



GROUND AND SURFACE WATERS

GISERA | Gas Industry Social and Environmental Research Alliance

A review of the beneficial reuse and end use options for brine for the Narrabri Gas Project in northern New South Wales

This project will improve understanding of the beneficial reuse and end-use options for the brine produced as a by-product, by the Narrabri Gas Project (NGP) in northern New South Wales (NSW).

Key points

- The Narrabri Gas Project (NGP) is a coal seam gas development in northern NSW that will result in the production of saline 'produced water,' and highly saline wastewater (brine) as a by-product.
- Local communities have concerns about the management of brine and options for its reuse/end use.
- This study aims to review the beneficial reuse and end use options for the brine from the NGP.
- Researchers will review existing and emerging technologies and solutions for re-use. Researchers will also meet with the community to gather feedback on the socio-economic impacts of each option for brine reuse.
- Information will be translated to an accessible, easy to-understand report, and shared at a community meeting.
- Project outcomes will help drive understanding of potential uses of brine produced by the NGP.

The development of the NGP in northern NSW, and the associated production and reuse of highly saline wastewater - known as brine - have caused for concern in the local community, who have asked for more information on brine, and its management.

CSIRO's Gas Industry Social and Environmental Research Alliance (GISERA) has undertaken a study bringing together knowledge about the options for the beneficial reuse and end-use of brine created by the NGP.

Research objectives

This research project aims to review beneficial reuse or end-use options for brine from the NGP region. To address the community concerns, all of the potential options for management of brine need to be evaluated appropriately and presented to stakeholders.

In this study, GISERA researchers aim to:

1. Collate existing data and knowledge on brine in the NGP region.
2. Undertake a review of existing and emerging innovative technologies and solutions for beneficial reuse or end-use options for brine.
3. Conduct techno-socio-economic analysis (identify 'pros and cons') for options identified above.
4. Communicate and engage with key stakeholders about brine's beneficial reuse or end-use options.



The Narrabri Gas Project

In 2020, the NSW approved the NGP. Santos was granted approval to extract coal seam gas (CSG) from the Narrabri region, in the Gunnedah Basin. The NGP will result in the production of brine.

There is increasing interest from stakeholders in the beneficial end-use or reuse options for brine. The production and management of brine from water purification must meet environmental, social, and economic needs, and address community concerns.

Coal seam gas and the production of brine

The extraction of CSG results in water from the coal seam being brought to the surface. This 'produced water' contains salts and other minerals. Before it can be reused (for instance, for irrigation) it must go through a process of reverse osmosis to remove the salt. Then, the operator is left with a large volume of water ready for beneficial reuse, and a small volume of highly saline wastewater.

If it is not managed correctly, the hyper-saline brine can pose risks to the environment, to communities and to agriculture. Development conditions for the management of produced water include maximising the beneficial reuse of brine and salt, disposing of salt that cannot be beneficially reused, or other end-use options.

Building on existing research into brine re-use

The use, disposal, and reuse of water associated with oil and gas production has been a topic of interest to operators, regulators, water users, and researchers for decades. Researchers will draw information from a number of existing reviews that have assessed options for brine and salt management.

Existing beneficial reuse options for brine include:

- Selective salt recovery of high purity salts (Na_2CO_3 , NaHCO_3 , NaCl) for industrial applications.
- High-value algae cultivation.
- Acid mine drainage neutralisation.
- Recovery of critical raw minerals (e.g., calcium, magnesium, potassium).
- Mining of precious and other important metals, such as lithium.
- Harvesting energy (e.g., osmotic power).

Since these assessments of brine management, some options that were previously not commercially viable are likely to now be feasible. Researchers will consider all existing and emerging technologies and options.



A CSG produced water holding pond.

Project methods and outcomes

CSIRO researchers will collate literature relating to brine and salt management in the NGP. This includes consideration of information relating to technical, regulatory, economic, social and environmental aspects of brine reuse

Researchers will then assess existing and emerging technological innovations that could be applied to brine or salt.

Having identified promising technology and management options for the beneficial reuse or end-use options for brine from the NGP region, researchers will assess each option's technical merits and demerits, as well as potential socio-economic impacts of each option.

Community workshops will be held to share information and gather feedback from local stakeholders. These insights will help inform socio-economic assessments.

A final report will synthesise and summarise the study findings and all results will be publicly available on CSIRO's GISERA web site.

More information

Read more about the project to [examine brine reuse options in Narrabri](#).

Read about other [GISERA projects based in NSW](#).

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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.