Social sustainability

►Indicator 3 : Households with access to electricity

Well over 99% of New Zealand's households are reticulated with electricity.[29] Rural reticulation was subsidised between 1945 and 1990, from a small levy on the revenues of local power companies. Some of the later schemes were very ambitious and would be considered entirely uneconomic today. Households not connected to the grid almost invariably generate their own electricity, usually from diesel generators but increasingly from micro-hydro dams, wind generators or photovoltaic cells, or a combination of these.

Power network companies are required to maintain uneconomic lines until 2013. During that time, one might hope that distributed power generation from renewable energy might be introduced widely. (See discussion under Indicator 8). This would reduce not only greenhouse gas emissions but also the noise and nuisance of diesel generators. However small backup generators will always be needed as small renewable sources are subject to high variability in supply. In the absence of such schemes, some rural lines will have to be rebuilt at very high cost.

Most households without access to electricity are those that have been cut off for non-payment of power bills, as discussed below. The other major access issue in New Zealand is temporary loss of supply, either from faults in the network, or because power station failure or shortage of hydro energy requires cutbacks in consumption.

In February 1998 (in the NZ summer), the entire Auckland central business district lost electricity supply for five weeks as four underground cables failed in quick succession. Remaining smaller transmission lines together with diesel generators in the streets provided partial supplies for a few hours per day, but many businesses had to close down. The power company had been held up by the business community as an example of aggressive and successful corporatisation policies[30], but its focus on management of financial rather than physical assets had allowed managers to ignore the signs of incipient failure of the cables.

In June and July 2001 a hydro shortage - the second in a decade - led to spot market prices up to $1/kWh for brief periods, and 25-50 c/kWh for days at a time. This compared to prices of 2-4c the previous year. Because domestic customers were on fixed tariffs they had no incentive other than exhortations from the Minister of Energy to save electricity (which were effective). But those large industrial users which bought some of their electricity on the spot market were affected immediately. Many which had been on fixed price tariffs have found their supplier would not renew the contracts, but are forcing companies to buy at spot prices, or at drastically inflated fixed prices.

Since the 1998 breakup of power companies, most companies have increased fees for disconnections and reconnections, and fixing faults. They are also tougher in requiring bonds for customers considered unreliable payers. These moves affect low-income customers disproportionately. One company is believed to have increased the number of disconnections of domestic consumers during the power shortage, simply to reduce its exposure to skyrocketing spot prices[31]. No statistics are kept on disconnections for non-payment of bills, as this is considered to be a commercial rather than a public policy issue.

[29] Alan Jenkins, Electricity Networks Association, pers. comm.

[30] Management, December 1997

[31] NZ Herald 11 August 2001

In the wake of the shortage domestic power prices are rising - at a time when hydro energy is abundant and savings are no longer needed. And there is a continuing exchange of customer blocks between different retailers. Consumers in most districts now find their incumbent retailer is acting as a monopoly. The discipline of a competitive market is no longer effective, and both industrial and domestic consumers are paying higher prices as a result. Government exhorts consumers to change suppliers if they are dissatisfied with price or service, but the billing systems have proved unable to cope. Many customers who have switched are not billed for many months; some are then threatened with disconnection. An Electricity Commissioner has just been set up to arbitrate consumer complaints - but not all retailers have subscribed to this scheme.

Power companies have no commercial incentive to support energy efficiency measures which save electricity at lower cost than electricity from new power stations. But Christchurch's network company, owned by its city council and supported by its community, has done so for a decade. As long as Government continues to allow commercial agendas to drive energy decisions, energy efficiency initiatives will remain sporadic and do little to actually reduce electricity demand.

Although power connections are virtually universal, the affordability of electricity is becoming an issue increasingly. We consider that the most important available measure of access to electricity is the proportion of households which spend more than 10% of their income on domestic fuel and power, which we consider a threshold defining "fuel poverty".

In our 1998 report to HELIO we predicted this would increase. Since that year, only one figure has been released, and surprisingly it is little different from the 1997 figure. It would appear that the "price holiday" that accompanied the 1998 breakup of local power companies has kept this indicator value down. But since the breakup most companies have increased their fees for disconnections, and reconnections, for fixing faults and for pay-as-you-go meters. These moves have impacted far more on low-income people than on the average New Zealander. Retail price hikes are predicted by all power retailers. These factors are very likely to cause fuel poverty to increase.

The HELIO indicator is nominally simple to calculate: 100% access to electricity, in 1990 and 2000 alike.

►Indicator 4: Investment in clean energy

"Clean Energy" is defined for the purpose of this report as including hydro generation from stations less than 100 MW, small recently built geothermal power stations, and new renewable energy sources.

Energy efficiency investment is also counted as "clean energy", and has the potential to substitute for a great deal of power generation that is now being planned. EECA has recently subsidised residential energy efficiency by around $2millionNZ/yr mainly to low-income households - but this is small in comparison with the continuing capital investment in inefficient energy-using equipment in all sectors - household, commercial and industrial.

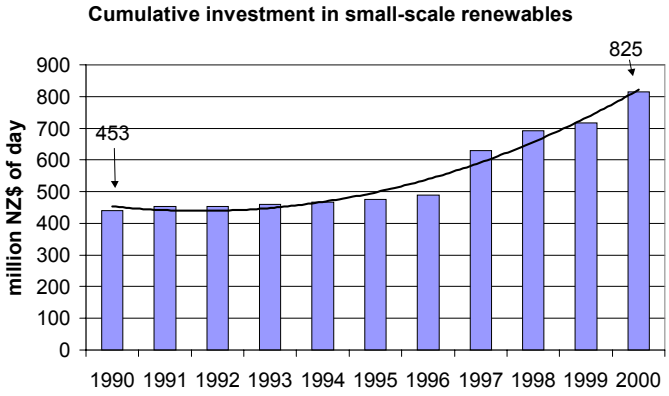
During the mid 1990s small-scale renewable energy was on track to become very significant in meeting the still-modest growth in electricity demand. Some 350 MW of such power stations were built by local power companies during this brief period when there appeared to be an imminent shortfall of generation.

However the commissioning of almost 1000 MW of large-scale gas-fired generation after 1998 has kept wholesale prices low - some 2.5-5c/kWh at most times - and stifled the planned expansion of two wind farms.

Clean Energy also includes the "un-sexy" but important conversion of industrial wastes to heat. This has proceeded steadily, and now produces a large proportion of New Zealand's renewable energy other than hydro and geothermal.

Domestic fires remain an important energy source, and the fact that efficient wood burners are increasingly common allows their use to be described as potentially clean. Eucalyptus coppice fuelwood is being introduced; this is clean and convenient to handle and can dry naturally to 25% moisture content in 2 months or less after harvest[32]. This gives hope that fuelwood might be available at short notice, thus able to offset high spot prices in the occasional years when hydro energy is in short supply. Investment costs for this technology include plantations, highly efficient wood burners, and some handling equipment and vehicles for distribution; they cannot be estimated at this stage.

The baseline investment in New Zealand's energy sector will be estimated in extremely broad terms, being a very large number to which a small number is compared. We take the Maui development as costing $1 billion for each of the two offshore platforms (actual numbers, but in dollars of the day, say 1980 and 1990), another $1 billion for onshore facilities (say 1980), and another $1 billion for non-Maui gas and oil fields (say 1980; Kapuni was earlier , small oil fields, later). We take the investment in the oil refinery as another $1 billion. We take electricity investments as the value of Crown electricity assets in 1986, $6.3 billion, plus another $3 billion for all local authority electricity assets. Coal assets are small by comparison. Thus in dollars of the day, we take conventional energy assets as worth $13 billion in 1990.



The last decade saw some $1 billion invested in almost 1000 MW of gas-fired generation and cogeneration.[33] There was one major upgrade of large hydro generation and several small upgrades, costing over $200 million. Exploration and development of several small oil fields cannot be costed, but could amount to several hundred million. In all we will count $2 billion of additional investment in conventional energy supply between 1990 and 2000.

The HELIO indicator is much more sensitive to the definition of "clean energy" assets in 1990. Hydro stations of less than 100 MW capacity in that year summed to approximately 400 MW; some of these had particularly major environmental impacts (two collapsed as they were being commissioned, and a third did so in 1998). Yet others were built with strong support from their communities after extensive consultation. Here we arbitrarily take half the small hydro power stations as "clean energy", and their investment cost as a generic 1.9 million NZ$ per MW

[32] Ralph Sims, Massey University, Palmerston North, pers. comm.

[33] A 400 MW combined cycle plant on an existing site commissioned in 1998 in Taranaki cost approximately $NZ1000/MW; costs in US$ for combined cycle plants of various sizes cluster in the neighbourhood of $1000US/MW. www.fe.doe.gov/coal_power/special_rpts/market_systems/appc.pdf

Renewable generation commissioned in the period 1990-1995 were 17 MW of geothermal and 9 MW of landfill gas. In 1995-1999, 60 MW of geothermal, 7 MW small hydro, 3 MW landfill gas and 35 MW of wind power were commissioned. 2000 saw another xx MW of geothermal.

Generic costs will be taken as follows:

-The cost to Alpine Energy of the 1998 7 MW hydro station was approximately $13m including repair costs. Given the cost overruns in earlier small hydro schemes, an estimate of 1.9 nz$/watt seems reasonable for all small hydro. Geothermal costs will be prorated to the $42 million cost of the Rotokawa power station for 24 MW.

-Wind costs will be prorated to the $50m cost for the 32 MW Tararua wind farm.

-Landfill gas will be put at $1200/MW US, times a PPP factor of 1.44 NZ$/US$ for 2000.

Based on these numbers, the HELIO indicator for 2000 is 12.57.

The outcomes from renewable energy investments are tracked in the Energy Data File, and are reported in Indicator 8.