Northern Territory Low Emissions Hub

CSIRO has partnered with the Northern Territory Government, industry, and engineering companies to develop an understanding of potential low emissions hub development

Defining the Low Emissions Challenge

Understanding options to rapidly decarbonise existing sectors whilst promoting the growth of new low emission industries will be a key challenge for the next decade as global emissions reduction requirements increase. For the energy industry, this will become even more pressing as end users demand lower carbon intensity fuels and products.

Mapping the possible evolution of this change and understanding different demand drivers, both domestically and interationally, will enable informed decarbonisation choices for industry, government and the community.

Northern Territory Low Emissions Hub

CSIRO's work is centred on understanding the potential for developing a low emissions hub in the Northern Territory with a particular focus on the Darwin region.

If realised, a low emission hub could both significantly reduce emissions whilst catalysing growth of new sustainable industries that can continue throughout the energy tranfromation. It could be one of the world's largest purpose built facilities of its kind.

The Hub could enable the development of an interconnected hydrogen industry and the utilisation of the carbon dioxide captured from other industrial processes could lead to the production of sustainable fuel alternatives for transportation. It could also create a blueprint for future low emissions hubs around Australia.

Why CSIRO is involved

With expertise in hydrogen, renewable energy, techno-economics, and Carbon Capture Utilisation and Storage (CCUS), CSIRO is providing impartial scientific advice, coordinating the development of detailed concept designs, building domestic & international linkages, and conducting geological research and economic and customer studies.

"As Australia's national science agency, CSIRO is always looking for ways to bring business and government together to envision and deliver a more sustainable future for some of our largest industries," CSIRO Chief Executive Dr Marshall said.

"The NT Hub could create new jobs and export pathways, and give Australia a global advantage by pushing the boundaries of science and technology to put home-grown innovation into real world demonstration projects, including through our Hydrogen Industry mission."

Business Case for NT Low Emission Hub

CSIRO is leading a consortium in the development of a business case to assess the viability of a large-scale low emissions CCUS Hub outside of Darwin.

The Business Case will assess the Hub's viability and outline options to significantly reduce the emissions of the Territory's gas industry, providing a tangible pathway towards the region's net zero emissions targets.



View of Icthys LNG plant, Middle Arm of Darwin Harbour

(photo by Wayne Zerbe, courtesy of NTG)

The Business Case will apply best practice learnings from international low emission industrial hub projects. It will consider technology solutions and engage with industry and community stakeholder groups as Australia navigates the transformation pathway to a low emissions future.

Industry and engineering companies who are collaborating with CSIRO and the NT Government on the business case to date include:

Santos	INPEX	Eni
Woodside	Xodus	

Clean Hydrogen

The Darwin Clean Hydrogen Hub joint study between INPEX, Santos, Xodus and CSIRO will explore opportunities to provide clean hydrogen solutions – with domestic and international hydrogen supply chains as potential beneficiaries. Findings from this complementary study will be used in the Business Case. Focus areas include:

- market demand for hydrogen and its derivatives (e.g. methanol and ammonia) as fuel in transport and power generation, and feedstock for chemicals;
- renewable energy sites and infrastructure for water electrolysis to produce and deliver hydrogen and its derivatives to market;
- hydrogen production from natural gas and carbon capture and storage capacity requirements;
- bulk and distributed storage requirements, and domestic and international hydrogen supply chains.

Technology Innovation precinct

CSIRO is working with the Northern Territory Government to identify technology demonstration projects that could use future low emission hub infrastructure within the Middle Arm Sustainable Development Precinct.

Frequently asked questions:

What is Carbon Capture Utilisation and Storage (CCUS)?

CCUS is the process of collecting CO_2, a greenhouse gas, and either converting it for use in other products or permanently removing it from the atmosphere by disposing of it underground.

Why is CCUS important?

Whilst estimates vary, the International Energy Authority in its 2023 world energy outlook quantified 7.6 Gigatonnes per annum of CO_2 storage and utilisation could be required by 2050 to achieve net zero emissions, particularly in hard-to-abate sectors of the economy that will continue beyond the energy transition.

What are the benefits of CCUS?

Effective implementation of CCUS can reduce the amount of CO_2 being emitted into the atmosphere from hard-to-abate industries where emissions reduction cannot be achived with renewable technologies alone.

By capturing, using or locking away carbon from the atmosphere or industrial waste streams, CCUS can support a circular economy through the re-use of CO_2 or even support potential negative emission technologies such as Direct Air Capture.

Does CCUS work?

Rigorous scientific research into CCUS has been undertaken for over 20 years and CO_2 storage is operating in over 30 sites around the world. Future projects include a 100 million tonne per annum project proposed for the Gulf of Mexico to decarbonise the Houston region.

How does CCUS support other low emission technologies including hydrogen?

CCUS can play a number of roles in supporting low emissions technologies. This includes eliminating CO_2 produced during hydrogen generation from natural gas or combining captured CO_2 with green hydrogen to lower emissions intensity synthetic fuels for use in areas like the aviation of maritime industries.

Where is Middle Arm Sustainable Development Precinct?

The location of the Middle Arm Sustainable Development Precinct is shown in the figure below.



Map of Middle Arm of Darwin Harbour with inset of wider NT

As Australia's national science agency and innovation catalyst, CSIRO is solving the greatest challenges through innovative science and technology.

CSIRO. Unlocking a better future for everyone.

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