

Environmental sustainability

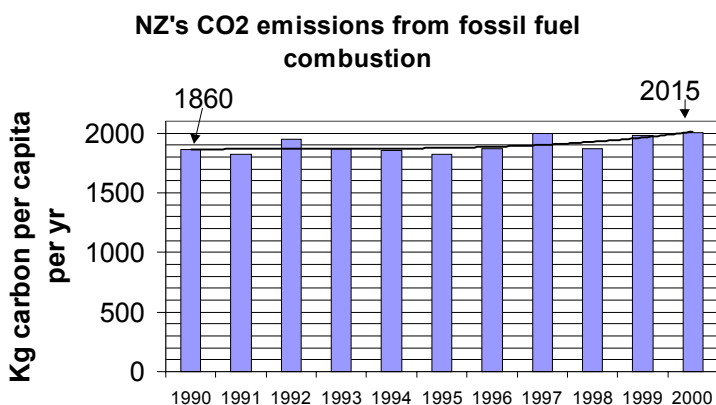
►Indicator 1: per capita carbon emissions

New Zealand's carbon dioxide emissions derive 90% from fossil fuel combustion, with 40% of that figure coming from transport emissions. Transport emissions have increased 44% since 1990.²³ Aluminium, steel, and cement manufacture emit CO₂ from chemical processes as well as from combustion, and those parts of their emissions are excluded from these figures.

Electricity generation from gas and coal varies widely, because two thirds of New Zealand's electricity comes from hydro power systems which can only store a few weeks of New Zealand's annual generation. Emissions from thermal power generation have increased 33% since 1990.²⁴ A hydro shortage in the winter of 2001 led to a 30% increase in total gas use. The impact of thermal power on emissions will increase when the Pohukura gas field begins to replace the declining Maui field in 2005, because the new field will be much less able to change its output from month to month²⁵. Thus more oil or (probably) coal will be needed to make up for variations in hydroelectricity.

Geothermal energy releases the CO₂ dissolved in the geothermal fluids, at rates very specific to each site and method of development. The largest geothermal plant emits just 6% of the CO₂ that would be emitted by a combined cycle gas turbine; the second largest geothermal plant emits 96%. Overall, the geothermal sector is now emitting 41% of the CO₂ of our most efficient gas-fired generators.

The Ministry of Energy's Energy Outlook²⁶ now projects some 800 MW of coal-fired power being introduced after 2010 - this also assumes rather optimistically that 80PJ/yr gas will become available from the present until 2020. The baseline forecast projects greenhouse gas emissions from the energy sector in 2020 to be 68% higher than they were in 1990. The document does not mention the Kyoto Protocol.



New Zealand's other greenhouse gas emissions are particularly strong. They come mainly from the farming sector, as methane from anaerobic digestion in ruminant livestock, and nitrous oxide from soils. In the local debate about the Kyoto protocol, energy sector interests are calling for their emissions to be offset by the growing plantation forest estate. But environmental interests consider that wrong to mix up energy sector agendas with land use issues.

²³ NZ Greenhouse Gas Inventory 1990-1999, Ministry for the Environment 2001

²⁴ MFE op. cit.

²⁵ Lloyd Taylor, Business News on Radio NZ, 6:45 am 25 Feb. 2002

²⁶ on www.med.govt.nz

HELIO INDICATOR:

The value 1 of this indicator is the global average of emissions per capita in 1990 of carbon dioxide expressed as carbon, namely 1130 kgC/cap. The value 0 is 30% of that value, or 339 kgC/cap. The indicator value in 2000 comes to 2.12.

►Indicator 2: Local environmental impacts

Local environmental impacts from New Zealand's energy production include the loss of cultural and environmental values from the damming of almost every economically viable major river system, and many smaller ones. Low lake or river levels, variations in river flows, and sometimes flooding are matters of continuing concern. Past geothermal power proposals have also given rise to major cultural concerns, but consultation with Maori has overcome concerns in most recent projects. Cooling water discharged from a 1000 MW thermal power station raises river temperatures and generation must be constrained at times in summer months. There are some local impacts from onshore gas and oil production and coal mining, but these are generally well contained.

The environmental impacts from energy use affect many more people in New Zealand than those from energy production, because of its largely urban population.

Emissions of small particulates (PM10), mainly from domestic solid fuel burners, are monitored in Christchurch, where an inversion layer in winter traps polluted air and affects a substantial population. Many suburbs throughout New Zealand are subject to similar trapping of particulates. The Canterbury Regional Council now prohibits open fires and requires closed wood burners to meet a stringent emissions standard of 1.5g/kg.

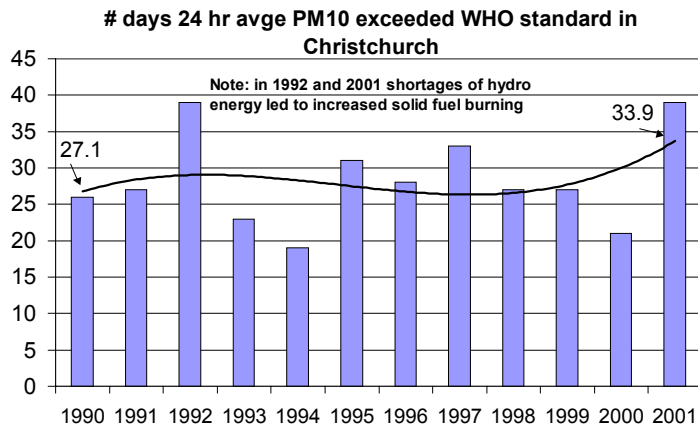
Emissions from vehicles in Auckland, New Zealand's largest city, cause a high level of pollution in some areas. Data on pollution are collected by Auckland Regional Council; a variety of monitoring methods were used, at several stations. At present the number of days per year that the WHO limits on air pollution are exceeded are fewer than those found in the Christchurch study. Nelson is another city in a basin subject to winter inversions; the number of days WHO levels were exceeded were substantially greater this year than those in Christchurch.

A significant local impact from energy use arises from a steadily increasing use of portable LPG (liquified petroleum gas) heaters in houses. About 1/3 of New Zealand houses have these heaters²⁷. The heaters discharge combustion gases including moisture directly into living areas, producing levels of nitrogen dioxide which are usually near or above the WHO limit of 160 ppb.²⁸ The moisture can cause serious dampness in the house; this in turn is an important contributing cause of asthma, which is increasing in New Zealand. Dampness can also damage the structure and contents of houses. A two-year study of the relationship between asthma and the air quality and temperatures in houses began last year, and its results can be expected to have significant policy implications.

The indicator we choose for local pollution is based on outcomes not inputs - that is, days in a year when the WHO standard for PM10 in Christchurch has been exceeded - not emissions of PM10 per capita. Furthermore, instead of taking values for 1990 and 2000

²⁷ "An Unflued Heater in your Home? Consumer, March 1998, p. 368

²⁸ "Domestic Indoor Air Quality, a survey of the impact of gas appliances", Bettany, B. L. et. al., MESC Report S93/191, from the Building Research Institute of NZ, 1993



as the basis for the HELIO indicator, we take the values derived from a trendline (fit with a power series). Other indicators will use this approach where possible, as it is particularly suitable for New Zealand with its small size, large variations in each indicator, and statistics which allow confidentiality of data on energy supply and use by certain industries.

The HELIO indicator for local pollution is 1.28.