

A European Perspective on Exploration Destinations and the Implications for New Zealand

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Abstract

The paper considers the current perceptions of European oil and gas companies to exploration in New Zealand. Some suggestions are made regarding ways in which further exploration investment could be attracted to New Zealand. This incorporates an analysis of companies active or potentially active in New Zealand together with a review of some previous experiences of European companies elsewhere that may be applicable to New Zealand. Areas that are considered include:

- A review of the key influences on European oil companies when they evaluate potential destinations for upstream investment
- The current general European perception of New Zealand's exploration history to date and potential as an exploration destination
- An analysis of oil companies, including European companies, presently or potentially active in New Zealand
- Previous experiences that European companies are likely to draw upon when considering potential exploration investment in New Zealand. The consideration will include a review of successful European fiscal regimes and exploration techniques as well as analogies between New Zealand and European exploration experiences
- Potential means to attract more exploration investment from European companies

Introduction

This paper considers the current perceptions of European oil and gas companies to exploration in New Zealand. By analysing companies presently or potentially active in New Zealand and the previous experiences of European companies elsewhere that may be applicable to New Zealand, this paper seeks to make suggestions as to ways in which further exploration investment could be attracted to New Zealand:

Key Influences on Evaluating Exploration Destinations

The key factors considered by European companies when evaluating potential exploration destinations for investment are essentially those that apply to the oil and gas industry worldwide, namely:

- Political stability
- Fiscal regime

- Prospectivity
- Infrastructure
- Markets
- Oil price

Current European Perceptions of New Zealand's Exploration History and Potential

It would appear from research carried out for this paper that some European oil and gas companies have not undertaken detailed evaluations of New Zealand for a number of years and hence some of the current perceptions may not have the benefit of recent developments in the country. Some general perceptions, recently expressed in Europe, are reviewed below.

Political stability

New Zealand's long standing political stability is clearly a very positive factor from the viewpoint of outside investors from Europe and elsewhere. This is, however, tempered by some minor concerns about the strong competition from local companies which could make it difficult for outside investors to build a meaningful portfolio. For example, the February 1998 edition of Ministry of Commerce *Petroleum Exploration in New Zealand News* lists eight new permits, of which only one is to a non-New Zealand company (Amity Oil of Australia). In reality, local companies are currently taking permitting opportunities in a situation where outside investors have yet to enter the New Zealand market in numbers.

Fiscal regime

New Zealand's fiscal regime is generally recognised in Europe and elsewhere as being very favourable. In a comparison of fiscal regimes New Zealand's contractor take of approximately 50% compares well to the median of around 30% for other exploration destinations (see Figure 1).

Further fiscal incentives are a way in which New Zealand could attract additional investment, particularly into deep-water and/or remote areas. This possibility is considered further below. However, the existing favourable regime provides little scope for further discounts to encourage investment in this way. For example, Angola has a maximum government take of 74% discounted to 61% for deep-water areas and Gabon discounts from 68% to 52%, whereas Pakistan, which is in a similar position to New Zealand, is only able to discount from 51% to 48%.

Onshore hydrocarbon prospectivity is a particular problem with a perception of modest historical success from limited plays and typically small reserves. To a large extent this

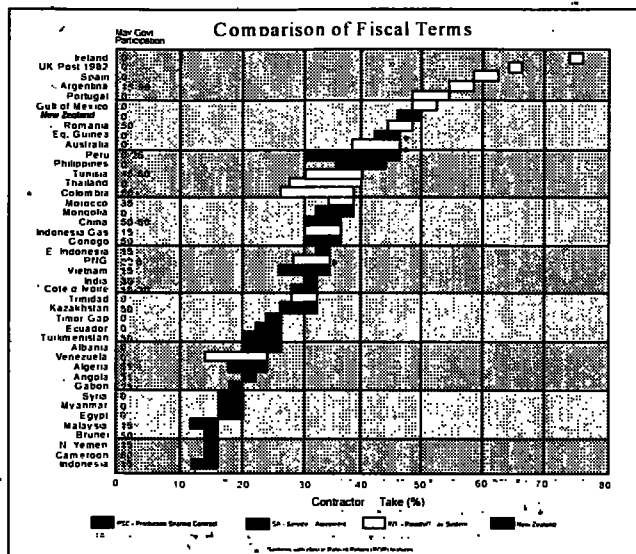


Figure 1. Comparison of fiscal terms (modified after Daniel Johnston and Co Inc 1996).

view is borne out by the 336 MMB (million barrels) of original reserves for the whole of New Zealand as at 1 January 1997 of which 173.5 MMB is held in the offshore Maui Field (Ministry of Commerce 1996). This indicates relatively small proven reserves in onshore areas despite 196 wells being drilled onshore between 1960 and 1996 inclusive. A summary of onshore drilling to the end of 1997 is provided in Figure 2.

However, there is scope for New Zealand to promote the potential of offshore areas to investors from Europe and elsewhere. As shown in Figure 2, the drilling density offshore is low with only the offshore Taranaki Basin reaching double figures in terms of the number of wells drilled.

Infrastructure

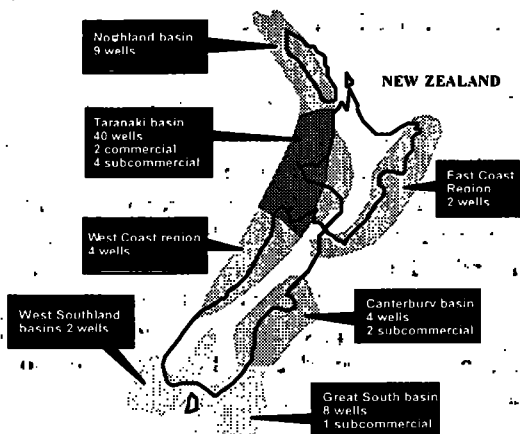
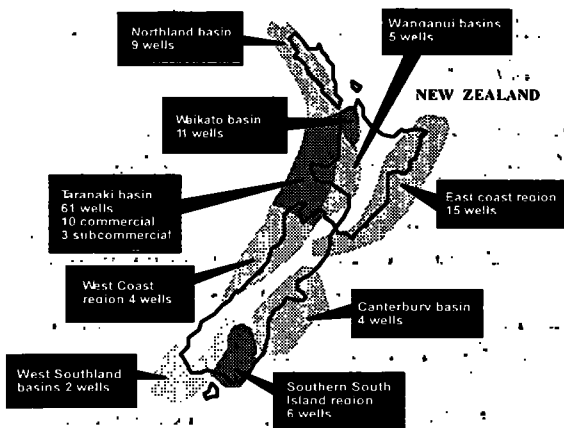
Infrastructure represents another area where the European perception of New Zealand currently appears negative. The existing limited pipeline system, which is likely to require some expansion in the eventuality of a large gas find, together with the perceived lack of a substantial domestic market (which is considered further below) are both problem areas. Remoteness and distance to market are also difficulties that are particularly felt by European companies. As shown in Figure 3, New Zealand, which is 19,000 km from London and 9,400 km from Tokyo, appears to be remote and on the edge of the market to European companies. The resulting time difference also makes communication difficult for them. In addition, the distances involved are likely to result in substantial expenses.

Markets

The distance of New Zealand from potential overseas markets is considered above. Europeans also perceive New Zealand as having a small domestic market which could be limiting if large amounts of hydrocarbons are discovered.

ONSHORE DRILLING* TO YEAR END 1997

OFFSHORE DRILLING TO YEAR END 1997



* All wells drilled to a depth greater than 500 m

Figure 2. New Zealand basins and wells drilled (modified after Cook and Gregg 1997).

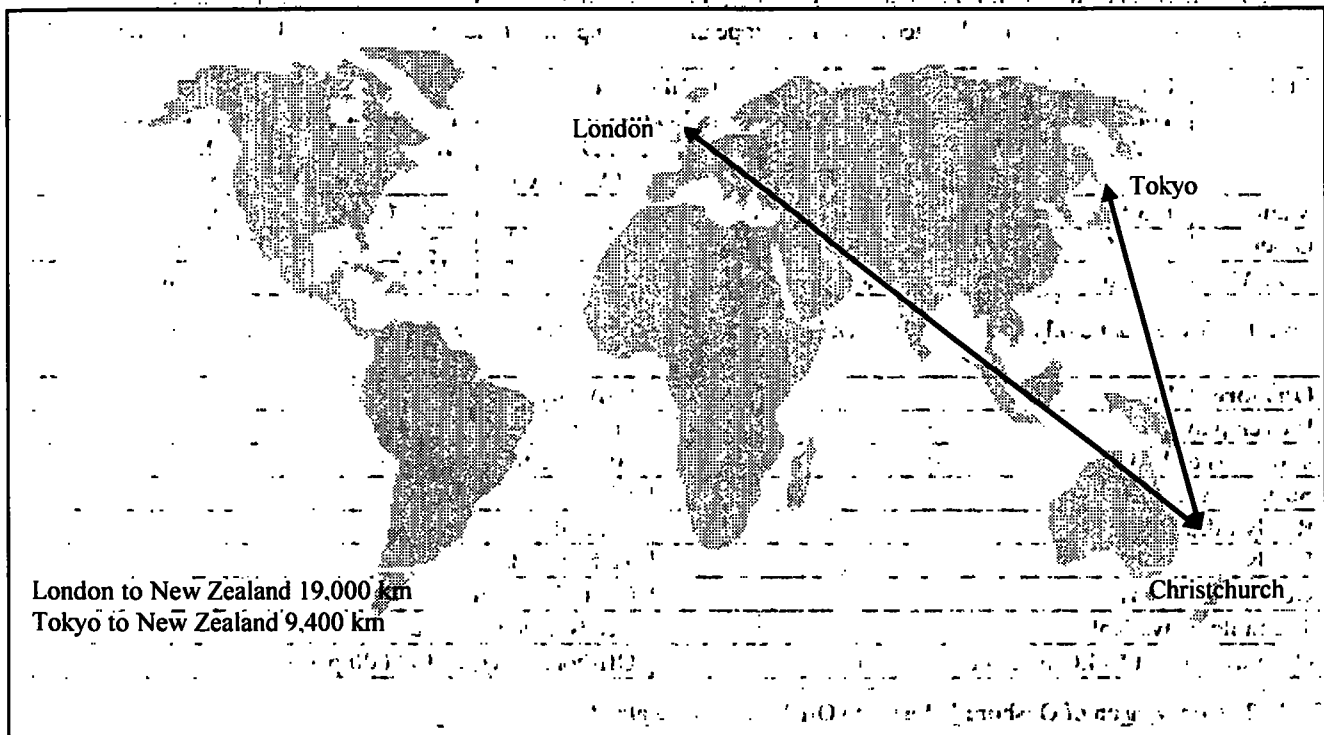


Figure 3. New Zealand distance map.

However, this view does not necessarily accurately represent the current position. Oil consumption in New Zealand is increasing - from 186 Petajoules in the year to March 1995, to 196.93 PJ to March 1996 and 199 PJ to March 1997 (Ministry of Commerce 1997).

Meanwhile, although New Zealand's production increased by 55% from March 1996 to March 1997, the country remains a net importer of crude oil and condensate. In the mobilisation and demobilisation costs when drilling in year to March 1997 New Zealand production was 106.67 PJ, and imports were 158.85 PJ whereas the refinery intake was 194.26 PJ and exports were 68.03 PJ (Ministry of

Commerce 1997). Net imports were therefore 90.82 PJ or approximately 16.14 MMB compared to New Zealand's crude oil and condensate production of 106.7 PJ or 18.96 MMB.

These figures need to be viewed against a backdrop of declining reserves. Production in New Zealand rose to record levels in 1997 with the Maui F sands coming on stream in September 1996, but no significant new reserves have been discovered in recent years. New Zealand remains heavily reliant on the Maui Field, which by mid-1997 represented approximately 70% of national production. However, as Maui and other fields continue to deplete as illustrated in Table 1, New Zealand has a need

to encourage more exploration in other areas of the country and there is an increasing opportunity for companies who may make a large hydrocarbon find to generate sales into the local market.

Oil price

Although it is too soon to assess whether or not the fall will continue into the medium to long term, the recent drop in the oil price may also have an impact on the choice of exploration destination. Should lower oil prices be sustained and oil companies seek to limit exploration budgets, it is probable that they will initially seek to reduce investment in the higher risk deep-water and frontier areas. If so, there may be some adverse effect on exploration in New Zealand.

Summary

In summary, some of the current European viewpoints on New Zealand can be highlighted by a comparison of New Zealand to another exploration destination. For reference a simple comparison of the position of Onshore Pakistan, an area where the demand for licences from European

companies is currently high, to offshore New Zealand is set out in Table 2.

Analysis of Company Presence in New Zealand

A summary of licenced exploration acreage in New Zealand as at January 1998, analysed by the country of origin of the rightholder, is shown in Table 3. The figures are affected by the large area of frontier exploration acreage held in block PEP 38602 in the Northland Basin by Conoco (a US company holding 55,384 km²), Inpex (a Japanese company holding 32,573 km²) and Todd Petroleum (a New Zealand company holding 9,773 km²).

A number of European companies have in the past explored in and since departed from New Zealand. These include BP, Total, Bula Oil, Burnside Overseas Exploration, Seafield Resources, Goal Petroleum and Aberdeen Petroleum. However, as can be seen from Table 3, the current European presence in New Zealand is relatively small. There are presently only two European companies holding interests in licences in New Zealand.

Field	Oil/Condensate Total Reserves MMB	Oil/Condensate Remaining Reserves at 01.01.97 MMB	Oil /Condensate Production Y/E 31.3.97 MMB (Approx.)	Gas Total Reserves BCF	Gas Remaining Reserves at 01.01.97 BCF
Maui	173.50	88.5	13.27	3,395.0	1,300.0
Others	162.46	46.76	5.69	1,747.4	898.3
TOTAL	335.96	135.26	18.96	5,142.4	2,198.3

Table 1. New Zealand oil and gas reserves and production (modified after New Zealand Crown Minerals 1996).

Onshore Pakistan	Offshore New Zealand
Proven play	Frontier
456 wells drilled	20 (excluding Taranaki)
Surface outcrops	Water
Ready infrastructure	Limited
Ready market	To be developed
Good fiscal terms	Good fiscal terms
Technology available	Needs to be imported
Onshore rig cost \$14,000 per day	Offshore rig cost \$140,000 per day

Table 2. Comparison of Onshore Pakistan to Offshore New Zealand.

Country of origin of rightholder	Licenced/permitted acreage held (km ²)	Percentage of total licenced/permitted acreage held
United States	71,977	29.8
Canada	40,922	16.9
Australia	40,508	16.8
New Zealand	38,892	16.1
Japan	32,601	13.5
Singapore	2,063	0.9
Germany	1,458	0.6
Holland	1,119	0.5
Other/Unknown	11,741	4.9

Table 3. Licenced/permitted exploration acreage analysed by country of origin of the rightholder.

These are Shell (as Shell Todd Oil Services and Shell (Petroleum Mining) Company) which has interests in four blocks in the Taranaki Basin and Preussag Energie which has interests in three blocks in the Taranaki. Preussag has recently relinquished interests in two further blocks in the Taranaki Basin and another European company, Croft Exploration, forfeited its 10% interest in one block in the East Coast Basin during December 1997. The location of the current European interests is set out in Figure 4.

In addition to those European companies already active in New Zealand, there are a number of other European companies who already have an established presence in the Australasian region. As of January 1998, seven European companies had interests in Australia as set out in Table 4. Only one of these seven, Shell, also holds acreage in New Zealand.

Previous Experiences of European Companies Potentially Influencing Investment in New Zealand

Recent experiences in Europe are also likely to have some bearing on the potential investment decisions by European companies evaluating New Zealand. Two areas will be considered in more detail, namely fiscal terms and new technology.

Fiscal terms

Companies looking for exploration and development opportunities are attracted by favourable licensing terms to offset perceived high risk. However, favourable licensing terms by themselves are not usually enough to attract investment. There usually has to be an additional incentive,

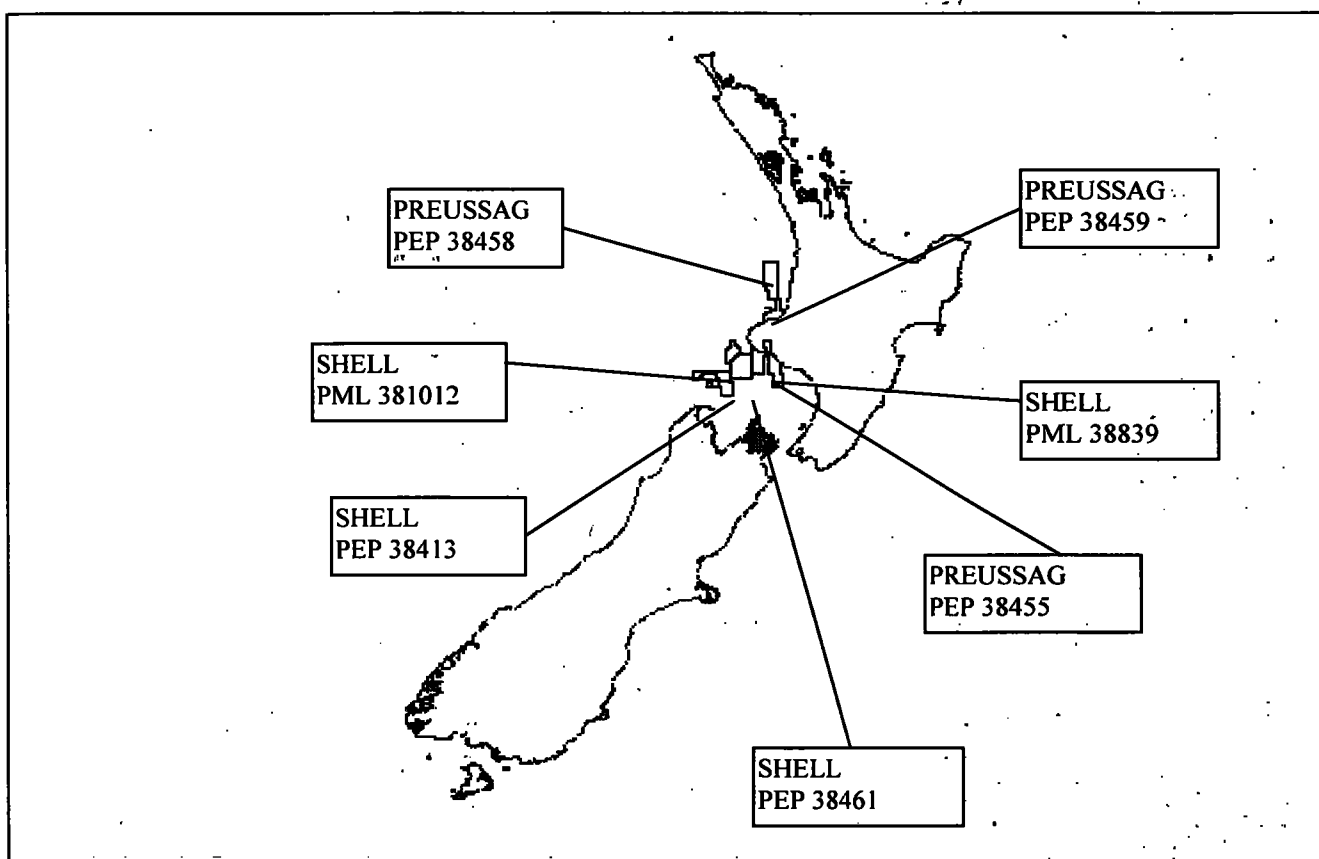


Figure 4. European companies with interests in New Zealand.

Company	No. of interests Western Australia	No. of interests ZOCA	No. of interests Northern Territory	No. of interests Tasmania	No. of interests Victoria
Shell	54	7	9	0	3
Premier Oil	30	0	1	3	0
BP	22	0	0	0	0
Statoil	2	0	0	0	0
Seafield Res.	3	0	0	0	0
Enterprise Oil	1	0	0	0	0
Hardy	16	2	1	0	0

Table 4. European companies with interests in Australia.

such as proven reserves, a recent significant discovery, or an allied strategic advantage to bring a company to a remote area.

As we have already seen, New Zealand presently has relatively favourable fiscal terms (see Figure 1), suggesting that there may be limited scope for further incentives. The existing Petroleum Prospecting Permits may also be attractive to potential new investors in that they allow a company to undertake reconnaissance and general investigative studies over large areas without the need for drilling commitments. However, there are various other generous fiscal mechanisms considered below that European companies will have encountered recently in other countries.

Some countries, for example, Ireland, have introduced special incentives for higher risk/deeper water areas. Ireland is perceived as having one of the most favourable petroleum fiscal regimes worldwide (see Figure 1). The country introduced a new Finance Act in 1992, which was accompanied by revised Licensing Terms (Petroleum Affairs Division 1994). The new policy introduced three categories of Exploration Licence, a Standard (valid for 6 years in areas up to 200 m water depth); Deep water (12 year term, water depths exceeding 200 m) and Frontier (15 year term, in areas of special difficulty related to physical environment, geology or technology). This policy has been successful in encouraging foreign companies to take licences. However, part of the attraction was undoubtedly due to the recent exploration success in the United Kingdom West of Shetland deep water area (BP operated Foinaven and Schiehallion fields), which is on trend with the west of Ireland Atlantic margin deep water region.

New technology

Many European based companies have had particular experience in the North West European hydrocarbon province, of which the main producing area is the North Sea Basin (United Kingdom, Norwegian, Danish and Dutch sectors) with the lesser producing areas of Morecambe Bay (United Kingdom) and Offshore Ireland (Celtic Sea). The exploration history of this area, which is mainly offshore, has provided the impetus for, and advanced significantly as a result of, the development and application of a range of new technologies (although not all of these were initially developed specifically in this province). A selection of the main technological advances that have been applied in the North Sea area are listed in Table 5.

Of particular note are improvements in drilling, seismic, geological evaluation and production technologies, examples of which include play fairway analysis, structural modelling, exploration 3D seismic, sequence stratigraphy, biostratigraphy deep water drilling, high temperature/high pressure drilling and low cost production techniques. The combination of 3D seismic, structural modelling, horizontal drilling and new production techniques is particularly effective and has been applied in many parts of the world to develop accumulations that were previously considered non commercial or in existing fields in production decline.

Of those companies operating in the North Sea that have developed particular expertise in specific technologies, some have subsequently applied these skills in other areas of the world. A good example of this is Danish company

1960s	Development of marine jack up and semi submersible rigs
Early 1960s	Air gun energy source for seismic
Late 1960s	Change from analog to digital recording of seismic data
Early 1970s	Satellite navigation offshore (more accurate seismic, well and platform location)
Mid 1970s	Semi-subs capable of year round drilling in North Sea
Mid 1970s	Exposed Location Single Buoy Mooring (oil storage) for tankers
Early 1980s	Water gun energy source for seismic
Early 1980s	3D seismic
1980s	Seismic/sequence stratigraphy
1980s	Advances in structural modelling (to improve accuracy of E & P models)
1980s	Play fairway concept
1980s	Biostratigraphy advances to support subsurface correlation, reservoir zonations, sequence stratigraphy
Mid 1980s	Increased use of sea-bed completions and floating production systems (to reduce development costs)
Late 1980s	Horizontal drilling (enabling production of complex, thin reservoirs and satellite developments)
1960s - 1990s	Continued advances in computer technology
1980s - 1990s	Advances in deep water drilling techniques
1980s	Drilling of high temperature/high pressure reservoirs
Late 1980s - 1990s	Development of seismic/geological workstations (to aid handling, display and interpretation of large volumes of data)
1990s	4D seismic
1990s	Innovative asset dealings (enhanced portfolio management)

Table 5. Technological advances in offshore exploration in North West Europe (modified after Glennie and Hurst 1996).

Maersk, which significantly advanced the technique of horizontal drilling to exploit thin porous limestone zones (within the upper-Cretaceous to lower-Palaeocene Chalk Group), guided by a combination of MWD logging (Measurement While Drilling) and biosteering (use of well site biostratigraphy to identify biozones and guide the directional drilling, Shipp and Marshall 1995). This work was the drilling evaluation of new 3D seismic data sets that assisted in the identification of particular intra-Chalk reservoir units and plays. As a result of the successful application of the technique in the Danish North Sea fields (Megson 1992), Maersk took a contract in Qatar to develop the Al Shaheen Field, reservoir in thin lower-Cretaceous porous limestones, which had previously been considered to be non commercial. The horizontal drilling technology has successfully brought the field into development with an average 1997 production level of 100 MBOPD. An equivalent thin limestone unit in New Zealand that could benefit from such technology may be the Tikorangi Formation in the offshore and onshore Taranaki Basin.

North Sea exploration over the years has successfully pioneered the evaluation of deep marine sandstones in the Jurassic, Cretaceous and Tertiary sections. Examples include Chevron and partners in the Alba Field (Eocene) and BP in the Andrew Field (Palaeocene) in addition to similar aged reservoirs in other areas including West of Shetland. It is possible that the Miocene Moki Formation turbidites in the Taranaki Basin are analogues to the North Sea reservoirs.

In its now more mature stage of development the UK sector of the North Sea in particular has introduced new, lower cost production methods in some cases (eg subsea completions and floating systems such as FPSOs (Floating Production, Storage and Offtake unit)). There has been a progressive increase in the application of such methods in the North Sea particularly since the 1980s. Such new methods may be of potential application to small, previously considered non-commercial fields in New Zealand. A FPSO was first used in New Zealand by Shell Todd in 1996 to offtake the oil production from the Maui B platform. Shell Todd has stated that the availability of the FPSO unit was a reason for the company buying into block-PEP 38413, southwest of Maui, in 1997, an area which includes the suspended Maui-4 oil well. This accumulation, when appraised, may become commercially viable if developed with a low cost production system.

Through the 1980s, the development of sequence stratigraphy (based on well data), tied to high resolution seismic and the related play fairway concept, has helped a great deal in the evaluation of exploration prospects and offered new interpretations of complex reservoirs in known fields. This has had a great impact on the understanding of North Sea plays and reservoir architecture, which is also of applicability to the analysis of stratigraphic traps. Such an approach may be of some value in New Zealand, although many of the obvious

structural traps have been evaluated in the better known areas such as the Taranaki Basin. Stratigraphic trapping potential does however exist in other basins, such as the Northland Basin and Great South Basin (Cook and Gregg 1997) and exploration in these areas may benefit from the sequence stratigraphic approach.

Potential for Further European Investment in New Zealand

The new ventures teams of oil companies in recent years have had a large choice of countries to evaluate, as a result of the opening of many new regions for exploration and development projects (eg the Former Soviet Union, Eastern Europe, South America, Vietnam, Laos, India, Africa and parts of the Middle East). These countries often have larger proven oil reserves than New Zealand and/or are closer to European and Asian markets. However, New Zealand is already regarded very favourably with regard to political stability and fiscal regimes and a number of European new ventures teams would appear not to have evaluated New Zealand for a number of years. New Zealand also remains a net importer of oil and existing reserves, particularly from Maui, are depleting. Therefore, to attract further investment, New Zealand now needs to promote the fact that the country is relatively unexplored and that potential prospectivity exists, particularly offshore.

In order to promote New Zealand in this way the country already has a number of advantages including a strong organisation, Crown Minerals, Ministry of Commerce, organising conferences and distributing good quality publicity material, and reasonably priced, well organised, accessible data. Other areas that could be considered to stimulate exploration include:

- (a) Fiscal incentives for deep-water or frontier areas
- (b) Reaching agreement with a seismic company for a speculative seismic shoot
- (c) Encouraging further research for example through PhDs
- (d) Reaching agreement with consultants to produce speculative technical reports
- (e) Raising the profile of New Zealand via advertising in the trade press, attendance at industry events, for example the international pavilion of the AAPG (American Association of Petroleum Geologists), and international promotional seminars.

New Zealand faces a number of hurdles in attracting further investment from Europe and elsewhere, not least because of its frontier status and remoteness. However, the recent, predominantly European, interest in the Falkland Islands demonstrates the willingness of companies to explore in remote frontier areas, given the right conditions.

Part of the attraction of the Falkland Islands is undoubtedly its unexplored nature. The *Borgny Dolphin* rig is currently (March 1998) undertaking the 70 day journey from the North Sea to the Falklands to commence drilling. Figure 5 compares the relative distances between Europe and the Falkland Islands/New Zealand and a comparison of key factors relating to exploration in the Falklands Islands and New Zealand is set out in Table 6: The success in attracting investment to the Falklands to date shows that the obstacles facing New Zealand have the potential to be successfully overcome.

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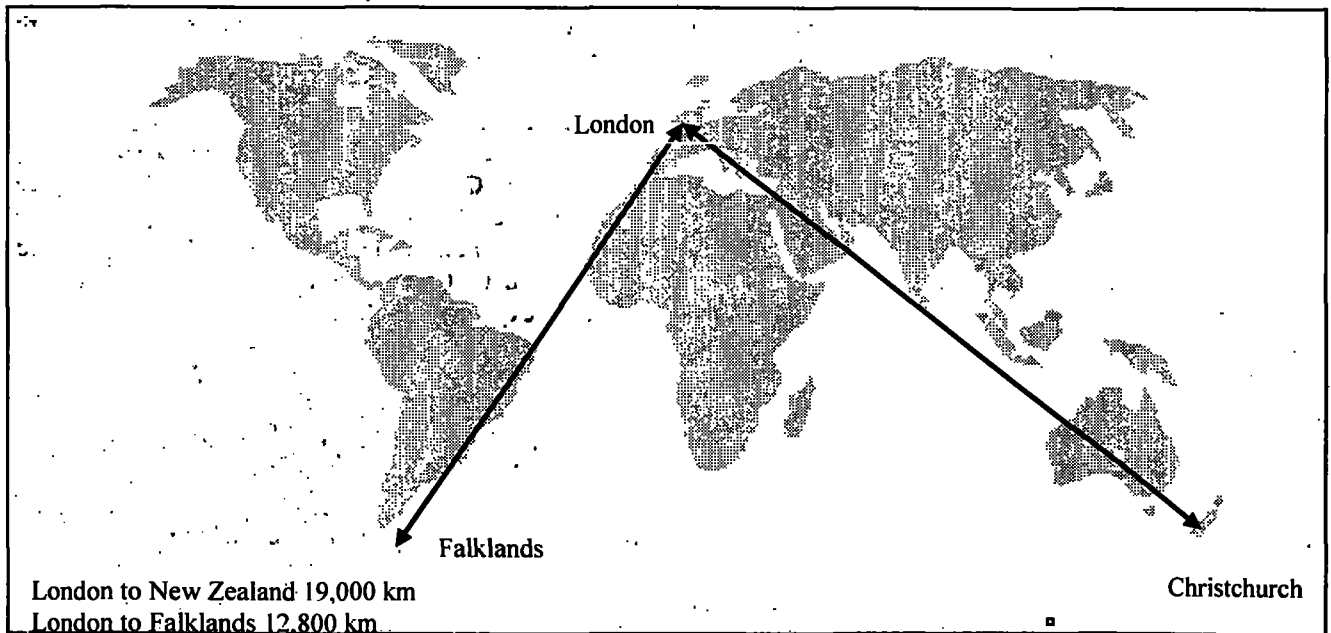


Figure 5. Falkland Islands distance map.

Offshore Falkland Islands	Offshore New Zealand
Frontier	Frontier
No wells drilled	20 (excluding Taranaki)
Water	Water
No infrastructure	Limited
No ready market	To be developed
Good fiscal terms	Good fiscal terms
Technology needs to be imported	Needs to be imported
Offshore rig cost \$140,000 per day	Offshore rig cost \$140,000 per day

Table 6. Comparison of Offshore Falkland Islands to Offshore New Zealand.

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