require treatment and will create a highly saline by-product – brine – which has been a cause of concern for the local community.

Although the disposal of brine salts in landfill is permissible if it meets regulatory requirements, the Development Consent for the NGP published by the Independent Planning Commission of NSW prefers beneficial reuse options where feasible.

Banner image – Narrabri region landscape.

This project, conducted through CSIRO's Gas Industry Social and Environmental Research Alliance (GISERA), reviewed a range of options for the beneficial reuse of brine from the Santos Narrabri Gas Project (NGP) in New South Wales.



## Brine as a by-product of CSG activities

The production of CSG requires the extraction of groundwater to reduce pressure within the coal seams and allow the release of the gas. Significant volumes of water are extracted and this water contains salts and other dissolved chemicals.

The predominant management option for this water is treatment via reverse osmosis (RO) process, which is highly effective in removing salts and other dissolved chemicals from solutions. It produces treated water – which can be reused for purposes like crop irrigation, livestock watering and dust suppression – along with a highly concentrated brine solution.

The brine is considered a waste product, and until recently no viable options for beneficial reuse had been identified.

However, recent technological developments, driven by interest in the recovery of useful salts and critical minerals, and energy production and storage, have raised the possibility of beneficial reuse of brine.

This CSIRO study aims to address community concerns by considering both the technical aspects of brine reuse and the social and economic implications of reuse options.



A CSG water holding pond. The reverse osmosis treatment process produces water suitable for uses such as irrigation, livestock watering, or dust suppression, and also produces a reject waste stream which is highly saline (brine).

## Options for reuse

There are a range of beneficial reuse and end-use options for brine, but in order to determine which, if any, are feasible options for the NGP, researchers needed to consider technical, economic, social, environmental and safety factors.

The options evaluated in this research included:

- recovery of high-purity salts for industrial applications
- recovery of critical minerals and other important elements
- acid mine drainage neutralisation
- high-value algae cultivation
- energy harvesting and storage.

Researchers undertook a techno-socio-economic analysis of each option over a 30-year project life.

From an economic perspective, selective salt recovery, acid mine drainage neutralisation and microalgae cultivation were the most promising options for long-term viability. The recovery of critical minerals and other important elements was not shown to be economically viable due to recovery costs exceeding likely returns.

A social assessment revealed that some of the options present exciting opportunities to contribute to community wellbeing through job creation, business development and training programs.

The report also noted that the social and environmental advantages of brine reuse can be amplified when two or more options operate together, for example algal production followed by selective salt recovery, using energy harvesting for on-site power.

Feedback from the community workshops conducted during this project highlighted the importance of providing context and transparent information to enhance understanding and trust when evaluating brine management options.

### More information

Read more [about this project](#)

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GISERA is a collaboration between CSIRO, Commonwealth and state governments and industry established to undertake publicly-reported independent research. The purpose of GISERA is to provide quality assured scientific research and information to communities living in gas development regions focusing on social and environmental topics including: groundwater and surface water, greenhouse gas emissions, biodiversity, land management, the marine environment, and socio-economic impacts. The governance structure for GISERA is designed to provide for and protect research independence and transparency of research.