



## A Joint Venture

The Bass Strait oil and gas fields and associated production and processing facilities are owned by Esso Australia and BHP Billiton in a 50:50 joint venture arrangement. Esso Australia is the operator and, as such, has responsibility for the day to day management decisions and the operations of the production and processing facilities.

Esso Australia Pty Ltd is a subsidiary of the largest petroleum and petrochemical company in the world, the United States based Exxon Mobil Corporation.

ExxonMobil conducts business in more than 200 countries around the world - in the exploration and production of oil and gas; manufacturing and marketing of fuels, lubes and chemicals; and electric power generation.

BHP Billiton Petroleum Pty Ltd is a subsidiary of BHP Billiton, one of the world's largest diversified natural resources groups. BHP Billiton has operations in the major resources provinces of Africa, Australia and Latin America, and provides a range of products (including aluminium, base metals, carbon and stainless steel-making raw materials, diamonds, energy coal, petroleum and various steel products) to customers in the markets of North America, Europe and Asia.

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**BASS STRAIT  
OIL AND GAS**



## Offshore Operations in Bass Strait

In 1965 an Esso/BHP joint venture drilled Australia's first offshore well and discovered the Barracouta gas field in Bass Strait.

Two years later the joint venture discovered Kingfish, the first offshore oil field, which to this day remains the nation's largest oil field.

These, and other subsequent world-class discoveries in Bass Strait, off Victoria's Gippsland coast, have led to significant changes to Australia's industry and economy.

Since the first Bass Strait platform, Barracouta, started operations in October 1969, more than 3.5 billion barrels (556,000 million litres) of crude oil and 5 trillion cubic feet of gas have been produced.

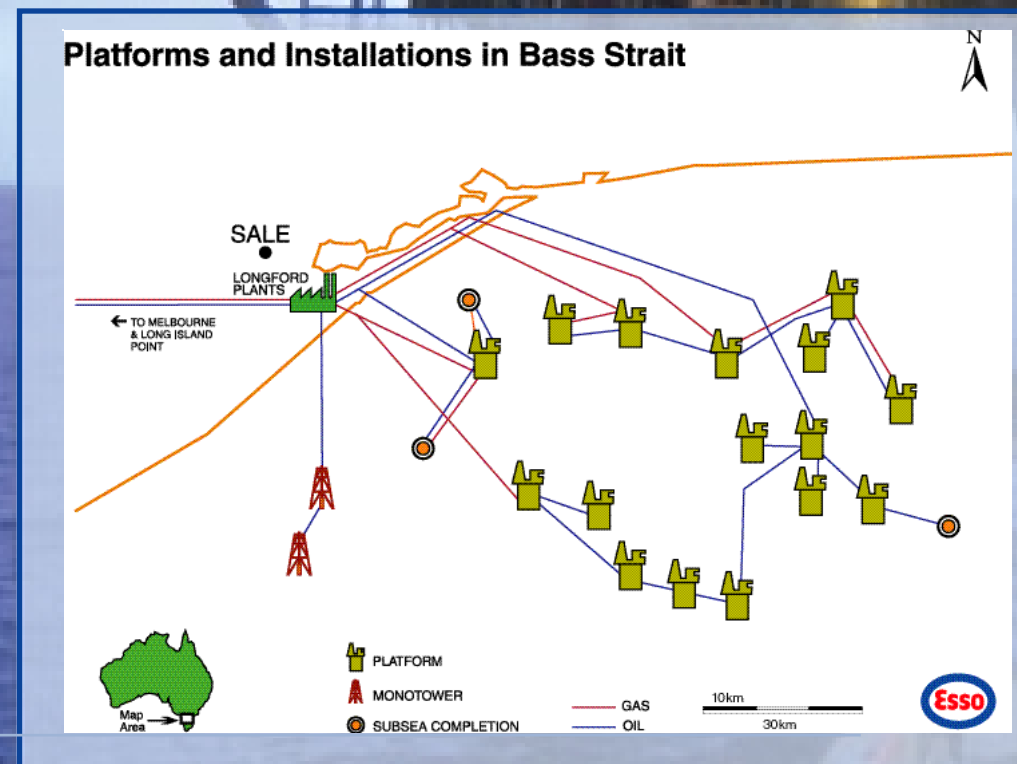
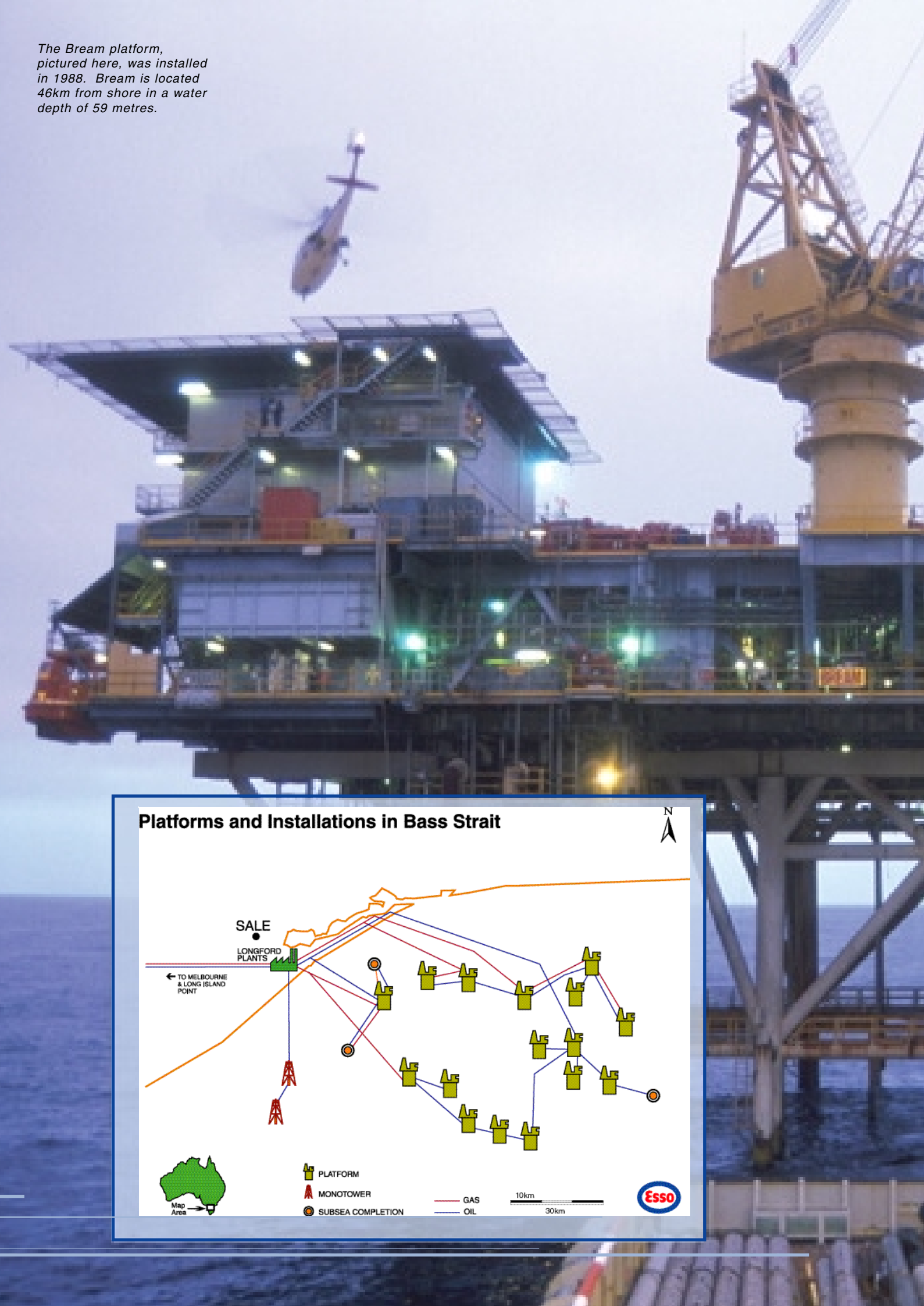
Massive infrastructure costing more than \$12.5 billion has been built to develop, produce and process the crude oil and gas, which is used to power industry, fuel vehicles, heat homes and manufacture products in Australia and overseas.

New platforms and other production facilities have been regularly added, the most recent being the Blackback sub-sea facility, which at a depth of nearly 400 metres is one of Australia's deepest oil developments.

There are now 21 offshore platforms and installations in Bass Strait which use a network of 600km of underwater pipelines to keep the oil and gas flowing, 24 hours a day.



The Bream platform, pictured here, was installed in 1988. Bream is located 46km from shore in a water depth of 59 metres.





## Living and Working Offshore

Up to 300 Esso personnel and contractors are living and working offshore at any one time. Platforms operate 24 hours a day and crews typically work 12 hour shifts on a seven-days-on and seven-days-off roster.

The biggest platforms are capable of sleeping up to 80 people at any one time although the actual number of personnel on a platform varies considerably depending on the platform's current work program.

An effort is made to provide as many home comforts as possible. The platforms have gymnasiums and recreational rooms where off-duty personnel can workout, watch television, play pool or computer games. There are also fully equipped kitchens which provide thousands of meals each year.

Reflecting the international nature of the oil and gas industry the platforms often comprise a mix of personnel from all over the world. At any one time it would not be unusual for more than a dozen nationalities to be represented in Bass Strait. As well as the Australians, the most common are Americans, Canadians and Europeans.

Platform crews are typically made up of a supervisor, who oversees all work undertaken on the platform; operators, who control the crude oil and gas flow to the surface and monitor the processing facilities on each platform; maintenance personnel, who look after electrical, mechanical and instrumentation equipment; crane drivers; trades assistants; and platform services operators who carry out first aid duties as required. Contractors do most of the other specialised jobs like drilling, construction, diving, painting and catering.

Crews travel to and from the platforms by helicopter.



*Safety is a priority offshore. Brightly coloured coveralls, hard hats, safety glasses and hearing protection are worn at all times when working outdoors.*





## The Lifelines of Bass Strait

### BY AIR...

Helicopters are one of the crucial lifelines that support the oil and gas operations in Bass Strait. Esso operates Australia's largest privately owned helicopter fleet from its heliport at Longford near Sale, 220 kilometres east of Melbourne.

Sikorsky S-76C helicopters operate regular morning and afternoon flights to ferry personnel to and from the platforms which are between 25 and 80 kilometres offshore.

The helicopters are capable of seating up to 12 people and each year they move about 20,000 passengers and accrue about 5,500 hours of flying time. They also carry more than 20 tonnes of urgent freight and critical spares per month.

### AND SEA...

Two supply ships operate out of Esso's Marine Terminal at Barry Beach, near Welshpool.

The ships operate 24 hours a day and move between platforms loading and unloading cargo. They have a crew of 11 and are equipped with specialised navigational equipment and propulsion systems which allow them to operate close to the offshore platforms.

Around 50% of the cargo delivered to the platforms is bulk products essential for drilling and oil and gas production - diesel, water, glycol, barites and cement. These are carried in below deck tanks. The balance of cargo is food and machinery which is transported on deck packed in specially designed containers.

*The Mackerel platform, pictured here, has been producing oil and gas from Bass Strait for over twenty years. It first commenced production in December 1977. Mackerel is located 72 km from shore in a water depth of 93 metres.*



*Seismic vessels, like the Pacific Titan, pictured here, tow hydrophone streamers up to 5 km long*

The seismic data collected through this process is analysed and interpreted using extremely powerful computer programs and software. The computers then generate three dimensional (3D) images of the various underground formations.

Studying these images can tell us the geology and properties of the rock within a reservoir and thus allow geoscientists to identify prospective drilling targets as well as effectively and efficiently managing the current resources.

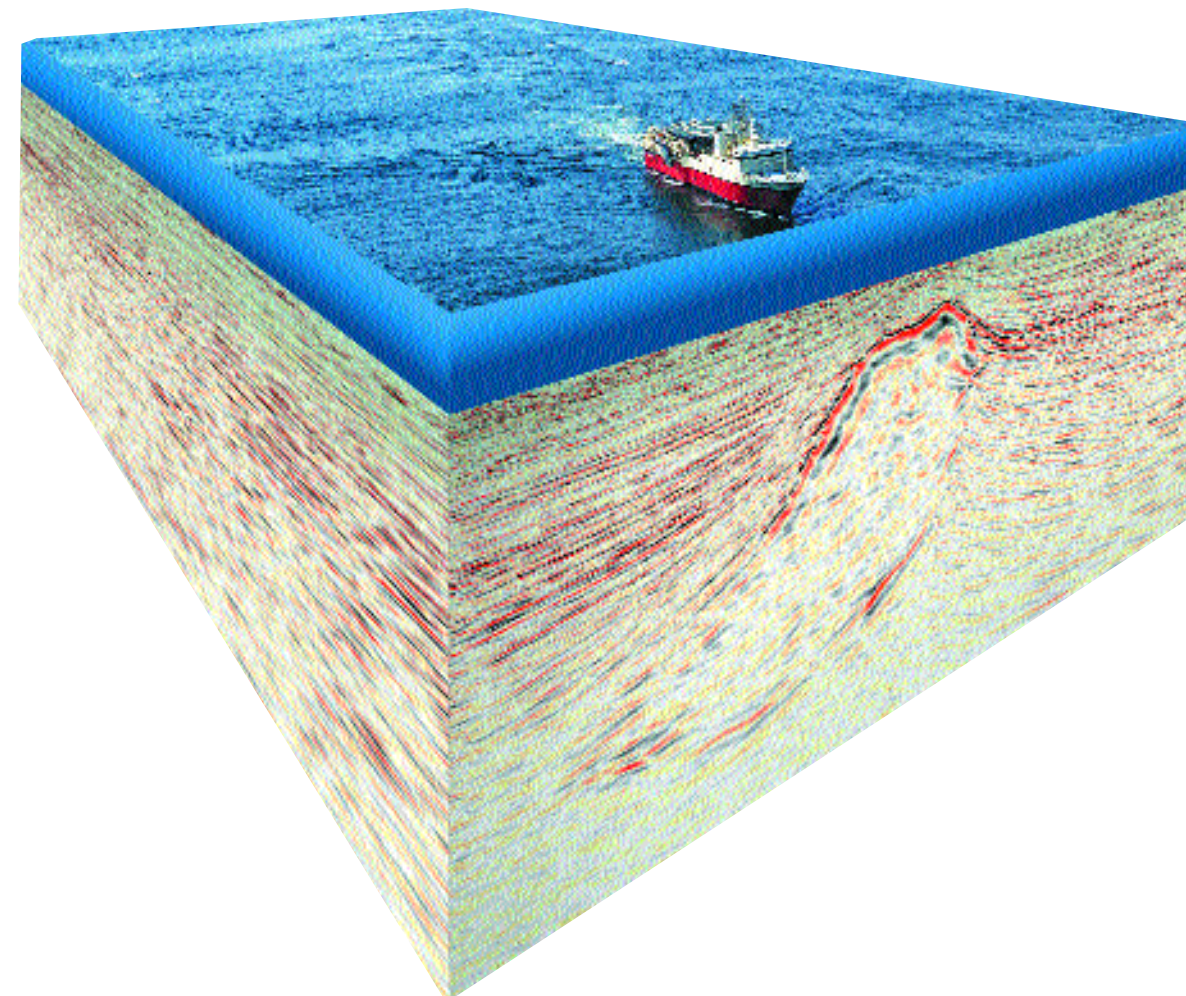
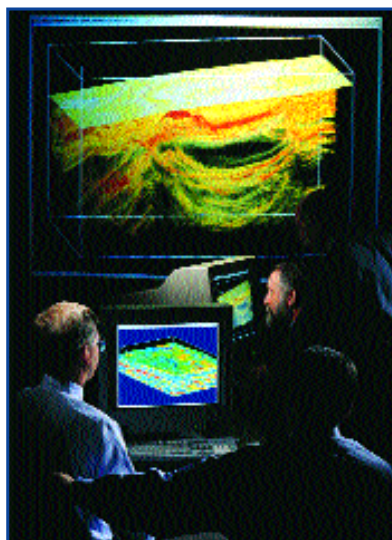
Exploration technology is constantly improving and the introduction of 3D imaging in particular, now allows us to see potential oil bearing structures deep inside the earth that would not have been visible just a few years ago.



## Offshore Exploration

Offshore exploration in Bass Strait is conducted with the assistance of specialised seismic surveys.

Seismic surveys use compressed air to bounce low-frequency sound waves off boundaries between different rock layers far below the ocean floor. The sound waves are recorded by long streamers of hydrophone listening devices which are towed behind a specially configured ship. The hydrophone streamers can often be up to 5km long and a large seismic survey usually takes several months.



*Seismic surveys, and powerful 3D computer software, allow geologists to "see" potential oil bearing sands deep inside the earth.*

## Drilling and Production

Offshore wells rarely go straight down. Most are drilled out at an angle in many directions in order to access different parts of an oil or gas field. Some wells penetrate rock formations several kilometres away from the platforms.



Bass Strait oil wells vary in length from about 2km to 8km and the maximum horizontal distance from a platform is more than 6km. Drilling is conducted using computer controlled, extended reach rotary drills which cut through rock using a drill bit with steel or even diamond tipped teeth.

The design of individual wells varies considerably depending on the size and characteristics of the field, the rate of flow and the long-term production strategy.

The Bass Strait oil and gas fields are monitored by Esso's engineers and geoscientists using sophisticated computer modelling applications. A reservoir can be redrilled several times as the best well locations change as the field matures and becomes depleted.

When new drilling is required a special drilling rig will be attached to an existing platform where it will usually remain for several months. Most drilling rigs are run by contractors who take their rigs to oil fields all over the world, from Norway, Malaysia and the Middle East, to Bass Strait.

Whilst the basic idea of drilling has not changed much over the years the technology has improved dramatically. In fact, the robotics, space age metals, and remote sensing devices used for offshore oil exploration and production rival the space station as advanced technologies for a hostile environment.



### Millions of Years in the Making

Crude oil is a mix of thousands of hydrogen-carbon compounds ranging from gases to solids as well as sulfur and other materials. It began forming millions of years ago as plant and animal remains decayed in sediments at the bottoms of oceans, lakes and streams.

Massive pressures and temperatures converted this organic matter into oil and gas. In rare circumstances, like those in Bass Strait, rock formations trapped large accumulations that can be extracted in commercial amounts.

Even then, oil and gas do not lie in vast underground lakes just waiting to be tapped, they are contained within the tiny spaces of layers of porous rocks which may be a few metres, or a few hundred metres thick.

*Offshore platforms use hundreds of kilometres of metal pipes and tubing for both drilling and ongoing production. 9.6m long joints are screwed together and run into the well by the drilling rig.*

## How much oil and gas does Bass Strait have left?

Oil and gas reservoirs by their very nature start to decline in production rates after about half of their reserves are produced. Therefore, fields need to be managed very carefully and ongoing exploration and development is important to ensure production levels can be maintained into the future.

In late 2001 Esso conducted its largest 3D seismic survey ever in Bass Strait. The very detailed and high quality data from this survey will be used by Esso's geoscientists and engineers for years to come.

In particular, this exploration data is being used to enable a new round of activities in Bass Strait. Whilst massive new fields are rarely discovered once a region has been producing for some time, new exploration using improved state of the art technology often detects smaller fields which may have previously been uneconomic to develop.

In Bass Strait there are a number of smaller, more complex fields which as stand-alone discoveries would be difficult to commercialise. However, because of their proximity to existing fields and infrastructure they may be able to be commercially produced.

Bass Strait reservoirs are expected to produce crude oil and natural gas until at least 2030.



## A Commitment to Safety and the Environment



Esso is committed to protecting the health and safety of its employees and contractors. The operational procedures used on the Bass Strait platforms follow comprehensive guidelines which have been developed through the years as experience has grown.

A structured framework known as the 'Operations Integrity Management System' (OIMS) is used to identify and control all safety risks associated with the design, construction and operation of the platforms. Each platform has its own individual "safety case" which integrates the identified major hazards and risks with the controls provided by OIMS.

In addition all platforms and installations have response plans in place in case of an emergency. Platform personnel conduct regular emergency drills and all platforms are equipped with emergency equipment and escape capsules.

Esso's operations in Bass Strait are conducted in strict compliance with all environmental laws and regulatory requirements and in a manner which ensures minimal impact on the marine environment.

The offshore platforms themselves have become home to many marine animals and a popular resting place for large colonies of fur seals.



Flares are an important safety mechanism and work much like a home gas heater. A pilot light burns all the time and ignites any gas which may be collected and sent to the flare when there is an interruption to the normal operational processes. Burning the excess gas ensures that it does not escape into the atmosphere creating a possible safety and environmental hazard.



## The History of Oil and Gas in Bass Strait

Strandings of oil have been recorded along Australia's southern coastline since 1869 but it wasn't until 1960 that the hunt for oil in Bass Strait began in earnest.

In 1960, BHP contracted a leading American oil-field geologist who, just days before his planned return to the US, managed to convince them to follow his hunch and explore Bass Strait - one of the roughest stretches of water in the world.

Bass Strait was an area that had been deemed not worth exploring. It was adjacent to a coast where 140 dry holes had been drilled in 40 years of unsuccessful searches for oil. On top of this, it was exploring water conditions and depths that were beyond the oil-field technology of the day.



However, BHP proceeded and, following encouraging results from an initial aerial survey, commissioned Australia's first offshore seismic survey. This survey indicated that there were several areas in the Gippsland Basin where oil could possibly be trapped.

It was now time to bring in a partner with oil industry experience and Esso Standard Oil (Australia) Ltd, a subsidiary of Standard Oil of New Jersey, was signed on as 50:50 joint-venture partner in 1964.

The drilling ship Glomar III, at the time operating in the Gulf of Mexico, was brought to Australia to drill the country's first offshore exploration well.

The first well into a prospective field is called a 'wildcat' because it is so unpredictable. Bass Strait's wildcat drilling progress was hampered by the notorious bad weather and the water

depth, which set the Bass Strait operation apart from any similar project attempted anywhere in the world at the time.

On February 18, 1965, the drill reached 1318 metres and the joint venturers made their first discovery -- gas.

"This Could Be It!" screamed the newspaper headlines. There was every reason for excitement. To make a strike in the first wildcat well into a new region goes against all the odds of exploration. There was no doubt that this find would have far-reaching economic implications for Australia.

A year later came the discovery of another major gas field, Marlin, and this was where the hunters got their first look at the real prize - oil. At 10.47am on March 14, 1966 it emerged from deep inside the earth, a continuous, steady, honey-coloured stream.

The first wildcat well into the massive Kingfish field demonstrated the difficulties faced by geoscientists as they tried to develop a picture of subsurface formations based only on seismic data. While the geoscientists and engineers believed they were drilling into the crest of a huge formation, they were actually way out on a flank. However, the sheer size of what, to this day, remains Australia's biggest oil field meant they couldn't miss it and they managed to hit what they thought was a medium-sized oil column.

The next wildcat, Halibut, intersected a 120 metre oil column. The oil-bearing sand was of such high quality that the field was declared commercial on the strength of that first wildcat well. This is almost unheard of in the conservative world of oil exploration.

After Halibut the discoveries came thick and fast: Dolphin, Perch, Flounder, Tuna, Snapper, Mackerel and Bream as well as oil at Barracouta and West Kingfish.



The frantic drilling activity offshore was matched by the intensive construction that began onshore. A marine supply terminal was constructed at Barry Beach to service the drilling vessels and supply boats with equipment, tools and food. It also became the construction site for the offshore platforms.

Construction was also under way on a plant at Longford near Sale to process the raw gas and stabilise the crude when it came in from offshore. At Long Island Point near Hastings a crude tank farm, fractionation plant and jetty were also being constructed to further process the products and deliver them to the marketplace. Connecting all the facilities, onshore and offshore, required the construction of a network of more than 1000km of pipelines.

At its peak in the mid-'80s Bass Strait was producing upwards of half a million barrels of oil a day. Since production started in 1969 Bass Strait has delivered more than 3.5 billion barrels of oil and 5 trillion cubic feet of gas.

Prior to the Bass Strait discoveries Australia was almost totally reliant on imports of petroleum products. Crude oil was the nation's most costly import item. When you consider all the oil and gas produced from Bass Strait over the years – oil that would otherwise have had to be imported – then add the tens of billions of dollars paid by the joint venturers in revenue to the government, you begin to get a vague idea of the significance of Bass Strait to the development of Australia.

