Working together:

Protecting our marine environment

APPEA 2021

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About APPEA

The Australian Petroleum Production & Exploration Association (APPEA) is the national peak body representing Australia's upstream oil and gas explorers and producers. Its purpose is to be the effective voice of the oil and gas industry on the issues that matter, working collaboratively with industry, government, and the community to achieve shared goals.

APPEA members account for nearly all of Australia's petroleum production. APPEA also represents about 130 member companies that provide a wide range of goods and services to the upstream oil and gas industry.

APPEA is forward-looking and outcomes-focused, aiming to raise awareness of the economic, environmental, and social benefits of the oil and gas industry across Australia.

Acknowledgement

APPEA acknowledges the Traditional Custodians of Country throughout Australia and their knowledge in caring for land, sea, and community. We pay our respect to Elders; past, present, and emerging.

Contents

Energy for a better Australia

Industry overview

80,000

Australia's oil and gas industry supports 80,000 direct and indirect jobs and thousands more in industries that rely on natural gas.

64%

Oil and natural gas provide around 64 per cent of Australia's primary energy and almost one-third of all gas consumed in Australia is used by manufacturers.

$473 billion

Australia's oil and gas industry has invested $473 billion in the Australian economy over the past decade.

$40 million

Contributed by Australia's offshore oil and gas sector to marine environmental research in the past decade.

$35.6 billion

The oil and gas industry contributes $35.6 billion to Australia's 'blue economy'.

$5.85 billion

In 2018–19 the industry made tax payments of $5.85 billion and has paid more than $66 billion over the decade to 2018–19.

Australia's upstream oil and gas industry

Australia's upstream oil and gas industry includes explorers—companies that search for new oil and natural gas resources—and producers that responsibly develop oil and natural gas for the benefit of all Australians.

Australia is a global leader in the exploration and production of oil and natural gas. Our nation is fortunate to have abundant resources of oil and natural gas, both onshore and offshore.

Sustainable development of these resources provides households and businesses across Australia with a reliable and affordable supply of energy for electricity generation, heating and cooking, manufacturing and minerals processing.

Oil and natural gas together provided approximately 64.5 per cent of Australia's energy in 2018–19.[1] Around five million Australian homes and businesses have a direct gas connection, and natural gas is also an essential raw material to make products like glass, bricks, cement, plastics and fertilisers, in addition to consumer products such as hand sanitiser, beauty products and deodorants.

Creating jobs and growing businesses in Australia's regions

Australian jobs rely on the oil and gas sector, including the 80,000 people employed directly and indirectly in the industry and tens of thousands more working in the electricity generation, manufacturing, transport, construction and mining sectors.

Many oil and gas jobs are in regional and rural areas which help to grow strong and resilient communities and support local businesses. From large regional businesses that supply materials and equipment to the industry to local cafés and retailers, we all share in the economic benefits generated by the oil and gas industry.

Over the past decade the industry invested some $473 billion[2] in the Australian economy, contributing towards re-investment in hospitals, schools and roads for communities across Australia.

In addition to supplying Australia's domestic energy needs, liquefied natural gas (LNG) is also Australia's second largest export industry and is forecast to remain in this position until at least 2024.[3] LNG exports are expected to increase as Australia's trading partners throughout Asia demand more natural gas to power their fast-growing economies.

Reducing Australia's greenhouse emissions with more natural gas

Importantly, Australia's natural gas is playing a vital role in helping reduce greenhouse gas emissions—here in Australia and abroad.

Using more natural gas in Australia's power generation and resource processing would significantly enhance the nation's ability to meet increasing energy needs and reduce emissions.

With structural changes underway in the power sector and growth in renewable energy technologies, natural gas is the perfect partner to intermittent renewable energies that requires 'on call' electricity generation when the wind doesn't blow or the sun doesn't shine. As more renewable energy is integrated into the grid, this balancing role becomes more critical.

If the industry can develop them, Australia's natural gas resources can underpin an historic shift to a lower emissions generation sector. Natural gas plants also use much less water than coal-fired power and produce much lower levels of noxious substances such as sulphur dioxide, nitrogen oxides and fine particle emissions. Burning gas instead of coal improves urban air quality.

For our trading partners overseas, Australia's resources of natural gas and proximity to growing markets make us well placed to meet the global climate change challenge while substantially contributing to Australia's economic growth. While the demand for energy as part of the industrialisation of Asian economies is a key driver, the properties of natural gas as a lower emitting and cleaner burning fuel is also driving much of the international demand for LNG.

Australia's LNG exports have for decades made a strong and positive contribution to the global efforts to reduce greenhouse gas emissions.

The offshore environment

Much of Australia's energy needs are met by offshore oil and gas fields. These reserves are located under the ocean seabed within Australia's maritime boundaries.

While our offshore oil and gas sector may seem small in global terms, our nation's prosperity and energy security depends on these offshore projects.

For over 50 years, the Australian offshore oil and gas industry has safely and responsibly explored and developed our resources to deliver energy security and economic prosperity.

APPEA's members are committed to developing these resources sustainably and to the highest levels of environmental standards.

This report, while not an exhaustive review, highlights how Australia's offshore oil and gas industry is working responsibly to preserve our oceans while also delivering the energy to power our homes, businesses and essential services.

A strictly regulated industry

Australia's regulations governing offshore oil and gas projects reflect international leading practice and are consistently reviewed to ensure they are fit for purpose.

Offshore oil and gas companies that operate in Australia abide by stringent regulations to keep waters safe, workers safe, and minimise impacts to our environment.

Australia's independent regulator for offshore oil and gas projects in Commonwealth waters (greater than 3km from the coastline) or state waters where regulatory oversight has been conferred is the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA).

Before any offshore oil or gas activity can begin, baseline information and data are collected to understand the existing marine environment. The company then develops detailed environment plans for approval and implementation. These plans aim to minimise any impact on the receiving environment, which includes its flora and fauna.

Approval to begin an offshore petroleum activity is only granted after NOPSEMA has conducted a rigorous assessment of the project, environmental performance is monitored throughout the life of the project, and the project has been open for consultation and public comment.

APPEA's members have a proud history of going above and beyond regulatory requirements to protect and preserve the marine environments in which they operate.

The industry has contributed approximately $40 million to marine research that helps to protect our oceans and their unique environments. Important partnerships between oil and gas companies and world-class research organisations, such as the Australian Institute of Marine Science (AIMS), are delivering real outcomes for our oceans and biodiversity.

This commitment forms part of a wider international effort within the oil and gas industry, led by bodies such as the International Association of Oil & Gas Producers (IOGP), which founded the E&P Sound and Marine Life Joint Industry Programme (JIP) in 2005.

The case studies contained in this report demonstrate the industry's commitment to leading the way in environmental knowledge and understanding, and improvements in marine protection and preservation.

Seismic and environmental monitoring

Seismic surveying is an important part of offshore oil and gas operations. It involves directing compressed air sources—or pulses of sound—beneath the sea floor using special vessels to identify subsurface structures in the rock.

Seismic surveys are conducted under the guidance of stringent environmental approvals and carefully monitored so as not to negatively impact local marine environments or disrupt marine life, particularly whales.

Policy Statement 2.1 of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) provides a framework to minimise the risk of acoustic injury to whales in the vicinity of seismic surveying operations.

Multiple studies over the years have determined that seismic surveys do not negatively impact the populations of marine mammals or commercially valuable fish. Seismic surveying has been used in Australia for more than 50 years and in that time, whale populations off the coast of Western Australia have steadily increased. In particular, humpback whale populations in the Kimberley region, once in decline due to whaling, have boomed, and the region is now considered to boast the world's largest population of breeding humpback whales, with current estimates of around 20,000 whales in the region in total.[4]

APPEA members have also partnered with bodies such as the Commonwealth Scientific and Industrial Research Organisation (CSIRO), AIMS, and Geoscience Australia to monitor any potential impact of seismic surveys on fish populations and catch rates.

How loud is a seismic survey?

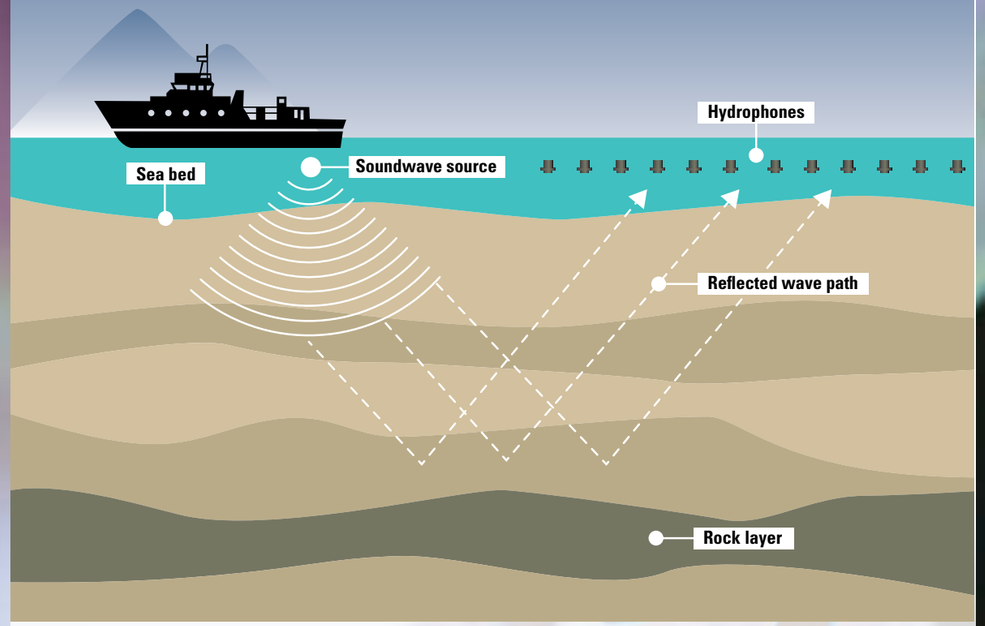
The noise generated by marine seismic surveys is analogous to many naturally occurring marine sounds—including those made by some animals themselves. For example, a sperm whale click has a sound intensity and pressure in the same range of a seismic acoustic source.

Source	Sound intensity and pressure (dB re 1µPa @ 1m)	Frequency (Hz)
Undersea earthquake	272	50
Seafloor volcanic eruption	>255	Varied
Lightning strike on sea surface	250	Varied
Seismic acoustic source	**Up to 255**	**<200**
Sperm whale click	Up to 235	100–30,000
Bottlenose dolphin click	Up to 229	Up to 120,000
Ship sound (close to hull)	200	10–100
Breaching whale	200	20
Blue whale vocalisation	190	12–400
Ambient sea sound	80–120	Varied

Adapted from: Swan, JM et al, 1994 environmental implications of offshore oil and gas development in Australia, APPEA, Australia

The offshore environment

An offshore seismic survey



In offshore operations, a specialised vessel tows a collection of cables or 'streamers'. One set with seismic sources that use compressed air to produce acoustic energy and another set with hydrophones attached that capture the returning sound waves for later analysis.

Decommissioning

Decommissioning is a topic of global importance to the oil and gas industry. As oil and gas structures (both onshore and offshore) age and come to the end of their economic lifespans, the industry must find ways to decommission them safely. For offshore platforms, this must also be approached with minimal disruption to marine life.

Decommissioning activities are expected to become increasingly important within Australia in the next decade and are already common in international oil-producing regions such as the Gulf of Mexico and the North Sea.

There are various methods used to decommission rigs; some platforms may be left in place, others may be removed, and others repurposed for other activities.

Like all offshore oil and gas industry activities, decommissioning is strictly regulated. Before decommissioning may begin, an oil and gas company must submit the relevant risk management plans to NOPSEMA for assessment and acceptance.

The plans required for decommissioning can include a safety case, well operations management plan, field development plan and an environment plan. NOPSEMA's dedicated assessment teams assess each plan against strict criteria as set out in the *Offshore Petroleum and Greenhouse Gas Storage Act 2006* and associated regulations.

Getting the policy settings right for future decommissioning works will be crucial for job creation, protecting the environment and stimulating the economy in the coming years. Around US$6.5 billion was invested in offshore decommissioning projects globally in 2019 and this is set to grow to US$8.3 billion by 2024.[5]

As oil and gas structures come to the end of their commercial lifespans, the industry is committed to responsibly managing its infrastructure in a way that maximises the ecological, social and economic opportunities for regional communities across Australia.

APPEA and member companies are working with the Australian Government to deliver a robust decommissioning framework that protects our marine environment and enables a local decommissioning industry to create jobs.

In anticipation of this expected upswing of decommissioning activity, National Energy Resources Australia (NERA) recently launched the Centre of Decommissioning Australia (CODA) to foster industry collaboration for the benefit of the Australian economy and environment.

Case studies

CASE STUDY

ConocoPhillips Long-term Turtle Management Plan

ConocoPhillips Australia is the operator of the Australia Pacific liquefied natural gas (APLNG) facility located on Curtis Island on the east coast of Australia. Curtis Island is in the southern end of the Great Barrier Reef World Heritage Area and is home to two other LNG facilities. Gladstone Harbor, where most of ConocoPhillips Australia's work takes place, is a busy industrial port located inside the Great Barrier Reef World Heritage Area—a location that makes biodiversity protection a top priority for them.

Working with the two other LNG operators and the government, ConocoPhillips Australia adopted an offset plan to protect the area's unique ecology and heritage for future generations, contributing to lifetime conservation of the Great Barrier Reef World Heritage Area. On Curtis Island alone, the LNG industry offset permanently protects over 15 times the area it disturbed with more than 59 per cent of the island now actively managed under a conservation management plan, compared to just 2 per cent of the land used by the LNG projects on the southern tip. A 10-year long-term turtle management plan monitors the turtle population and health within the Gladstone harbor and southern Great Barrier Reef.

Additionally, a 'Reef Trust', a Commonwealth of Australia initiative funded in part by APLNG and the two other LNG operations on Curtis Island, was established to protect and enhance the World and National Heritage values. The funding is earmarked for use on projects that protect, repair or mitigate damage to the southern section of the Great Barrier Reef World Heritage Area.

CASE STUDY

BHP King Reef

King Reef, located approximately six nautical miles off the coast of Exmouth, Western Australia, is the largest and fastest developing purpose-built artificial reef in the Southern Hemisphere.

In mid-2018, six giant streel structures from BHP's Griffin oil and gas facility were decommissioned, cleaned, repurposed and deployed on the ocean floor within the Exmouth Gulf in Western Australia.

Today, the two-acre King Reef has created more than 27,000 cubic metres of new underwater habitat, providing food and shelter for more than fifty different types of marine life, including a variety of fish, sea turtles, sea snakes, sharks and rays.

BHP also funds Reef Vision which empowers community stewardship through ecological data collection and is a vital component of the King Reef Project.

Through Reef Vision, community members head out to the reef, drop cameras to observe the marine life and send the data back to Recfishwest and Curtin University for scientific assessment and reporting.

CASE STUDY

Woodside Echo Yodel Subsea Infrastructure

In 2020, Woodside announced plans to decommission subsea infrastructure no longer required for production activities from the Echo Yodel field subject to approvals.

The existing subsea infrastructure has attracted a diverse array of marine life over the years. A number of scientific research articles have been published on the subsea infrastructure which has found a total of 48 species and 28 families of teleost fish and sharks have been recorded on the pipeline from a video survey completed in 2013. Over 20 species of commercial caught fish have been found on the pipeline, as well as a number of vulnerable species like the giant guitarfish, blotched fantail ray, sandbar shark, and silvertip shark.

Woodside plans to leave this subsea infrastructure in place to support the maintenance of this ecosystem, a decision made following consultation with stakeholders with interests in commercial fishing, marine science, and the Western Australian Government.

CASE STUDY

Australian Institute of Marine Science, North West Shoals to Shore Research Program

Santos supports the AIMS North West Shoals to Shore Research Program as part of the company's commitment to better understanding Western Australia's marine environment.

Research released in July 2021 has found marine seismic surveys used in oil and gas exploration are not impacting the abundance or behaviour of commercially valuable fishes in the tropical shelf environment in north-western Australia.

The research is the first of its kind to use dedicated seismic vessels to measure the impacts of the survey's noise in an ocean environment, with the eight-month experiment conducted within a 2500 square kilometres fishery management zone near the Pilbara coast.

It involved using multiple acoustic sensors, tagging 387 red emperor fish and deploying more than 600 underwater cameras to track and measure fish behaviour before and after firing seismic air guns into the ocean.

These red emperor fish—an important target of fisheries—were tagged and tracked via an array of acoustic telemetry receivers to understand their movements.

This research fills in a key knowledge gap in the effect of seismic exploration on fisheries in the area, which is necessary for managers, marine industries, and policy makers to make informed decisions about its sustainable use.

Case studies

CASE STUDY

BHP Griffin subsea pipeline research

A soon-to-be decommissioned gas pipeline off the coast of north-west Australia has become a haven for endangered fish species, including green sawfish (critically endangered) and zebra sharks, as well other commercially important fish.

BHP is planning for the safe and sustainable closure of the Griffin facilities, including the underwater pipeline, and will work with relevant parties through an inclusive, transparent consultation process.

A recent world-first research project on the BHP Griffin subsea gas pipeline undertaken with the University of Western Australia and coordinated by PhD researcher Todd Bond showed that the pipeline has a diverse fish community comparable to that described in the 1950s, an era before fish trawling.

In depths beyond 80 metres, they found the immediate area around the pipeline had two-to-three times the value of commercial fish than in surrounding areas. They found similar fish numbers in shallower depths.

Through this research they saw critically endangered fish species near the pipeline such as the green sawfish, along with over twenty endangered or threatened species such as the scalloped hammerhead, great hammerhead and zebra sharks. The research also found the pipeline to have high numbers of valuable commercial fish such as goldband and saddletail snappers and red and spangled emperors.

The research used baited cameras to survey 42.3 kilometres of the pipeline up to a depth of 140 metres. They then compared these results with similar surveys undertaken up to 40 kilometres either side of the pipeline. Of key significance, they observed many more commercial fish around the pipeline than off-pipeline. More commercial fish means fisheries could benefit from leaving the pipeline as is.

BHP's final decommissioning decision on the Griffin pipeline will balance their values and obligations with environment, health and safety considerations and external expectations to achieve an optimised closure outcome.

CASE STUDY

Woodside research collaboration with Australian Institute of Marine Science

To better understand the potential value of subsea infrastructure as habitat for invertebrates, fish and fisheries, Woodside collaborated with The University of Western Australia and AIMS to undertake numerous scientific studies. This research assessed the biodiversity, fish abundance and fisheries value of Woodside-operated existing offshore infrastructure—including infield pipelines, trunklines, wellheads and offshore platforms on the North West Shelf (NWS).

The research increased our knowledge of the ecosystems of the NWS and the role offshore infrastructure plays in marine habitat and fisheries habitat creation. Woodside has used these studies to inform and support assessments of decommissioning options for subsea infrastructure.

Significantly, the research has resulted in numerous peer reviewed scientific articles being published in international journals. The articles highlight that there is an abundance and diversity of species that exist on NWS infrastructure, particularly commercially significant fish species such as red emperor and gold-band snapper. In addition, rare and highly-protected species like whale sharks and sawfish are resident or regularly visit this infrastructure.

CASE STUDY

Santos Varanus Island Management Project

Santos is the operator of the Varanus Island processing facility, which receives gas, oil and condensate from several offshore fields off the coast of northwest Western Australia.

Varanus Island is a C-Class Nature Reserve, and like other islands in the area, boasts a considerable population of breeding seabirds, including the wedge-tailed shearwater. The desire to protect these birds resulted in the launch of the Varanus Island Management project in 2018.

Advice from a seabird ecologist informed the implementation of procedures that significantly improved interactions with seabird populations over a three-year project period.

Endnotes

1 Department of Industry, Science, Energy and Resources (2020), Australian Energy Update 2020, *Australian Energy Statistics*, September, Canberra (pp7–8).

2 Australian Bureau of Statistics (March 2020), 8412.0: Mineral and Petroleum Exploration, Australia.

3 Department of Industry, Science, Energy and Resources, Commonwealth of Australia *Resources and Energy Quarterly* June 2021.

4 Western Australian Marine Science Institution Marine Research Program KMRP Report, *Humpback whale use of the Kimberley: understanding and monitoring spatial distribution*, July 2018, p39.

5 Statista, Market value of offshore decommissioning worldwide in 2019 and 2024 (in billion US dollars), https://www.statista.com/statistics/326070/global-offshore-decommissioning-market-size/.

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