

Macroeconomic Implications of Importing Gas

LECG

**in conjunction with
Capital Economics Limited**

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16 January 2006

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1 Introduction

Contact Energy Limited (Contact) and Genesis Power Limited (Genesis Energy) consider that it is prudent to explore the option of importing natural gas given the risk of stranded assets from a shortfall of domestic gas. Being aware of speculation about the potential adverse implications for the balance of payments and international commodity price risk, they commissioned this report from LECG and Capital Economics Limited.

Contact and Genesis Energy consider that 60 petajoules (PJ) per annum of imported natural gas could provide the 1,000 MW of electricity that would be needed in the event that domestic gas can no longer supply existing combined cycle gas turbine plants (including e3p). They consider that the landed cost at the wharf of imported gas would be of the order of \$350-\$450 million annually.

The body of this report is structured into 3 sections as follows:

- Section 2 puts this rate of importing into a balance of payments context, purely from a statistical perspective.
- Section 3 analyses the balance of payments and commodity price risk issues from an economic perspective.
- Section 4 presents our conclusions in the form of answers to the list of questions provided by Contact and Genesis Energy.



2 Statistical impacts on the balance of payments

New Zealand's balance of payments statistics

New Zealand's balance of payments statistics are statements of New Zealand's transactions in goods, services, incomes and transfers with the rest of the world, net flows of foreign investment into New Zealand, and New Zealand investment abroad.

The current account of the balance of payments records New Zealand's transactions in: goods; services; income earned in New Zealand by foreign investors and earned overseas by New Zealand investors; and current transfer payments such as foreign pensions and foreign aid. The balance in the current account is the difference between receipts from all these sources and current payments. Natural gas imports will be recorded in New Zealand's balance of payments statistics as a current account item. So would imported capital equipment relating to a natural gas import project.

The other main account in the balance of payments is the capital account. It records all other transactions in the balance of payments. Because the overall balance of payments is in balance, by construction, a deficit in the current account balance requires an equal and opposite surplus in the capital account. The intuitive explanation is that if New Zealand residents buy more than they sell overseas on current account then they must borrow more from foreigners than they lend to foreigners on capital account.

Currently there are major regional imbalances globally in the current accounts of the balance of payments. Oil-exporting countries, China and some Asian countries are running large current account surpluses. Other countries are running correspondingly large deficits. These include the United States, Australia and New Zealand. New Zealand's deficit on current account has averaged 5.4 percent of GDP in the last decade and was 8.0 percent of GDP in the year ended March 2005.

Regional imbalances are common responses to fluctuations in commodity prices (such as oil prices), and in regional patterns of investment and saving.

Large current account deficits in the balance of payments not caused by excessive government borrowing are not inherently a cause of concern. This is because private lenders have a strong incentive to lend prudently. Even if the external causes of large regional imbalances persist, sooner or later a particular country's imbalance is likely to self-correct, for example through exchange rate adjustments that shift production in favour of exports and domestic substitutes for imports.

Many people are concerned that prolonged large current account deficits mean that the debt burden of New Zealanders must be growing unduly. This does not appear to be the case because:

- much overseas borrowing is by overseas-owned banks or companies resident in New Zealand;
- current account imports include imports of capital equipment that represent an asset against which it may be prudent to borrow;
- asset values have been growing as well as debts; and



- much of the borrowing may be done by central government, perhaps to help it fund capital projects.

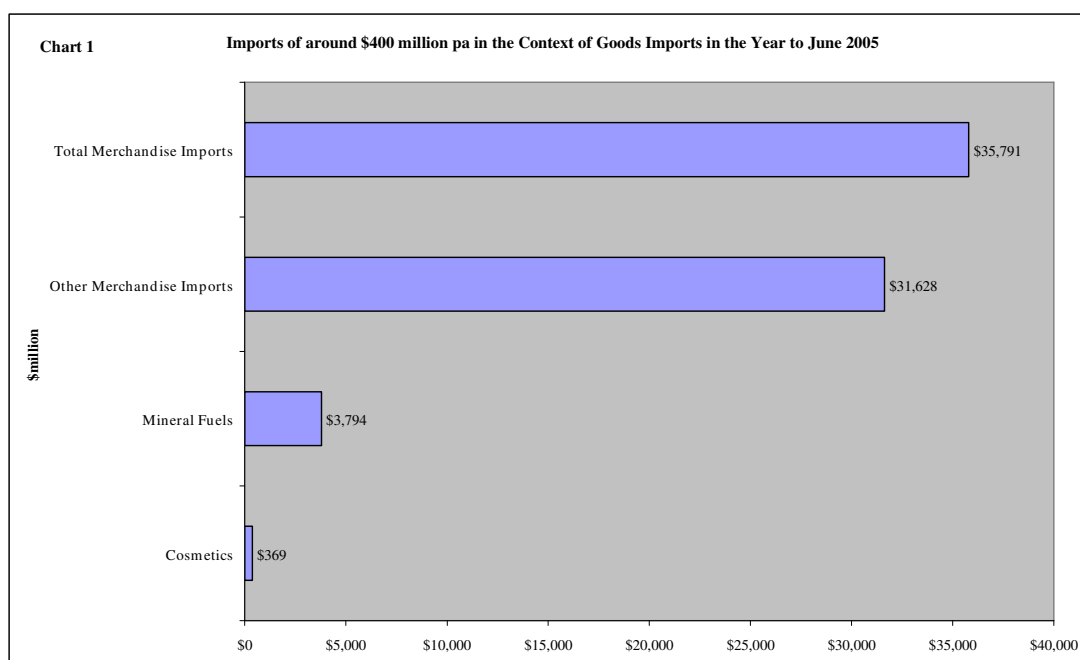
To illustrate these points, Reserve Bank statistics indicate that household borrowings fell from 21 percent of household assets in 2002 to 20 percent in 2004, notwithstanding the rise of mortgage debt relative to household income.

The best available assessment of the degree to which borrowing and lending in New Zealand is prudent is contained in the Reserve Bank's periodic Financial Stability Reports. The latest report finds that the balance sheets of the major financial institutions and companies are generally sound. (The balance sheets of central government and local authorities are very strong.) Rising land values and mortgage burdens have affected the balance sheets of households and farmers, but the Reserve Bank has not found evidence of imprudent borrowing or lending to a material degree. The main concern is that a fall in property values could cause difficulties for some borrowers.

Natural gas imports in a balance of payments context

Natural gas imports would, other things being equal, increase New Zealand's total import bill, and thereby increase the current account deficit. However, the effect would be small in relation to the total import bill. Imports of goods and services totalled \$44.453 billion in the year to June 2005 on a free-on-board (fob) basis. (The fob basis represents the transaction price of goods, including costs incurred in delivering the goods on board ships and aircraft at the point of origin.)

Imports are measured in New Zealand's external trade statistics on a cost-insurance-freight (cif) basis. This reflects the full cost of getting imported goods to New Zealand. (That is, cif is the fob cost at the point of origin, plus the costs of insurance and freight in transporting the goods to New Zealand.) During the year ended June 2005 imports of goods valued on a cif basis totalled \$35.791 billion. If \$400 million of natural gas had been imported in that year on a cif basis and nothing else had changed it would have added 1.1 percent to the merchandise import bill and 0.9 percent to total imports of goods and services.



The significance of imports of \$400 million a year of natural gas is comparable to the current significance of imports of cosmetics and perfumery. In the year to June 2005, imports of cosmetics and perfumery totalled \$369 million. Chart 1 illustrates the relative insignificance of this level of imports in relation to other merchandise imports.

A permanent 1.1 percent increase in the import bill due to natural gas imports would not be material in an economic growth context. In time, growth effects dominate one-off changes. The economy has been adding 1.1 percent to goods import volumes every 3.5 months, on average, for the last 50 years (at least). (The volume index for imports of merchandise grew at an average annual compounded rate of 3.9 percent per annum between the year ended June 1955 and the year ended June 2005 (and at 5.3 percent per annum during the last 25 years).¹). Therefore, the effects of economic growth on import volumes would quickly come to dominate the one-off effect of an additional \$400 million of natural gas imports.

In addition, there are not any obvious grounds for concern about the 'digestibility' of a 1.1 percent change in import volumes in any one year. Import volumes commonly change by much more than this from one quarter or year to the next. The standard deviation of the changes in merchandise import volumes during the last 50 years has been 10.7 percentage points, whether measured quarterly or annually. In 41 of the last 50 years the annual change has differed from the mean (uncompounded) annual change by more than 1.1 percentage points. In 16 of the last 50 years import volumes have increased by more than 10 percentage points. The average annual increase in these 16 years was 15.5 percent with a maximum of 31.8 percent. If increased natural gas imports of 1.1 percent had occurred in any of these 16 years chosen at random it would have barely lifted this 16 year average. If the increased imports had fallen on any of the other 34 years in the last 50 years the annual increase in that year would still have been under 10 percent.

The relative immateriality of the contemplated change in the volume of imports in the short term can also be illustrated by the volatility in the terms of trade (the price of merchandise exports divided by the price of merchandise imports). A rise in import volumes at an unchanged terms of trade has the same dollar effect on the balance of payments as a corresponding fall in the terms of trade for unchanged import volumes. The standard deviation of the annual percentage changes in the merchandise terms of trade (June year basis) was 7.9 percent between 1959-60 and 2004-05. In 37 of the last 46 years the merchandise terms of trade has varied from its average annual percentage change during this period by more than 1.1 percentage points.

We conclude that such an increase in the volume of imports is too small in terms of both historical importing trends and annual variability to provide, in itself, any prima facie grounds for concern about its balance of payments impacts. Any effects would probably be swamped by the more powerful factors currently operating.

Relationship to imported petroleum payments

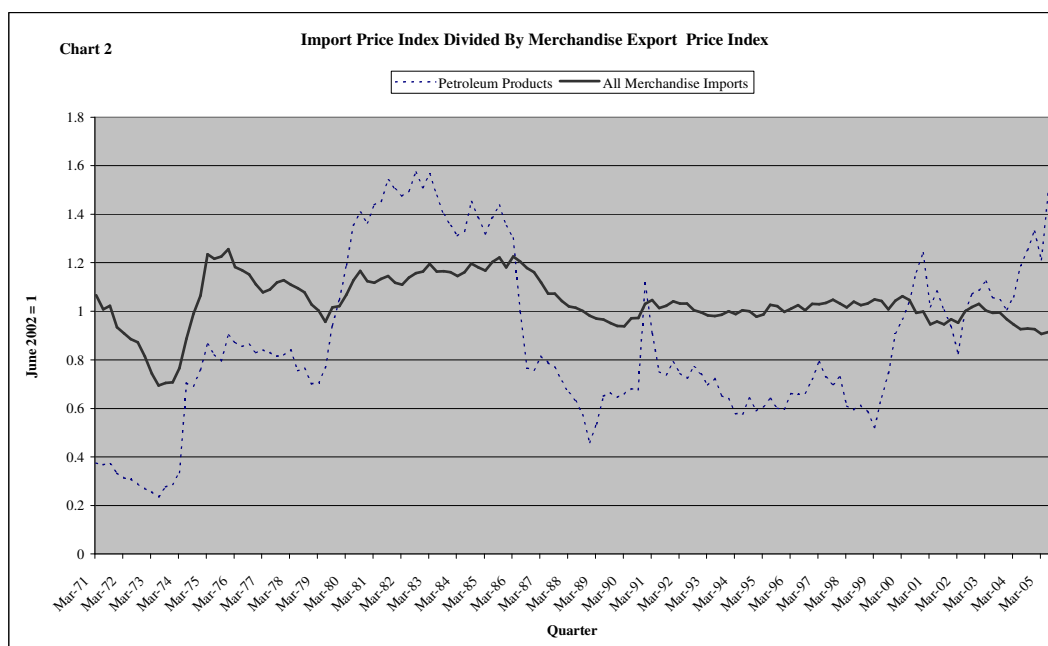
In the year to June 2005, imports of mineral fuels, oils and products totalled \$3,794 million. Imports of petroleum and petroleum products totalled \$3,682 million. Imports of natural gas of \$400 million pa would represent an increase of 10.9 percent in

¹ To check that this statistic was not unduly influenced by the choice of the start and end periods we fitted an exponential trend line to the annual data. The trend rate of growth for the last 50 years was 3.8 percent per annum.

the volume of imports of petroleum and petroleum products in the year to June 2005. The trend rate of increase in the volume of these imports during the 15 years from June 1990 to June 2005 was 4.9 percent per annum. An increase of 10.9 percent would therefore represent 2.2 years of growth at the average rate of growth experienced during the last 15 years.

Sensitivity to international price movements

Variations in the world price of petroleum product prices are a significant source of the volatility in New Zealand's terms of trade.



The chart above shows the great variability since March 1971 in the price index for imported petroleum products relative to the price index for all merchandise exports. Adding 1.1 percentage points to the bill for imported petroleum and petroleum products would not add materially to the volatility in New Zealand's merchandise terms of trade. This is because the value of imports of mineral fuels, oils and products has been on average only 7 percent of the value of total merchandise imports during the last 20 years. Mechanistically, if the contribution of petroleum to total imports had been 1.1 percentage points higher than it was during the last twenty years the annualised standard deviation in the merchandise terms of trade would have been 8.8 percent (had gas been imported over this period) rather than 8.7 percent (in the absence of gas being imported).

The following table indicates the potential sensitivity of New Zealand's oil import bill, during the year to June 2005, to variations in the value of the New Zealand dollar and in the world price of oil.

Table 1 **Indicative Cost of Annual Import Bill for NZ's Petroleum and Petroleum Products for Different Exchange Rates and World Oil Import Prices - Assuming Unchanged 2004-05 Import Volumes**

NZ \$million

US\$/NZ1	International Oil Price (Brent Crude Oil US\$ per barrel)						
	USD 20	USD 30	USD 40	USD 50	USD 60	USD 70	USD 80
0.45	NZD 2,450	NZD 3,675	NZD 4,900	NZD 6,125	NZD 7,350	NZD 8,575	NZD 9,801
0.50	NZD 2,205	NZD 3,308	NZD 4,410	NZD 5,513	NZD 6,615	NZD 7,718	NZD 8,820
0.55	NZD 2,005	NZD 3,007	NZD 4,009	NZD 5,012	NZD 6,014	NZD 7,016	NZD 8,019
0.60	NZD 1,838	NZD 2,756	NZD 3,675	NZD 4,594	NZD 5,513	NZD 6,432	NZD 7,350
0.65	NZD 1,696	NZD 2,544	NZD 3,392	NZD 4,241	NZD 5,089	NZD 5,937	NZD 6,785
0.70	NZD 1,575	NZD 2,363	NZD 3,150	NZD 3,938	NZD 4,725	NZD 5,513	NZD 6,300
0.75	NZD 1,470	NZD 2,205	NZD 2,940	NZD 3,675	NZD 4,410	NZD 5,145	NZD 5,880
0.80	NZD 1,378	NZD 2,067	NZD 2,756	NZD 3,445	NZD 4,135	NZD 4,824	NZD 5,513
0.85	NZD 1,297	NZD 1,946	NZD 2,594	NZD 3,243	NZD 3,891	NZD 4,540	NZD 5,189

(Note: The actual import bill in the year ended June 2005 was NZ\$3,682 million at a daily average exchange rate of \$1NZ=US\$0.6953 when the average price of Brent Crude Oil was US\$46.44 a barrel.)

The calculations are only indicative since they take no account of the effects of hedging, margin compression, diversity of fuel types and origins, or quantity responses.

It is evident from this table that a change in the cost of Brent Crude Oil of US\$10 a barrel, with an unchanged exchange rate, could have a significantly greater impact on the cost of New Zealand's imported petroleum bill than imports of \$400 million of natural gas. For example, at an exchange rate of 1\$NZ=US\$.70, the import bill could fall by an amount approaching NZ\$800 million if the average world price of oil fell from US\$50 a barrel to US\$40. Similarly, a reduction in the value of the New Zealand dollar from US\$0.70 to US\$0.60 cents could potentially add over NZ\$600 million to the import bill.

The next table summarises the sensitivity of the projected annual cif cost of 60 PJ of natural gas imports for different exchange rates and US\$ unit prices. A drop in the value of the New Zealand dollar from US\$.70 to US\$.60 could add \$66 million (NZ\$464-NZ\$398) million to the imported cost at the projected base case cost of \$US4.64 per GJ. Alternatively, at an unchanged exchange rate of NZ\$1=US\$0.70, a change in the US\$ price per GJ from \$4 to \$5 would add \$86 million to the annual cost (\$429-\$343).

Table 2**Sensitivity of Annual Natural Gas Import Bill for 60 PJ to different exchange rate and US\$ cif import price outcomes****NZ \$million**

US\$/NZ1	US\$ cif Price per GJ of imported natural gas						
	USD 2.00	USD 3.00	USD 4.00	USD 4.64	USD 5.00	USD 6.00	USD 8.00
0.45	NZD 267	NZD 400	NZD 533	NZD 619	NZD 667	NZD 800	NZD 1,067
0.50	NZD 240	NZD 360	NZD 480	NZD 557	NZD 600	NZD 720	NZD 960
0.55	NZD 218	NZD 327	NZD 436	NZD 506	NZD 545	NZD 655	NZD 873
0.60	NZD 200	NZD 300	NZD 400	NZD 464	NZD 500	NZD 600	NZD 800
0.65	NZD 185	NZD 277	NZD 369	NZD 428	NZD 462	NZD 554	NZD 738
0.70	NZD 171	NZD 257	NZD 343	NZD 398	NZD 429	NZD 514	NZD 686
0.75	NZD 160	NZD 240	NZD 320	NZD 371	NZD 400	NZD 480	NZD 640
0.80	NZD 150	NZD 225	NZD 300	NZD 348	NZD 375	NZD 450	NZD 600
0.85	NZD 141	NZD 212	NZD 282	NZD 328	NZD 353	NZD 424	NZD 565

The following table expresses these results as changes from the base case of an annual import cost of \$400 million and divides these changes by the total merchandise import bill for the year ended June 2005, augmented by base case natural gas imports of \$400 million pa. The impact on the volatility of the total merchandise import bill is small. For example, if the value of the New Zealand dollar fell from US\$0.70 to US\$0.50, at an unchanged US\$ price for gas, the effect would be to add only a further 0.4 percent to the cost of the import bill from this source. This addition would be very small relative to the overall effects on the import bill of such a major change in the exchange rate.

Table 3 Change in NZ\$ cost of imported natural gas for different exchange rates and US\$ prices from the \$400 million base case, expressed as a percentage of the total merchandise import bill in June 2005 plus base case natural gas imports**Deviation as a Percent of Augmented 2005 Import Bill**

US\$/NZ1	US\$ cif Price per GJ of imported natural gas						
	USD 2.00	USD 3.00	USD 4.00	USD 4.64	USD 5.00	USD 6.00	USD 8.00
0.45	-0.4%	0.0%	0.4%	0.6%	0.7%	1.1%	1.8%
0.50	-0.4%	-0.1%	0.2%	0.4%	0.6%	0.9%	1.5%
0.55	-0.5%	-0.2%	0.1%	0.3%	0.4%	0.7%	1.3%
0.60	-0.6%	-0.3%	0.0%	0.2%	0.3%	0.6%	1.1%
0.65	-0.6%	-0.3%	-0.1%	0.1%	0.2%	0.4%	0.9%
0.70	-0.6%	-0.4%	-0.2%	0.0%	0.1%	0.3%	0.8%
0.75	-0.7%	-0.4%	-0.2%	-0.1%	0.0%	0.2%	0.7%
0.80	-0.7%	-0.5%	-0.3%	-0.1%	-0.1%	0.1%	0.6%
0.85	-0.7%	-0.5%	-0.3%	-0.2%	-0.1%	0.1%	0.5%

(Note: The total merchandise import bill in the year ended June 2005 was NZ\$35,791 million.)

3 Macroeconomic analysis of natural gas imports

The forgone alternative

An economic analysis of any proposal to import natural gas must consider what would happen otherwise. The assumption about what is the best forgone alternative can have a decisive effect on any conclusion about the desirability of a proposed alternative.

The statistical discussion in section 2 abstracted from the question of what New Zealand would do if domestic gas was in insufficient supply and natural gas was not imported in the envisaged quantities. As a result it took the form of a 'before-and-after' analysis. While useful in assessing the potential magnitude of a change from an original position, a 'before-and-after approach' may be irrelevant to the decision if the status quo is no longer tenable.

In the absence of additional gas from imports or new domestic discoveries, replacement electricity generation would probably be from diverse sources, including small quantities of gas-fired generation, wind, coal and hydro. This combination of options would also affect the balance of payments through imports of fuel and capital equipment.

One possibility is that imported coal would be the dominant commercial alternative to imported natural gas.² Contact and Genesis Energy consider that the cost of imported coal would be \$3.50-\$4.50 per GJ but that because of poorer conversion efficiencies perhaps 85-90 PJ would need to be imported annually in order to produce the same electricity that could be produced from 60PJ of imported natural gas. The implied cif import cost of this volume of imported coal would be \$300-400 million per annum.

As a result, the imported coal counterfactual would reduce the ongoing contribution of imports of natural gas to the nation's cif imports to around \$50 million (\$400 million minus the mid-point of the \$300-400 million range). That contribution represents around 0.1 percent of the current import bill.

There would also be one-off capital expenses associated with all the options for making good a deficiency of these orders of magnitude in domestic gas supplies for electricity. The capital costs of setting up the infrastructure to handle and process imported natural gas must be contrasted with the capital costs of other options, some of which may involved building replacement generating plants (for 1,000MW) and enhancements to the transmission grid. Capital costs could be higher with some other options.

The following table is from a Ministry of Economic Development report, and sets out costs and performance for a range of fossil fuelled electricity generating technologies likely to be used over the next 25 years.

² Waikato coal might not be feasible because of geological uncertainties, environmental issues, and costs. South Island coal might either lack quality or be too costly, particularly taking into account additional plant and transmission costs. Of course, there would be a range of responses to the non-importation of natural gas.

Table 4: Current Power Station Capital, Operating and Maintenance Costs, and Efficiency³

Technology	Size	Capital Cost ⁴	O & M Cost ⁵		Efficiency
			Fixed	Variable	
	MW	\$/kW	\$/kW	c/kWh	%
Conventional Pulverised Coal with FGD ⁶⁷	400	2330	45	0.8	36
Integrated Coal Gasification Combined Cycle	400	2840	62	0.19	43
Gas Combined Cycle	400	856	30	0.12	45
Advanced Gas Combined Cycle	400	1229	28	0.12	49
Combustion Turbine	160	706	12	0.02	30
Advanced Combustion Turbine	120	986	17	0.02	37
Generic Distributed Generation (Base Loaded)	2	1297	8	3.56	31

The capital cost of a gas combined cycle plant (such as Stratford Power Station) is \$856/kW for a 400MW plant, and \$1,229/kW for an advanced gas combined cycle plant. In comparison, conventional pulverised coal with FGD plants (for example, the Huntly power station with FGD added) has a capital cost of \$2,330/kW.

More generally, investors in electricity generation plant typically face trade-offs between high capital costs with relatively low fuel costs, or relatively low capital costs but high fuel costs. For most generation options, the capital equipment is imported.⁸ The following table shows qualitative comparison of the capital and fuel costs of alternative generation technologies:

³ East Harbour Management Services Ltd. (May 2002). *Costs of Fossil Fuel Generating Plant*. Report to the Ministry of Economic Development.

⁴ Costs are in September 2001 New Zealand dollars

⁵ Costs are in September 2001 New Zealand dollars.

⁶ Fluidised bed plant has similar capital and O&M costs to pulverised coal plant with FGD

⁷ For a pulverised coal plant without FGD deduct \$416/kW from the capital cost.

⁸ The primary exception is earthworks associated with a hydro dam.

Table 5: Qualitative Comparison of Generating Technology⁹

Technology	Capital cost/kW	Fuel cost
CCGT	Low	High
Coal	High	Medium
Nuclear	High	Low
Hydro	Very high	Nil
Wind	Very High	Nil
Recip engine	Low	High
Fuel cells	Very high	High
Photovoltaics	Very high	Nil

Effects on the national economy

The key determinant of the effect of imports of natural gas on New Zealanders' welfare is whether the project is profitable overall. Economists usually assess this by considering whether the benefits to users and investors exceed the costs of the project to New Zealanders, taking risks into account.¹⁰ Where users have free choice, this typically comes down to assessing whether the project is good for investors since the project must be benefiting users, otherwise they would not buy and investors would be disappointed.

Investors will take risk into account in assessing whether the project represents a good investment. There may be a concern that investors do not adequately take into account inconveniences to users that might arise from price volatility or from physical disruption to supplies. However, several factors suggest that such concerns may be largely unfounded:

- wholesale electricity prices are already very volatile because of demand and supply volatility (eg hydro inflow volatility); it is hard to see natural gas imports having a material effect on existing volatility;¹¹
- alternatives to natural gas imports would also have scarcity values that fluctuated with world oil prices, so volatility is not necessarily increased at all;
- price volatility can benefit users who can defer or 'bunch' consumption in order to avoid periods of high prices and exploit periods of low prices; and

⁹ This information is taken from the International Energy Agency publication, 'Energy Market Reform: Power Generation Investment in Electricity Markets', 2003, table 2, page 32.

¹⁰ In technical terms if the sum of the surplus to suppliers (revenues from sales less the cost of production) and the surplus to consumers (benefits derived less the amounts paid to suppliers) is positive, then economists commonly deem the project to be profitable overall.

¹¹ To the degree that domestic energy sources are marked to world market prices, domestic price volatility would not be affected by a change in the source of supply. To the degree that they are not marked to world market prices, perhaps because of government policies or other risk-sharing arrangements, the same may apply to imported natural gas domestic prices.

- End users who desire stable prices may be able to obtain what they desire by: (1) taking up a risk-sharing contract offered by a supplier; (2) participating in hedge contracts; (3) owning shares in a hedging investment (e.g. petroleum company shares); or (4) having a government or regulator limit price volatility to classes of users

Of course a major shift in relative prices or supplies of major commodities can have macroeconomic consequences. Experience has shown that a major change in relative prices globally, or in resource availabilities locally, can necessitate potentially painful and costly adjustments to the structure of the domestic economy— whether the initial terms of trade impacts are positive or negative. For example, a sharp rise in imported oil prices could depreciate the currency. This could aggravate the pain to importers and consumers while benefiting exporters and some domestic producers of energy. Conversely, a large domestic oil find could appreciate the currency, creating major losses and unemployment in traditional export industries.¹² The key to minimising such losses is a high degree of flexibility – particularly clarity in property rights, ease of changing asset use and a high degree of freedom of contract and exchange. However, in the current context, the discussion is academic since the terms of trade effects of the proposed imports of natural gas are too small, even if imported coal is not the correct counterfactual

In our opinion the proposed project is too small statistically and economically to justify any material concerns of an economy-wide nature. The most important issue for national income is whether it is profitable, taking risks and forgone alternatives into account.

The self-sufficiency issue

Energy supplies can be disrupted by natural disasters, war-time blockades, other sources of disruption to normal shipping, or terrorism. These problems may be experienced as a problem of quantity rather than price. Expressed differently, there is unsatisfied demand at the market-clearing world price. Suppliers simply cannot get the supply through to the preferred location in time.

The risks of such supply disruptions is a fact of life for businesses. Businesses differ in their vulnerability to these risks and therefore in their responses to them. The wider the range of available responses, the better diverse businesses will be able to cope with such events.

Any increased risk of external supply disruptions needs to be put in the context of the existing imports of energy. Imported oil and oil products comprised 33.7 percent of New Zealand's primary energy supply in 2004.¹³ Imported natural gas of \$400 million a year would add only 10.9 percent to the \$3,682 million cost of imports of petroleum and petroleum products in the year ended June 2005 in a 'before-and-after' comparison. Any risks to electricity generation from greater reliance on imported fuel need to be balanced against the benefits of greater diversification of fuel sources and greater involvement in a larger international commodity market. From a practical perspective, the contribution the projected imports of natural gas would make to import fuel dependency would appear to

¹² For an accessible introduction to the "Dutch Disease" associated with the discovery of North Sea oil by the Netherlands in the 1960s, see Christine Ebrahim-zadeh, "Back to Basics, *Finance and Development*, March 2003, Volume 40, No 1, International Monetary Fund, <http://www.imf.org/external/pubs/ft/fandd/2003/03/ebra.htm>

¹³ Ministry for Economic Development, *Energy Data File*, July 2005, p 9.



be too small to make this a material issue, particularly in relation to realistic alternatives such as imported coal.



4 Conclusions

Our conclusions are summed up in the answers to the questions below:

1. What would be the likely current account impact of natural gas imports of 60 PJ per annum at a landed annual cost of NZ\$400?

Answer. The current account impact effect would be of the order of 0.1 percent of merchandise imports before any balance of payments adjustment mechanisms took effect. If the forgone alternative is not imported energy, the current account effect could be 1.1 percent of merchandise imports.

2. Would the impact on the current account have a substantial negative effect on the New Zealand economy?

Answer. No. First, the scale of the project is too small to be of macroeconomic significance. Balance of payments adjustment processes would continue to be driven by much more significant factors such as droughts, monetary policy and changes in domestic and foreign demand. Second, the protectionist argument that what 'improves' the balance of payments improves national income is wrong both in theory and in practice. The sign of the impact of imported gas on national income depends on the profitability of the project, not the balance of payments effect.

3. What is New Zealand's current imported petroleum bill, and how much would natural gas imports add to that bill?

Answer. The bill in the year ended June 2005 was \$3.7 billion. The projected natural gas imports would add about \$0.4 billion annually in a 'before-and-after' comparison and about \$50 million annually compared to the alternative of imported coal.

4. How might different international oil price and currency movements impact on New Zealand's total international petroleum products import bill?

Answer. A change of US\$10 a barrel in the world price of crude oil from around \$50 a barrel could alter the annual import bill for petroleum and petroleum products at current exchange rates by about NZ\$790 million. Conversely, a change in the value of the New Zealand dollar from US\$0.70 to US\$0.60 with an unchanged world price of crude oil could increase the annual import bill for petroleum and petroleum products by about than \$650 million. (Note that these calculations are no more than indicative. They take no account of hedging considerations or of how the margin between imported crude oil and imported refined products might move.)

5. What material impact would importing natural gas have on the answer to question 4 above?

Answer. Importing natural gas at a rate of NZ\$400 million a year would increase the sensitivities by around 10 percent in a 'before-and-after' comparison.



Specifically, a change of US\$10 a barrel in the world price of crude oil from around \$50 a barrel could alter the annual bill for petroleum and petroleum products now including the imported natural gas by of the order of \$875 million. A change in the value of the New Zealand dollar from US\$0.70 to US\$0.60 with an unchanged world price of crude oil could increase the annual import bill for petroleum and petroleum products now including the imported natural gas by about than \$720 million. Of course the sensitivity would be much lower compared to realistic alternatives such as imported coal.

6. What are the economic implications of reduced fuel self-sufficiency?

Answer. It is implausible that there are material economic implications for reduced fuel self-sufficiency. Imported natural gas at a rate of \$400 million a year needs to be put in the context of imports of petroleum and petroleum products of \$3,682 million in the year to June 2005. Any risks to electricity generation from greater reliance on imported fuel need to be balanced against the benefits of greater diversification of fuel sources and greater involvement in a larger international commodity market.

7. Would natural gas importation undesirably expose New Zealand to international commodity prices, including high oil prices?

Answer. No. The increased exposure is far too small to materially affect the volatility of New Zealand's merchandise terms of trade. In any case, it is desirable for efficiency reasons that energy users in New Zealand face the world price for importable or exportable energy since this reflects the value the community could derive if it did not use it locally. New Zealanders who do not wish to bear such price risks could avoid or mitigate those risks in many ways.

