Petroleum Basins

A submerged continent

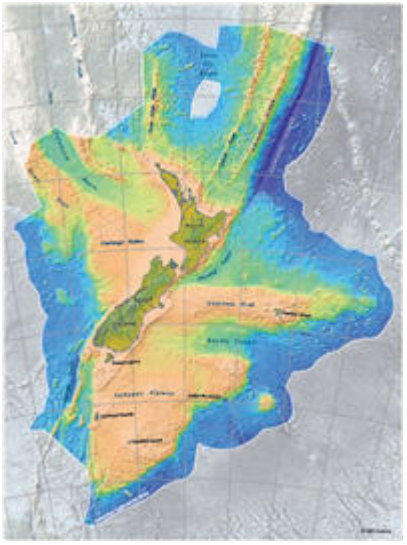
The islands of New Zealand have a total area of 250,000 sq km and are the emergent parts of an extensive continental landmass with a total area of 6 million sq km. Northwest, south and east of New Zealand are large areas of relatively shallow sea underlain by plateaux and ridges that border the deep ocean basins of the Pacific Ocean and Tasman Sea.
New Zealand established an Exclusive Economic Zone (EEZ) defined by a line 200 nautical miles from the New Zealand coastline and, under the United Nations Convention on the Law of the Sea (UNCLOS), is defined an Extended Continental Shelf (ECS) beyond the EEZ. In August 2008, a United Nations Commission confirmed the extent of New Zealand's maritime entitlement. New Zealand now has sovereign rights over more than 5.7 million square kilometres of seabed. This is an area 22 times greater than our land area; equivalent in size to the European Union, the North Sea, and a quarter of the Mediterranean combined.
Read more in The Continent of New Zealand [1.01 MB PDF]

New Zealand basin overview

There are multiple sedimentary basins with known or potential hydrocarbons onshore and underlying the extensive continental shelf of New Zealand, as well as several deepwater basins within its Exclusive Economic Zone.
Commercial and sub-commercial discoveries, abundant potential source rocks, thick Cretaceous-Cenozoic sediments, and numerous hydrocarbon seeps and shows in exploration wells all indicate that petroleum generation and migration has and is taking place in many of these basins. The petroleum systems hosted in several of the country's basins have many common characteristics because the stratigraphic distribution of potential source, reservoir, and seal rocks generally follows a similar pattern. However, the diversity of tectonic environments in New Zealand has produced differences in the timing of maturation and migration history.

New Zealand basins fact files:

- Reinga/Northland Basin
- Taranaki Basin
- Whanganui, King Country & Waikato Basins
- West Coast Basins
- Western Southland Basins
- East Coast Basin
- Raukumara Basin
- Pegasus Basin
- Canterbury Basin
- Great South Basin



Tectonic development of New Zealand basins

New Zealand's prospective sedimentary basins are mostly younger than Early Cretaceous and most are composite basins, exhibiting multiple evolutionary phases and sediment deposition. Some of the basins have underlying Jurassic sediment which may contribute to the hydrocarbon potential of the basin. Basin evolution can generally be divided (from oldest to youngest) into rifted margin, passive margin, and convergent margin episodes that reflect the broad plate tectonic development of the New Zealand sub-continent.

The break-up of Gondwana from the mid-Cretaceous, and spreading in the Tasman Sea in the Late Cretaceous and Paleocene, initially led to the formation of rift basins and the deposition of terrestrial sediments that now form the predominant source rocks in many basins. The early Paleogene was a period of comparative tectonic quiescence, basin development was characterised by regional post-rift thermal subsidence, and widespread marine transgression leading to the deposition of shoreline sands overlain by marine silts and muds. These transgressive shoreline systems contain important productive and potential reservoir rocks, while overlying silts, muds and carbonates form good seals.

In the Middle and Late Eocene, sea-floor spreading to the southwest of New Zealand marked the initial stages in the development of the present-day Australian-Pacific plate boundary in the region. Pacific Plate subduction began to impinge upon northern New Zealand from the mid-Oligocene. As subduction progressed through the Early Miocene, regional subsidence was accompanied by reverse faulting along the eastern margin of the Northland and Taranaki basins. Back-arc extension and local volcanism ensued, and has continued to the present day.

During the Neogene, the Alpine Fault evolved to become the primary focus of dislocation between the Pacific and Australian plates in the New Zealand region, with more than 450 km of dextral strike-slip motion on the fault since the Early Miocene. Since the Middle Miocene, relative plate motion has become more oblique and the rate of convergence has accelerated, resulting in increasingly rapid uplift, erosion and sedimentation, and widespread basin inversions. Deformation associated with this tectonism has produced many structural traps.

Prospectivity

Taranaki Basin, covering an area of about 330,000 km^2, is currently the only producing basin in New Zealand. Over 400 onshore and offshore exploration and production wells have been drilled to date. None have been drilled beyond the shelf edge. The basin remains under-explored compared to many comparable rift complex basins of its size and there remains considerable potential for further discoveries.

The rest of New Zealand is severely under-explored, nevertheless frontier basins drilled to date have all yielded discoveries confirming viable petroleum systems. Given many untested structures mapped have closures bigger than the Maui field (New Zealand's largest field), there is considerable potential for commercial hydrocarbon discoveries under New Zealand's largely untouched seabed.

More useful information:

- The Continent of New Zealand [1.01 MB PDF]
- New Zealand Petroleum Systems [730 kB PDF]
- Discoveries and Developments [2.16 MB PDF]
- Future Frontiers [1.09 MB PDF]
- New Zealand Infrastructure and Port Facilities [1.25 MB PDF]
- New Zealand's geological timescale

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All information on this page is included in the New Zealand Petroleum Basins publication.

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