

## Economic sustainability

### ► Indicator 5: Resilience: energy trade

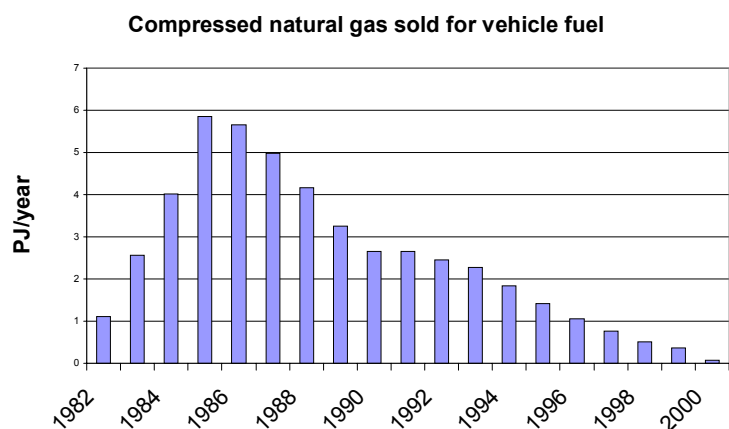
The HELIO indicator for “resilience” is conceived on the basis that oil importing countries are vulnerable to international oil price hikes. Imported oil comprises 42% of New Zealand’s net fossil fuel supply (a good deal of coal and indigenous oil is exported). Indigenous oil is also priced at international oil prices, and ownership of the indigenous resource is almost entirely foreign. Thus New Zealand’s ratio of imported oil to total fossil fuel consumption does not affect prices.

Trading in energy can increase resilience by increasing the number and type of energy sources and markets. Resilience suffers when there is excessive dependence on a single source of supply, whether it be natural gas, OPEC oil, or local rainfall. In this matter, the imminent decline of the giant Maui gas field is a major issue. This supplied up to half New Zealand’s primary energy during the 1980s. Its abundance and low cost suppressed development of other energy sources. It is the coming shortage of primary energy that is critical - and is affecting even electricity prices right now.

Commercial natural gas resources were developed just in time to offset the economic impact of the first OPEC oil crisis. Gas fields of about 1000 PJ and 5000 PJ were commissioned in 1973 and 1979 respectively. It was easy to believe that other large discoveries would follow - but after 30 years of further exploration, only another 140 PJ of recoverable gas reserves have been developed, with a further approximately 1360 PJ now considered commercially attractive at forecasted future gas prices.<sup>34</sup>

For a brief few years in the 1980s, New Zealand was on track to be truly resilient in its supply of vehicle fuels. From 1979 through to 1984, the government promoted compressed natural gas (CNG) and LPG (liquified petroleum gas) as a move towards self-sufficiency in vehicle fuels. Subsidies paid half the cost of installing CNG filling stations and a proportion of the cost of converting cars to CNG. LPG was promoted for use in areas not reticulated for natural gas. A network of almost 300 CNG filling

stations ensured wide availability, and about 5% of cars were converted at the peak.<sup>35</sup> The technology to convert large truck engines to CNG was developed and commercialised. But in 1985, Government according to its new philosophy removed the subsidies “so the industry could stand on its own feet”. Car conversions slowed to a trickle thereafter, and CNG filling stations gradually lost business and closed down. Over \$20 million of government funds, and several times that amount of private investment in CNG, were almost totally wasted, as CNG equipment was sold at salvage value, mostly to Pakistan, or simply thrown away. Sales of gas for CNG peaked at 5.85 PJ in 1987, and by 2000 had declined to .073 PJ/year<sup>36</sup>.



<sup>34</sup> [www.med.govt.nz/crown\\_minerals/petroleum/facts/index.html](http://www.med.govt.nz/crown_minerals/petroleum/facts/index.html)

<sup>35</sup> Ministry of Energy Annual Report 1984.

<sup>36</sup> Energy Data File 2001

The Maui gas field is now expected to run out early, and is believed to contain only 70% as much recoverable gas as originally predicted. The information source is suspect, as it gives an incorrect figure for the original size of the Maui field 4085 PJ instead of the actual figure 5440 PJ, which was published in 1973 and not challenged until 1985. The total gas in the field is now put at only 3880 PJ.<sup>37</sup>

Shell International, who manages the gas field, warns that the wholesale price of gas may have to triple to support petroleum exploration and development. Retail electricity prices are already rising, to support the higher costs of power from proposed new gas-fired power stations.

Shell's warning is an example of the "tyranny of scale", to which New Zealand is particularly vulnerable. Oil companies generally seek very large and profitable fields, which in the New Zealand context require exporting much of the energy content. New Zealand had to resort to highly energy-intensive exports, including methanol (made from gas), aluminium, and pulp and paper to utilise energy from major supply projects. The companies involved now expect (and make this clear to successive governments) a continued supply of energy at low prices. That is not resilience!

Nor is it necessary. A gas field discovered recently, Pohukura, is a quarter the size of Maui. If dedicated to New Zealand use instead of export industries, it could be the basis for continuing supply for 20 to 30 years, augmented by the remaining gas in existing fields, and gas associated with oil fields that would continue to be discovered and developed in the absence of subsidies. This could enable a transition to fully renewable biogas supply from wastes and low-cost biomass resources.

Unlike the Maui field, Pohukura cannot vary its flow easily from month to month to make up for seasonal shortages of hydroelectricity. The Ministry of Economic Development expects an increase in coal-fired electricity will be needed both in dry years and to meet electricity demand growth. If so, greenhouse gas emissions would increase 37% from 2000 to 2020. That is not resilience, either!

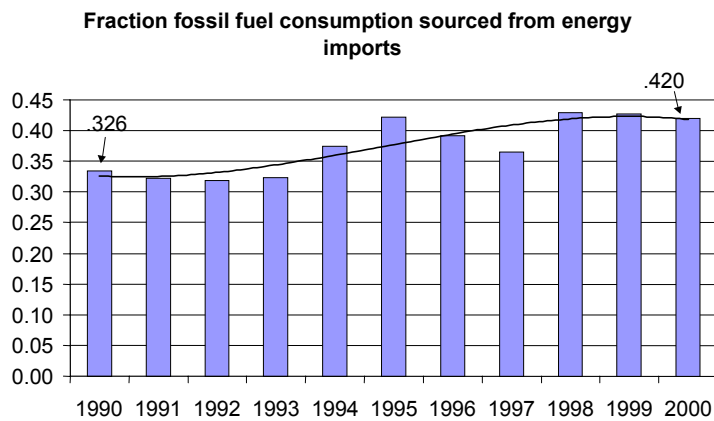
What the New Zealand electricity system requires (and if the market allowed, could develop in abundance) is a diversity of renewable resources which would reduce our dependence on hydroelectricity, together with major investment in energy efficiency designed to tailor total energy demand to indigenous supplies. Biomass energy could then be more than adequate to supplement hydro energy in dry years (see discussion, indicator 4). New Zealand's remaining gas could be increasingly shifted to highly efficient uses, ranging from CNG for vehicles, to cogeneration of heat and electricity, to fuel cells.

That sustainable development path would be highly competitive, and would keep prices close to costs - higher but not a lot higher than today's. But true competition is anathema to the private owners of the electricity system - and their bankers want firm contracts for both fuel supply and sales of power for any new power station. The government, which owns the large majority of hydro generation, is more than happy to take its share of the higher profits from today's deregulated industry.

Government's "Energy Outlook" document examines a scenario based on conservation and efficiency - but not a very ambitious one, as its greenhouse gas emissions are projected to be 19% higher in 2020 than those in 2000. This is better than the 37% projected for its baseline scenario, but still far from our commitments under the Kyoto protocol. It still assumes large-scale gas fired power stations dependent on new gas finds - and would almost certainly rely on energy exports to achieve the "economy (tyranny) of scale" that is now the norm.

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<sup>37</sup> NZ Herald 6 April 2002, Maui White Paper, Government Printer, 1973.



It is counterintuitive, but undoubtedly true, that New Zealand would become more resilient - and probably lessen the expected electricity price hikes - by abandoning all promotion of petroleum exploration, shutting down the export methanol plant, and relying on Pohukura alone to provide the bridge from fossil fuels to truly sustainable energy.

Resilience in a physical sense requires not only adequate primary resources, but reliability of the systems that convert them into consumer energy. In this respect, the commercialisation of formerly publicly-owned energy businesses has raised serious concerns. The failure of the Auckland power cables has already been noted (Indicator 3). New investments are not immune either: a 370 MW combined cycle gas generator was delayed in its commissioning for a year, attributed by some to cost-cutting during its construction.

These physical aspects of resilience are impossible to quantify; they have more to do with business planning and geological prospectivity than with trends in production of already-developed resources. As a guide to the financial impact of imported energy, the subsequent indicator, "burden of investment" actually says much about resilience.

But the HELIO indicator does give a useful picture of trends in self-sufficiency in fossil fuel, and is reported here as defined in the brief: 1.29

## ► Indicator 6: Burden of energy investments

This indicator is based on the idea that government investment in energy supply displaces higher priority government expenditure, such as health and social welfare. But in the deregulated New Zealand energy market, existing government-owned energy assets are not a burden as they can often extract high profits. The burden of energy investments is better described as the increasing flow overseas of profits and dividends from foreign-owned energy supply businesses.

Before the energy reforms that followed the 1984 election, New Zealand's central government owned the monopoly electricity supplier, half the giant Maui gas field, and much of the country's coal business. Under the policies of privatisation and deregulation, government has sold all its gas and petroleum investments, though it still owns and collects royalties on the resources. The gas and petroleum investments were sold to a New Zealand company (which always had substantial foreign shareholding). But last year that company sold its all its energy interests to Shell. Government's attempt to sell its coal business failed, and public pressure has prevented privatisation of four of the five state owned electricity businesses.

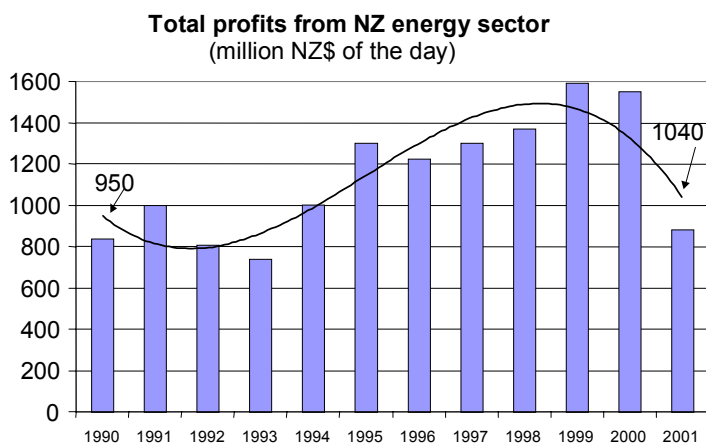
If foreign-owned businesses used their capital more efficiently than New Zealand-owned ones, there would be less concern. But for those assets that were sold, the prices and

terms of the asset sales, and subsequent weak regulation, has allowed their new overseas owners to extract excessive profits and capital gains.<sup>38</sup>

During the decade 1990-2000, central government made only small investments in electricity supply compared to earlier years. From 1998 the private sector invested in about 1000 MW of thermal generation, costing some \$1 billion NZ in round terms. The system now generates a significant surplus of electricity in most years. An exception was the winter 2001 hydro shortage, when spot prices skyrocketed. A foreign-owned generator-retailer, the Natural Gas Corporation, had insufficient generation to cover its consumers' demand, and lost some \$300 million of shareholder value. In this case it was indeed the private sector that was burdened by the extraordinary risks of the wholesale electricity market. The figures for 2001 in the spreadsheet attached to this report show this as effect as a sharply reduced net "income from foreign investment in NZ".

The burden of investment concept applies also to local community-owned power companies, which over the years built many small hydro projects (using large subsidies from central government). Many or most of these suffered from cost escalation, and three schemes suffered collapse of their dams or canals. However like all hydro projects these have practically no operating costs, and are now essentially cash cows for their owners. As noted before, the 1998 breakup of local power companies into separate retail and network businesses forced most of these power stations to be sold off to other generators.

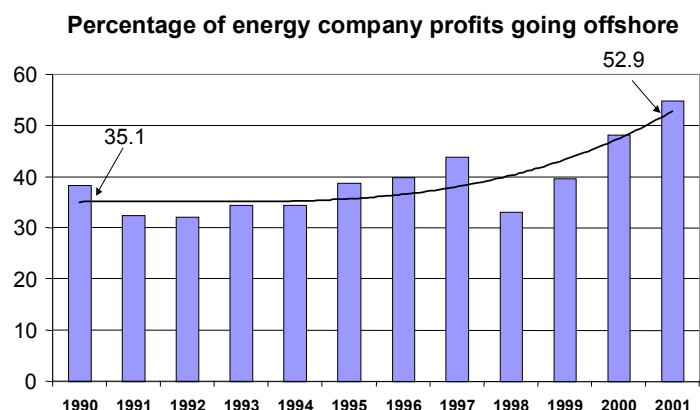
Most local electricity network companies are still publicly owned, but by far the largest, United Networks, is overseas-owned. It purchased the networks supplying a large



proportion of New Zealand's city residents, who are less costly to supply than town and rural customers - and so is particularly able to take monopoly profits to whatever extent a tolerant Commerce Commission will allow.

In 1990, foreign investment in energy supply comprised approximately half of the gas and oil producing fields plus New Zealand's oil refinery. In 1993 the first foreign company bought into a local power company. Thereafter

several foreign companies bought substantial shareholding in local power companies, and successive mergers and takeovers hiked share values, sometimes to four times their original book values. In 1999 one of the four state-owned generators was privatised, with 40% foreign ownership, since increased to almost 60%. And in 2001 the New Zealand-owned interests in the Maui gas field and other small oil and gas fields was sold to Shell Oil, which now dominates the gas and oil sector. The Commerce Commission surprisingly permitted the sale.



The flow overseas of profits and dividends from these investments

<sup>38</sup> Easton, "A hubris of managers", Listener Nov 17 2001 p. 38.

makes up the true burden to New Zealand of our energy sector. For the indicator, we take the ideal state as 80% publicly owned. This allows for a significant foreign ownership in gas fields which are already discovered, and which would provide a valuable diversity to an otherwise entirely renewable primary energy resource.

The spreadsheet attached to this report shows that the after-tax profits of the local power supply sector have risen several hundred percent since the sector was corporatised and partly privatised. The gas sector, also largely privatised, has also gained in profit. By contrast, the oil and central electricity supply sectors grew in profits during the mid 1990s but have tailed off since.