

# MANAGING MINERAL RESOURCES

Tough development choices ahead

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▶ Unlocking the country's mineral wealth will take more than oil rigs and earthmovers

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ARGUING that it would improve productivity and raise living standards, the Government has proposed removing about 7,000 hectares of land from Schedule 4 restrictions on mining and firming-up estimates of mineral resources on conservation land.



**P**REDICTABLY, many New Zealanders object to the Government's superficial assessment of economic benefits, likely environmental impacts and the erosion of New Zealand's clean, green image.

This adverse response is unsurprising as decisions should be based on an assessment of all relevant benefits and costs, including environmental costs.

While the Schedule 4 proposal was clearly unacceptable, it does not follow that there should be no discussion on how best to manage New Zealand's mineral wealth. Taking into account environmental values, New Zealand must decide what development of mineral resources is appropriate, and what business models should be used. Mineral extraction already occurs, and the current Government clearly anticipates more, having granted an offshore oil exploration permit to the Brazilian-headquartered transnational Petrobras. Given its cost, can we be confident that such activity will be managed to deliver the greatest benefits for New Zealand? This question is important because New Zealand has a shallow capital market, and in addition to owning minerals Government also controls significant strategic assets in the form of State-Owned Enterprises (SOEs).

Considering how best to manage New Zealand's mineral resources does not mean

that we should rely on mineral wealth to reverse New Zealand's slide down the OECD per capita income rankings—mineral development alone is unlikely to deliver an economic step-change. Nevertheless, it is possible that better management of New Zealand's mineral resources can help increase the country's prosperity. Economic models in the 1960s and '70s largely discounted the potential contribution of minerals to growth (these models failed to consider technological change and the market pricing of scarcity). Later, OPEC's interventions in the market triggered an obsession with minerals. The reality likely lies somewhere in-between: new technologies, along with increasing demand and scarcity, will increase the potential for mineral wealth to contribute to New Zealand's economic growth while protecting the environment—but only if we manage the opportunity carefully. Even then, more than minerals will be needed to create a step-change in New Zealand's economic performance, given that mineral resources are finite and that mineral extraction in itself is low in the chain of value-added production.



## Mineral production in New Zealand

NEW ZEALAND is a relatively small player in the global market for minerals and oil and it will continue to be a price taker. In value terms, however, oil remains New Zealand's third most significant export, and as a small open economy, the country's prosperity is tied to the value of its exports.

Figure 1 shows the percentage contribution of mining, petroleum, and chemical manufacturing sectors to GDP declining from around 3 per cent in 1988 to approximately 2.5 per cent in 2008. The value of mineral fuel exports, as a percentage of merchandisable exports, increased from 3 per cent in 2000 to 7 per cent in 2008, dropping back to 5 per cent in 2009. In 2009 the value of exported oil was NZ\$2.8 b, ranking behind only dairy and beef exports. Obviously, big hikes in oil prices have had an effect; but so would any future reversal.

Oil is a Crown-owned resource. Oil production peaked in the late 1990s, then decreased through to 2006 before peaking again in 2008. Historically, natural gas condensate from the Maui field, off the Taranaki coast, dominated production. With the Tui field, also off Taranaki, coming into production, crude oil now accounts for around 70 per cent of production.

A likely near-term scenario is that the price of oil will increase to around US\$100 per barrel as the world economy recovers from the great recession. But this is by no means certain. Potentially, there is a large amount of new oil and much global effort is aimed at improving energy efficiency. The key point on oil prices is that we can expect great, and frequent, volatility. Clearly, high prices will encourage exploration in the Arctic and basins in the Southern Hemisphere. Given that 96 per cent of its territory is under water, quantifying New Zealand's oil and gas resources is difficult. Onshore and offshore Taranaki has only been moderately explored and the vast majority of New Zealand's territory remains entirely unexplored. The exploration permit granted to Petrobras covers more than 12,000 km<sup>2</sup> in water depths ranging from coastal shallows to 3,000 m. To put this in perspective, BP's Deepwater Horizon oil rig in the Gulf of Mexico was drilling in 1,500 m of water.

Coal production in New Zealand increased from 60 peta joules (PJs) in 1989 to 150 PJs in 2007. In the North Island, coal is used in electricity generation, steel manufacturing, and other industrial uses. Higher-quality South Island coal is exported. Currently about half of the coal produced is exported. Low-quality lignite coals in Otago and Southland comprise New Zealand's largest known energy resource. The lignite resource, which in energy terms is 20 times that of the Maui gas field, offers the opportunity to develop a petrochemical industry producing fuels and industrial chemicals.

### MINERAL FUEL EXPORTS

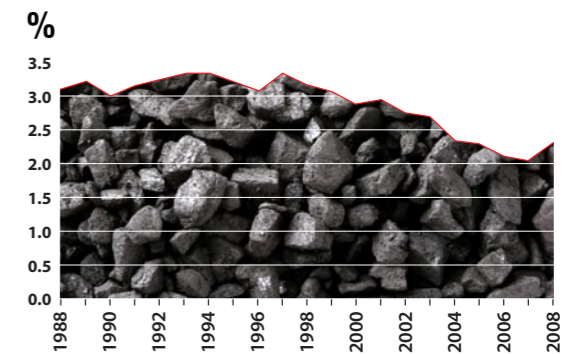


Figure 1: Contribution to GDP

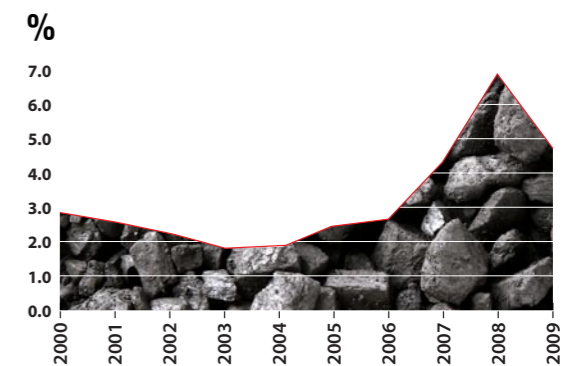


Figure 2: Mineral fuels as a percentage of merchandisable exports

## Government Involvement

GOVERNMENT is an important player in the mineral extraction industries, through property right creation and management, licensing and royalties, SOEs, tax expenditures, and environmental regulation.

For minerals to be extracted and sold, ownership of the resource must first be established, but this is not always straightforward. The Crown owns the petroleum resource, coal seam gas, gold, silver, and uranium. Other minerals, including coal, may be owned by the Crown, by the landowner, or by another party quite independent of the owner of surface land rights. For example, in the case of non-nationalised minerals held under private title—such as iron sand—a developer need only obtain access through private contract with the land owner. In contrast, if the Crown owned the iron sand resource, a developer must follow procedures set and administered by government.

Mineral development requires a significant commitment of capital, typically asset specific. For example, a new oil production platform could cost up to US \$750 m. Investors therefore require property rights of sufficient quality and duration to recover capital costs and make a return on investment. New Zealand can offer investors a stable political climate, an effective legal system, and a relatively stable fiscal regime. The structure of property rights associated with Crown-owned minerals is of relatively high quality. However, a poorly thought out oil regime, requiring constant modification, would create uncertainty in the minds of potential investors. Table 1 describes the prospecting, exploration, and mining rights that the Crown can grant developers. Exploration and mining rights are exclusive and protect a permit holder's investment. All three right types are transferable, allowing rights to gravitate to developers who can add the most value to the resource.

Irrespective of whether a developer obtains the prospecting, exploration, or mining rights to a mineral resource from a private person, the Crown, or by arrangement with both the Crown and private persons, the developer must also generally obtain land use consents. These consents are summarized in Table 2.

The Crown has a right to charge royalties with respect to Crown-owned resources. Petroleum royalty rates are either: an *ad valorem* royalty of 5 per cent applied to net revenue

derived from sale, or 20 per cent accounting profit royalty, where profit is determined after allowing for direct and indirect costs. Royalties also apply to other minerals, including coal, recovered from Crown-owned land. Non-nationalised minerals recovered from private land do not attract a royalty and are subject to the contractual arrangement entered into with the landowner.

Solid Energy is the SOE focused on extracting non-renewable energy resources. Solid Energy mines coal in the Waikato and West Coast of the South Island, and is the largest coal mining company in New Zealand. About half of the mined coal is exported, the balance being used by domestic industry for electricity generation, steel manufacturing and other activities. Solid Energy is currently focusing its attention on developing the huge lignite resources in Southland. Table 3 summarizes Solid Energy's recent financial performance and position.

The government extends industry-specific tax breaks to the mineral and petroleum mining industries. The economic equivalent of government outlay spending, these tax breaks relate to tax deductions for exploration and development expenditure. The Treasury does not currently publish cost estimates for these tax breaks.

Most would agree that development should operate within appropriate environmental and safety standards. The large proportion of New Zealand's territory that is under water highlights the importance of minimising adverse environmental impacts. The damages arising from the explosion of the Deepwater Horizon oil rig and the subsequent massive oil spill are expected to exceed the 1989 *Exxon Valdez* incident in Alaska. Mounting a cleanup operation along New Zealand's coastline, of the scale involved in the Gulf or Alaska, is well beyond the country's existing capacity. It is also clear that an environmental disaster would damage New Zealand's image and entail significant economic cost.

Currently, the key statute aimed at managing the natural environment in New Zealand is the Resource Management Act 1991, which combines previously scattered pieces of legislation. The government may also place conditions on permits granted under the Crown Minerals Act 1991, as it sees fit, including conditions to protect the environment. Both statutes require regard to be had to Treaty of Waitangi principles.

### PROPERTY RIGHTS

	prospecting	exploration	mining
exclusive	no	yes	yes
transferable*	yes	yes	yes
duration	1 year	< 5 years (+5 yr renewable)	< 40 years (scale dependent)
initial allocation	non-competitive	first-in-time petroleum block offers competitive	follows permit & preparation of work programme

\*Transfers are subject to ministerial consent **Table 1**

### CONSENTS FOR DEVELOPMENT

	prospecting	exploration	mining
Crown ownership	yes	yes	yes
private ownership	no	no	no
land access arrangement	if DOC	yes	yes
RMA land use consent	rarely	sometimes	generally

**Table 2**

### GOVERNMENT REVENUE (\$000)\*

	petroleum	minerals	coal
2005	\$1534	\$1066	\$378
2006	\$1701	\$1200	\$537
2007	\$2658	\$2014	\$678
2008	\$3440	\$2473	\$716
2009	\$3460	\$2336	\$711

\*Royalty payments **Table 3**



## Business Models

MANY reasons can be offered for state involvement in resource industries, including a desire to secure an adequate share of the economic rent—through direct participation and/or through royalties and taxation, to control access to state-owned resources, and to ensure that environmental standards are met. The strongest reason for state involvement is the difficulty of ensuring that New Zealand secures an adequate share of the economic rent associated with resource depletion. What is the optimal balance between state and private sector involvement? In other words, what business model can be expected to yield maximum benefit for New Zealand, which currently uses the SOE and tax/royalty models? The experiences of other countries—we take Norway and the United Kingdom as examples—can offer insights.

Norway Statoil is an example of a state regulating, and participating in, the development and commercialisation of energy. In the early 1960s, Phillips Petroleum approached the Norwegian government for oil and gas concessions. The government encouraged local participation but international oil companies held capital and technical expertise. The Norwegian State Oil company was formed in 1972 and a partnership with Norsk Hydro resulted in the development of processing plants. In 2001 Statoil was privatised and listed on the New York Stock Exchange. A merger with Norsk Hydro in 2007 resulted in the company becoming a dominant player in offshore oil and gas development. We can identify the following characteristics of the Norwegian experience: (i) explicit and consistent policy that focuses on long-term wealth management; (ii) limited political interference; (iii) a well-developed marine services sector providing a platform for developing the country's offshore technological capacity;

(iv) proximity to a large market; (v) a multi-dimensional package of policy tools used to develop the energy industry; and, (vi) an evolutionary approach to companies working in the resources field.

Shortly after the discovery of oil in the Norwegian sector of the continental shelf under the North Sea, BP announced discoveries of smaller oil and gas resources off the east coast of Scotland. Given the UK's domestic needs, it soon became evident that the country would be an exporter for only a short time and that it needed to focus on discovery to maintain self-sufficiency. The major objectives of the UK government were to: (i) encourage exploration, (ii) become self-sufficient in oil, (iii) ensure oil companies did not reap excessive profits, and (iv) secure for British industry a greater share of the onshore and offshore supplies market.

The principal instruments of UK government policy were licensing, taxation, and state participation. Licenses were awarded by ministerial discretion, without payment of bonuses, as a means of attracting domestic developers. An ad valorem royalty of 12.5 per cent of production value was imposed to capture some of the economic rent. Petroleum taxes were imposed and variations in the rate were used to adjust the government's share of revenues in the light of oil price developments. The Labour Government established the British National Oil Company (BNOC) in 1975 to participate in all projects with the aim of securing more understanding and control of oil production. Legal and financial impediments resulted in participation being limited mainly to the option to buy 51 per cent of production from each project. In 1982 its equity and operating interests were privatised by the Thatcher Govern-

ment. The option to buy oil from producers was retained but began generating large losses when the price of oil declined, and the option was discontinued in 1985.

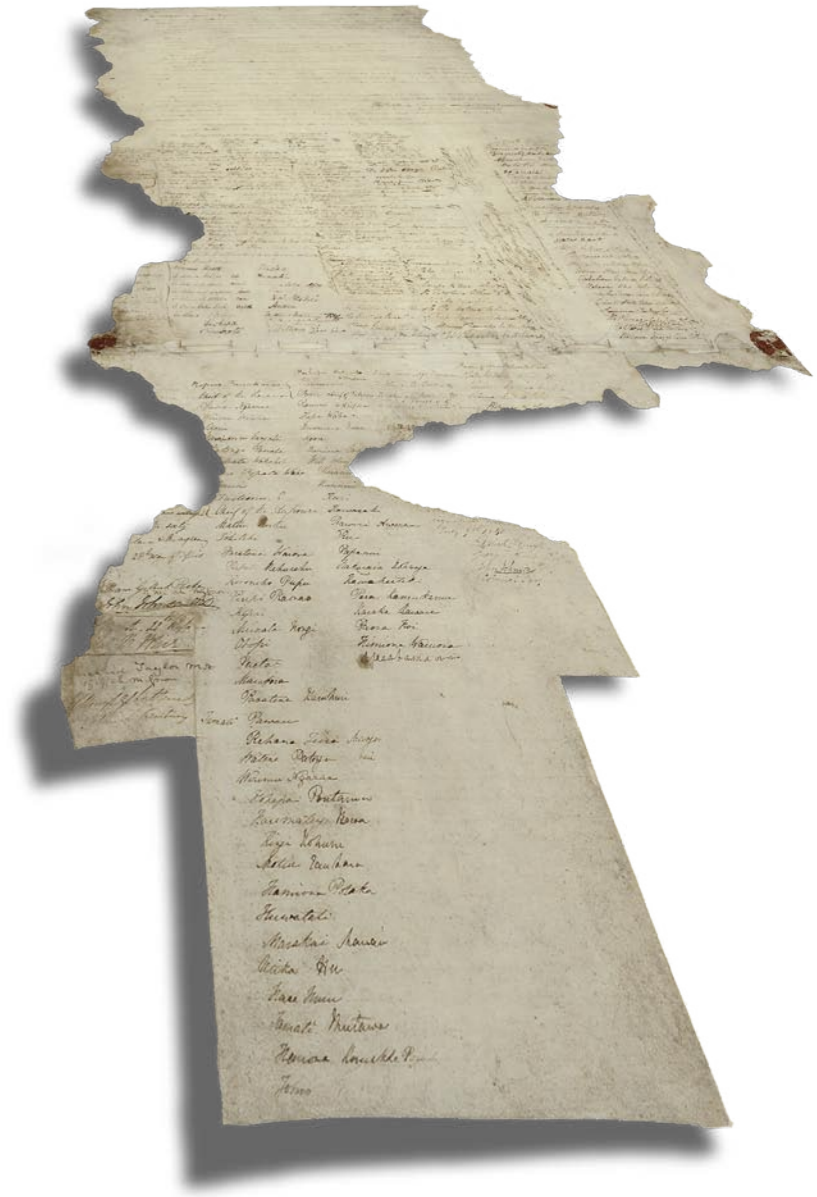
A key characteristic of the UK experience was that licenses were awarded freely and on generous terms in an effort to get exploration underway. With the global crisis of 1973-74, and a change in government, more direct participation was proposed. However, the cost was too great and focus turned to participation in control of the oil through the option arrangement. BP was majority owned by the state and it wasn't until the Thatcher era that the British government sold its entire share holding in the company.

The misdirected Schedule 4 proposal should not deter a more careful consideration of environmentally sound ways to manage effectively New Zealand's mineral resources. Given the context outlined above, what should be the policy priorities toward that end? In addition to the pressing near-term need to review and improve extractive industry safety standards in the wake of the Pike River disaster—along with a mechanism to review and monitor those safety standards—we tentatively suggest that policymakers prioritise the following:

### Review technology access and capability

New and emerging technologies are crucial to the safe and environmentally-sound extraction of value from mineral resources. Policymakers should consider whether New Zealand is positioned to take advantage of those technologies.

South Island lignite resources are an example. Energy shocks in the late 1970s and early 1980s led to an interest in using the resource for transport fuels. At the time, South Africa was turning coal into transport



### TREATY OF WAITANGI

New Zealand's founding document guarantees Maori full, exclusive and undisturbed possession of tribal lands and estates, including forests, fisheries and other resources.

fuels, so importing the technology into New Zealand was feasible. As it turned out, expectations over continued increases in the price of imported oil were not realised and development did not proceed. Technological change, coupled with rising energy prices, has now renewed interest in lignite development. Solid Energy recently announced that it will reassess the potential of technology to reduce the moisture content of Southland lignite. The potential economic benefits are immense. The size of these reserves is such that they could provide energy and feedstock for transport fuel and petrochemical needs for many years. However, without the adoption and development of new technologies to aid extraction and minimise environmental damage, the costs could be prohibitive.

New Zealand typically employs extractive technologies developed overseas. Increasing attention is being paid to the adverse impacts of mineral development, and we can expect to see innovations designed to mitigate those impacts. But is New Zealand positioned to take advantage of those technologies? Can SOEs and the private sector players obtain and use the latest extractive technologies developed elsewhere? Does New Zealand have the research and skills base needed to adapt, develop, and implement new and emerging extractive technologies locally? If not, policy options for addressing any lack should be considered.



#### Consider business models

To best manage its mineral resources, New Zealand must meet business challenges as well as technological ones. If Petrobras discovers oil, how should New Zealand participate in its development? Is New Zealand enterprise and government equipped to successfully work with a massive international oil corporation? Policy makers should start work on these questions in advance of any such discovery. They should also identify what can be learned from the country's experience with SOEs and royalties, and what can be learned from overseas business models.

Some business models and modes of state participation may be better suited than others to address environmental concerns. In other countries, the approach has typically been to leave environmental concerns to separate regulation (such as the RMA) rather than to consider how business models might be designed to mitigate environmental risks. Is this necessarily the way that New Zealand should go?

#### Consider value-added pathways

New Zealand's economy is already heavily concentrated in primary industry. But the potential value of extractive industries is not just in the jobs and value created directly, but also in the potential for the industry to be used as a stepping stone to higher value-added activities. Choices about how to do mineral extraction activities in New Zealand

should therefore be made with long-term pathways to sustainable higher value-added activities in mind.

Policymakers should therefore try to identify how value can be added domestically to mineral extractive activities, and how such activities might facilitate value-added activity in other sectors. For example, over time New Zealand may be able to develop expertise at creating and exporting environmentally responsible methods of mineral extraction instead of importing the technology. Or, it may be possible for the creation of local supplies of relatively environmentally low-impact fuel resources and chemical products to reduce the carbon footprint of our agricultural sector, thereby increasing New Zealand's comparative advantage as a producer of food products with a favourable environmental pedigree.

Not only must such pathways be identified and their feasibility assessed, but the opportunity costs of taking those routes, as opposed to others that might lead to higher value-added production in New Zealand, must also be assessed.

Answers to these questions should

shape New Zealand's approach to managing its mineral resources, including key choices such as what types of minerals, if any, are targeted for development, and how New Zealand interacts with foreign suppliers of capital and expertise in conducting any such development.

There is no obvious right model, or framework, that can be taken off the shelf. New Zealand will need to develop a business model, or models, to suit its own situation. Importantly, New Zealand needs to develop the capacity to negotiate successfully with early investors.

Better management of New Zealand's mineral resources has the potential to help increase New Zealand's economic performance while safeguarding the environment. But far from being a simple exercise in digging or piping money from the ground, complex policy choices are required to enable New Zealand to best access and use extractive technologies that protect the environment, create business models that deliver value to the country as a whole, and leverage mineral wealth to help create industries and jobs higher up the value-added chain. ■

## KEY TAKE-OUTS

- **Mineral resources alone will not reverse New Zealand's economic decline, but new technologies, increased demand and scarcity are boosting their earnings potential.**
- **Policy models must be developed that enable the country as a whole to benefit from mineral resources, including a push to create industries and jobs higher up the value chain.**
- **Emerging technologies are crucial to the environmentally-sound extraction of minerals and are likely to increase the worth of some, such as Southland lignite.**



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