LAND AND INFRASTRUCTURE

GISERA | Gas Industry Social and Environmental Research Alliance

Offsets for Australian greenhouse gas emissions of onshore shale gas in the NT

Assessing the future life-cycle greenhouse gas (GHG) emissions of Northern Territory onshore shale gas proposals, and options for offsetting these emissions.

Key points

- This research assessed the life-cycle GHG emissions of potential Northern Territory shale gas development over 25 years.
- The assessment was based on five production scenarios and a combination of different end uses for gas.
- Annual calculated GHG emissions across a range of production scenarios (365–1130 PJ/year) ranged from 6.6 million tonnes (Mt) to 33 Mt CO_2e/year. For comparison, Australia's actual GHG emissions in the 12 months to March 2022 were 487.1 Mt CO_2e.
- Total lifetime emissions (25 years) to be abated under these scenarios ranged from 164 Mt to 826 Mt CO_2e.
- The emissions intensity of gas delivered to Darwin was estimated at 8.85 kilograms of CO_2e per gigajoule (GJ) of raw gas.
- Researchers assessed potential options for offsetting or mitigating these GHG emissions.
- At present, more than 7 Mt CO_2e/year mitigation and abatement offsets could be achieved within the Northern Territory. A further 7.9 to 15.6 Mt CO_2e/year abatement and offsets could be achieved outside the NT but within Australia.
- From an engineering perspective, the majority of GHG emissions from four of the five scenarios could be mitigated or physically abated with options available in Australia.

The Australian Government's legislated net zero by 2050 goal places renewed focus on science-based understanding and management of greenhouse gas (GHG) emissions.

This CSIRO research assessed the Australian life-cycle GHG emissions of potential onshore shale gas projects in the Northern Territory using a set of plausible production scenarios from 2025 to 2050.

Options for mitigating or offsetting these scenarios' respective contribution to climate change were assessed.

Part of the context of this study is Recommendation 9.8 of the *Scientific Inquiry into Hydraulic Fracturing in the Northern Territory* (2018): "That the NT and Australian governments seek to ensure that there is no net increase in the life-cycle GHG emissions emitted in Australia from any onshore shale gas produced in the NT".

The research was conducted through CSIRO's Gas Industry Social and Environmental Research Alliance (GISERA).

The Beetaloo Sub-basin

The Beetaloo Sub-basin lies south-east of Katherine in the Northern Territory and spans an area of about 30,000 square kilometres. The estimated gas resources for the Beetaloo Sub-basin are of similar size to other major gas producing basins in Australia, such as the Surat Basin in Queensland and the Bonaparte/Browse Basins in Western Australia.

CSIRO | Australian Government Department of Industry, Science, Energy and Resources | Queensland Government | NSW Government | Supported by Government of South Australia | Northern Territory Government | Australia Pacific LNG | QGC | origin | Santos

Scenarios

In this research, four scenarios considered shale gas production of 365 petajoules per year (PJ/year) and one scenario of 1,130 PJ/ year. The scenarios explored various combinations of end uses for the gas, such as domestic use, LNG export, local refinery, and production of chemicals and hydrogen.

All scenarios assumed that the source of onshore shale gas would be the Beetaloo Sub-basin and that extracted gas would be processed before being transported by pipeline to Darwin for further processing and use.

Results – emissions

Results from this study describe a range of annual and total (25 years) offsets required for the various combinations of gas end use and production volumes. Results also expressed the GHG emissions intensity of each unit of gas delivered to Darwin.

While the annual and total offsets provide a guide to the size of the task, the emissions intensity calculations are a more valuable tool as they scale accurately to actual production levels.

- Annual GHG emissions ranged from 6.6 million tonnes (Mt) to 33 Mt CO_2e/year.
- Total lifetime emissions to be abated ranged from 164 Mt to 826 Mt CO_2e.
- In terms of emissions intensity, gas delivered to Darwin generated 8.85 kilograms of CO_2e per gigajoule (GJ) of raw gas input.

Results – offsets

The mix of mitigation or offset options for each scenario depended on scale, availability of the offset over the lifetime of the gas development, technical feasibility, indicative cost, and preference for local, well-governed offset schemes.

More than 7 Mt CO_2e/year of mitigation and offsets could be available within the Northern Territory, including mitigation activities during production, potential carbon capture and storage based out of Darwin, savannah fire management, and other land-based offsets. A further 79 to 156 Mt CO_2e/year of abatement or offsets is available outside the NT but wihin Australia, of which this study assumes ten per cent (7.9 to 15.6 Mt CO_2e/year) could be available for Beetaloo gas development.

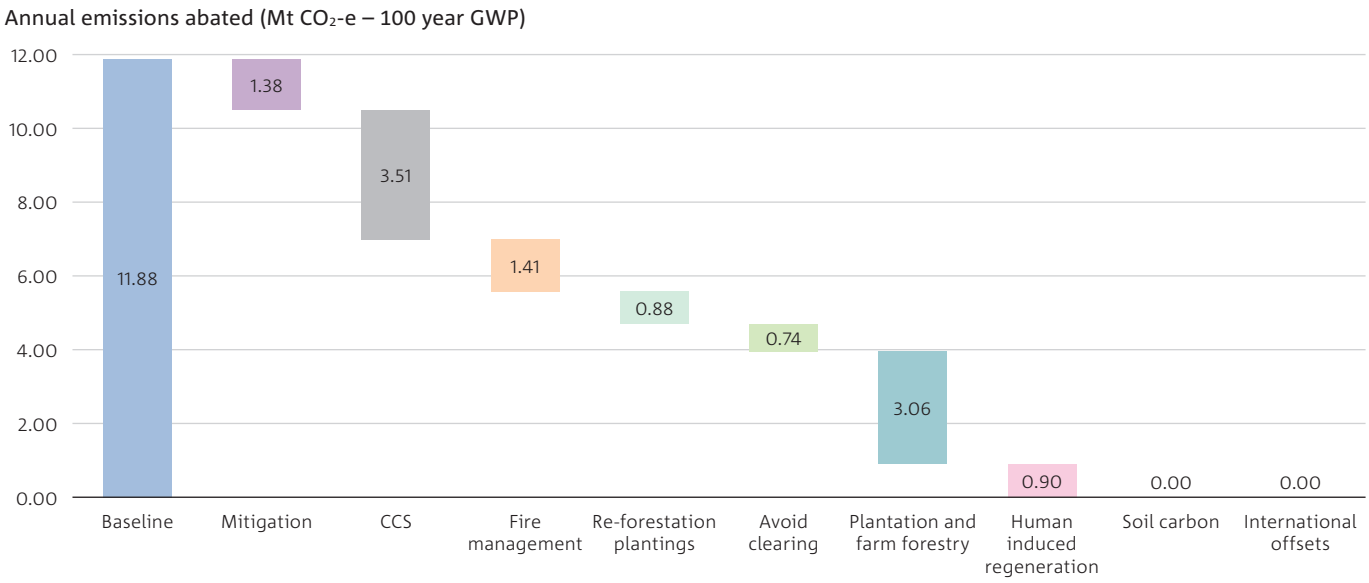
From an engineering perspective, the majority of GHG emissions from the four 365 PJ/year scenarios could be mitigated or physically abated with options available in Australia over the life of the project.

One 365 PJ/year scenario could be offset entirely within the Northern Territory. The largest 1,130 PJ/year scenario would require international offsets in addition to offsets and abatement within Australia.

More information

Read the final report

Find out more about CSIRO's GISERA research in the Northern Territory



Scenario 4: 365 PJ/year domestic gas use, LNG export, and hydrogen: Life-cycle GHG emissions and mitigation or offset implementation for a scenario that assumed 365 PJ/year of NT onshore shale gas would be used as: 45 PJ/year in domestic consumption; 120 PJ/year in hydrogen production and; the remaining 200 PJ/year for LNG export. In this scenario all emissions could be mitigated or offset within Australia.

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