

Case Study



Identifying existing opportunities for helium production

Helium is a unique substance of significant value and global demand for it is rising. With Australia possessing significant helium resources within its natural gas fields, the most prospective opportunities for its commercial recovery have been reviewed to highlight the potential to supply the helium market from existing natural gas operations.

The Challenge

The extreme properties of helium make it a material that cannot be substituted in many applications. It is both the coldest liquid refrigerant and a chemically inert gas, making it a critical commodity used in medical imaging, laboratory work, welding and cutting, semiconductor and fibre optic manufacture and many future technologies.

Global demand for helium is rising at a compound annual growth rate of 11 per cent, with frequent shortages occurring. This has led to helium being recognised as a critical raw material in many countries.

The majority of helium worldwide is generated as a by-product of LNG production. Helium production in Australia is adequate for our domestic market, but there is potential to increase production capacity from Australia's existing LNG operations to not only secure domestic supply but develop helium export opportunities worldwide. The global helium market is forecast to be worth \$18 billion in 2025.

The Solution

The FenEx CRC conducted a review of Australia's helium resources, with consideration of existing natural gas and LNG infrastructure, helium recovery technologies, and the economics of helium production to identify the most prospective opportunities for commercial helium production in Australia.

Outcomes and Impact

The report 'Opportunities for Helium Resource Development in Australia' is set for release in Q4 2021. It highlights that Australia has 3.6 billion cubic metres of helium in its natural gas resources, enough to meet 21 years of global consumption, and identifies the gas basins in Australia containing the most helium.

Recovery of helium as a by-product of LNG production is an attractive option as helium is enriched through the end-flash process of LNG production, as well as in any nitrogen rejection units (NRU) that process end-flash gas. Australian LNG plants with NRUs installed are likely to be venting helium at rates comparable to existing helium plant capacities, and may already enrich helium above the feed gas concentration used by Australia's only helium producer, BOC. The report ranks existing NRUs by helium concentration and vent rate.

Project costs and helium plant economics are presented, based on a profitability analysis of existing projects, to demonstrate the commercial opportunity presented by helium production from NRUs.

Alternative helium recovery technologies to the industry-standard cryogenic separation of gases are also reviewed. Technologies including membrane and adsorption separation do not use as much energy as cryogenic processes and may be commercial at smaller scale, or better suited to helium gas (rather than liquid) production.

Overall, the report maps the opportunities for Australian natural gas producers to extract additional value from their resources by also producing and exporting helium.

Future Horizons

The report has been circulated among FEnEx CRC partners, and identifies specific potential for helium recovery studies for Ichthys LNG, Waitsa Gas Project Stage 2, Wesfarmers LPG and Santos Narrabri Gas Project. With the Western Australian government also a partner of the CRC, policy discussions centred on helium as an export of interest may also commence.

Other projects within FEnEx CRC continue to develop non-cryogenic helium recovery technologies to make helium production at smaller scale more accessible and economic for Australian natural gas producers. Opportunities to pilot these technologies will occur from 2022.

Contact:

Project 20.RPO-001, Commonwealth Milestone 1.1.1
Dr Luke McElroy
luke.mcelroy@curtin.edu.au

