



Offshore Petroleum Factsheet Series:

How offshore oil and gas projects impact the environment

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What is this factsheet about?

This factsheet explains how offshore oil and gas projects impact the environment, ecosystems and marine species. It aims to provide crucial information relating to offshore petroleum projects. It is useful to anyone who wants to understand the environmental impacts of offshore oil and gas projects or anyone who is writing a submission to NOPSEMA.

Outline

(Click subheadings to skip to that section)

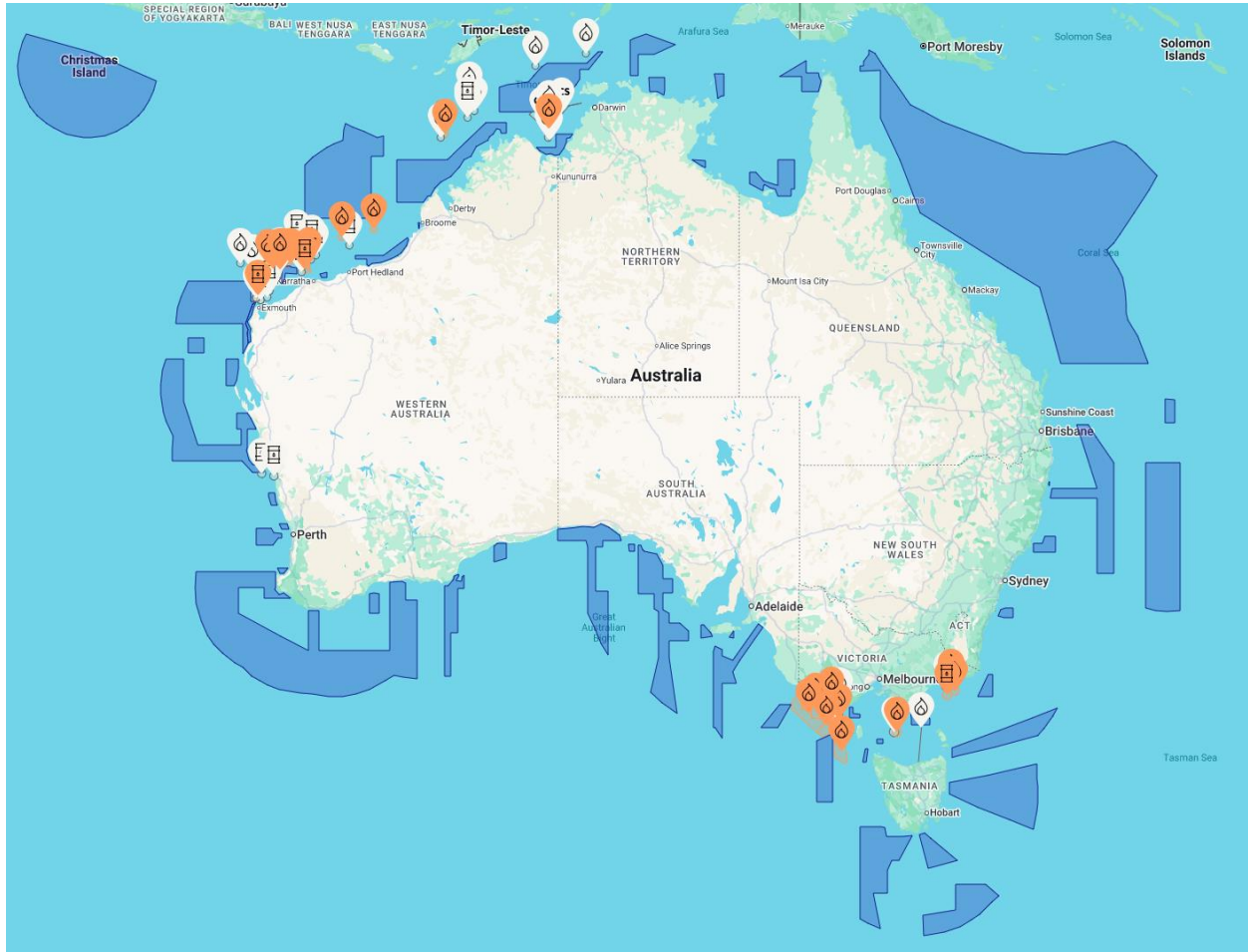
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Overview

Australian waters have large reserves of oil and gas (collectively referred to as petroleum) under the seabed. Companies can explore for and extract petroleum if they have permission to do so. The scientific evidence is clear that this industry, which has numerous

environmental, economic, and social impacts, needs to be wound down. Yet companies are seeking to expand their operations and develop new petroleum fields.

Figure 1: Map of Australia showing the location of offshore oil and gas activity in Australia¹



How does exploration and production activities impact the environment?

To extract oil and gas, companies must go through two main stages: exploration and production. Both stages require permission from the Joint Authorities in the form of petroleum titles.

Exploration

What is exploration?

¹ Environmental Defenders Office, 'Have your say on offshore fossil fuel projects' (Online 8 June 2026) [EDO Offshore Map - Environmental Defenders Office](#)

Exploration involves looking for petroleum reserves underneath the ocean floor. The aim of exploration is to understand whether there is enough petroleum to justify full-scale production. A company requires an exploration permit to explore for petroleum in Commonwealth waters.

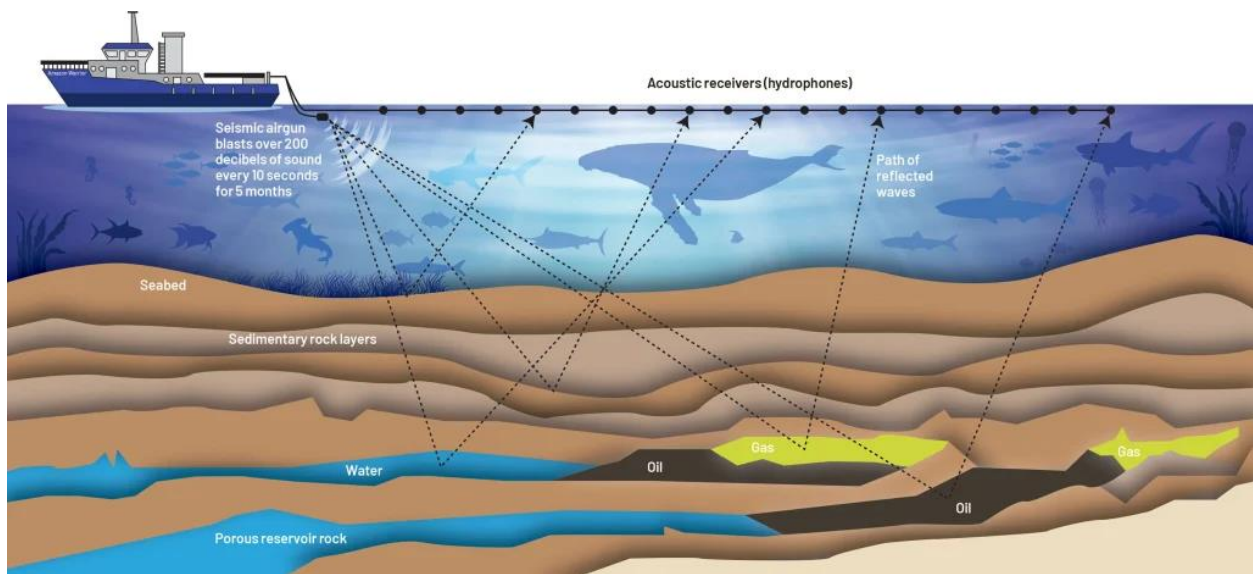
Exploration will usually involve either seismic blasting (also known as seismic surveying) or appraisal drilling. Each of these activities carries risks, which must be considered in an environment plan.

What are the impacts and risks associated with exploration?

Seismic blasting

Seismic blasting (or seismic surveying) involves sending loud, low-frequency pulses of sound into the water over large areas and sometimes for several months, to generate detailed images of the underlying ocean floor.² These blasts have the potential to impact marine animals which communicate within the same sound range, including mammals, turtles, fish and invertebrates.

Figure 2: How Seismic Blasting works³



² NOPSEMA, *Environment and Communications Reference Committee – Inquiry into the impact of seismic testing on fisheries and the marine environment* (Submission, December 2019) p.5
<<https://www.nopsema.gov.au/sites/default/files/documents/2021-06/A706091.pdf>>.

³ Timothy Erik Ström, 'Blasted Sea: A Fossil Fuel Cacophony in Bass Strait', *ARENA* (Online, 17 August 2023)
<<https://arena.org.au/blasted-sea/>>.

Potential impacts to marine animals include death, communication problems, abandonment of their habitat, reduced reproductive rates and behavioural changes due to stress.⁴ Whales and dolphins are particularly sensitive to noise impacts due to the importance of sound in their lives, which they use to communicate with each other and locate food.

These impacts can have flow-on effects for people, particularly First Nations communities with cultural and spiritual connections to Sea country. Industries such as tourism and commercial fisheries could also be affected by changes in the amount and location of marine life.

Exploration (appraisal) drilling

To access petroleum reserves under the ocean floor, companies must drill down (sometimes more than a kilometre) to access the petroleum. This core hole becomes a **well** through which the petroleum can be brought to the surface for testing and appraisal. The drilling process can disturb the ocean floor, including important habitats for marine animals.

Drilling can also lead to petroleum or ‘hydrocarbon’ spills. Drilling exploration wells carries an increased risk of a spill as the petroleum reserve releases enormous pressure once it’s intercepted by the drilling equipment.⁵ This is known as a well-blowout.

Large spills can have catastrophic consequences for both people and the natural environment.

For people, large spills can damage coastal communities and industries that rely on the marine environment, including tourism and commercial fisheries. Petroleum spills can also harm cultural heritage sites and First Nations peoples’ physical and spiritual connections to affected areas.

For marine life, spills can smother (and kill) plants and animals and coat beaches and rocky shore habitats with toxic oil or gas condensate. These devastating impacts can last years after a single incident.⁶

⁴ NOPSEMA, Environment and Communications Reference Committee – Inquiry into the impact of seismic testing on fisheries and the marine environment (Submission, December 2019) pp. 23-24.
<<https://www.nopsema.gov.au/sites/default/files/documents/2021-06/A706091.pdf>>.

⁵ Tina Soliman Hunter, *Offshore petroleum drilling and risk: a study of proposed deep-sea exploration drilling in Commonwealth Regulated Waters of the Great Australian Bight* (Aberdeen University Centre for Energy Law Report, April 2019) 11.

⁶ Barron, Mace G et al. “Long-Term Ecological Impacts from Oil Spills: Comparison of Exxon Valdez, Hebei Spirit, and Deepwater Horizon.” *Environmental science & technology* vol. 54,11 (2020): 6456-6467.
doi:10.1021/acs.est.9b05020

Case Study: Montara Oil Spill

Spills from offshore drilling activities have occurred in Australian waters. For example, the 2009 Montara Wellhead Platform blowout released approximately **64 tonnes of crude oil** per day into the Timor Sea for **74 days**.⁷ The spill harmed marine life, including turtles, sea snakes and migratory birds. It also killed seaweed crops in Indonesia, which resulted in a successful class action against the company, PTTEP.

Production

What is production?

If petroleum in the form of oil or gas is found within an exploration permit area, the company will need to apply for a production lease to be able to extract the resource.

What are the risks and impacts associated with production?

Production drilling

In addition to the exploration well, a company will drill several more wells to extract petroleum from under the ocean floor. Constructing these wells, using drilling equipment can damage the seabed including habitat for marine animals.

Drilling can also lead to petroleum spills. Large spills can have catastrophic consequences for both people and the natural environment.

For people, large spills can damage coastal communities and industries reliant on the marine environment, and harm cultural heritage sites and First Nations peoples' physical and spiritual connections to affected areas.⁸

For marine life, spills can smother (and kill) plants and animals and coat beaches and rocky shore habitats with toxic oil or gas condensate. These devastating impacts can last years after a single incident.⁹

⁷ Australian Maritime Safety Authority, Montara Well Head Platform, 21 August 2009, (Web Page, November 2020), <<https://www.amsa.gov.au/marine-environment/incidents-and-exercises/montara-well-head-platform-21-august-2009>>.

⁸ The Senate, *Environment and Communications Reference Committee – Oil or gas production in the Great Australian Bight* (Submission, May 2017), pp. 84-5, <https://www.aph.gov.au/Parliamentary_Business/Committees/Senate/Environment_and_Communications/Oil_gas_production45/Report>.

⁹ Ibid.

Production facility

Once a company commits to full-scale production, a production facility is needed to extract and store petroleum. A pipeline or shipping container is also needed to transport the petroleum back to shore. This increases the risk of petroleum spills caused by a pipeline leak, rupture or a shipping accident. With more shipping containers in the area, marine animals, such as whales, are at risk of being struck or having their migratory pathway disturbed.¹⁰

The production facility also generates significant noise which can impact marine animals within thousands of metres of the facility. Noise-sensitive species such as whales, dolphins and turtles can suffer behavioural changes (such as avoiding the area); problems communicating and navigating; and disruptions to reproduction due to noise emissions.

What are the impacts of offshore projects on Greenhouse Gas Emissions and Climate Change?

Greenhouse gas (**GHG**) emissions from petroleum activities, including those undertaken offshore, contribute to climate change both directly and indirectly.¹¹ Gas production processes release vast quantities of greenhouse gases in the form of carbon dioxide, nitrogen oxide and methane. Liquefying gas for export also requires large amounts of energy, which is most often provided by the consumption of fossil fuels. Indirectly, carbon dioxide is produced when the gas is burned for energy by consumers.¹²

Currently, companies are only required to report on carbon dioxide emissions of activities. Given the increased potency of methane (the main component of gas), compared to carbon dioxide, it is likely that companies are significantly underreporting their GHG emissions.¹³

Evaluate this resource

¹⁰ Ibid, pp.74-5.

¹¹ 'Greenhouse gas emissions and climate change – Managing industry greenhouse gas emissions' *NOPSEMA* (Web Page, 13 June 2021) [1] <<https://www.nopsema.gov.au/offshore-industry/environmental-management/greenhouse-gas-emissions-and-climate-change>>; 'Why is Gas Bad for Climate Change and Energy Prices', *Climate Council* (Explainer, 30 June 2023) [2] <<https://www.climatecouncil.org.au/resources/why-is-gas-bad-for-climate-change-and-energy-prices/>>.

¹² 'Why is Gas Bad for Climate Change and Energy Prices', *Climate Council* (Explainer, 30 June 2023) [2] <<https://www.climatecouncil.org.au/resources/why-is-gas-bad-for-climate-change-and-energy-prices/>>.

¹³ Natasha Schapova, 'Methane emissions from offshore oil and gas severely under-reported, study finds' *ABC Gippsland* (online, 3 February 2023) <<https://www.abc.net.au/news/2023-02-01/methane-emissions-from-offshore-oil-gas-energy-under-reported/101912200>>.

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