

Why design sustainably?

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Homes have major impacts on Kiwis' health and comfort, account for around 30% of New Zealand's electricity consumption, and cost a lot of money to run. Homes are where most of our water is used, most of our wastewater generated, much of our material resources consumed, and nearly half of our landfill waste arises. In a greenhouse- and water-aware world it makes sense to alleviate the environmental and economic impacts as much as possible.

Sustainable housing provides better health and comfort, uses less energy, water, and materials, costs less to run, and produces less wastewater and solid waste. Building sustainably is just smart building.

"By the time the design for a development is completed, 80-90% of its life-cycle economic and environmental costs will have already been made inevitable. More importantly, when just 1% of a development's up-front costs have been spent, up to 70% of its whole-of-life costs may already be committed"

(Romm and Browning, 1998, quoted in "The Value Case for Sustainable Building" (Ministry for the Environment).

How do sustainable homes benefit you?

Improving our health

Cold homes create condensation - 45% of our homes have mould and are ideal environments for fungi and dust-mites, helping trigger increasingly high rates of allergy and asthma. Cold, damp and mould indoors, where we spend most of our time, affects the health of 25% of our households and is a key contributor to New Zealand's high winter mortality rate (1600 more people die in winter than in summer) - one of the highest in the developed world.

This costs us, as individuals and as a nation. Sick days off work and school are just the tip of the iceberg – there are doctors' visits, prescription charges, hospital costs – the list goes on.

Making our homes affordable

Truly affordable houses are cheap to run, not just cheap to buy. Reducing energy and water requirements – and therefore costs - generates a significant increase in household disposable income, which could easily go towards repaying the mortgage.

Case study: the NZ Housing Foundation's HomeSmart Home

The New Zealand Housing Foundation's HomeSmart Home introduced energy efficiency, passive solar design, good thermal envelope and energy generation to a standard NZHF design. The results produced a low energy and very affordable home for the family of six living in the house.

The HomeSmart Home's design incorporated good solar orientation with all living areas and bedrooms facing north and the garage to the south. It was well-insulated with R4.6 ceiling insulation, R2.6 external wall insulation, and uPVC-framed double glazing on northern windows, and thermal curtains for all windows and doors. Heating, lighting and appliances were selected for energy efficiency.

The improved thermal envelope (heavy insulation, double glazing) reduced heating requirements to virtually nil. A heater was used initially to keep the newborn baby warm, but subsequently the heaters were not used at all.

A 310 litre heat pump hot water system with a 4 star energy rating was installed, saving significant amounts of electricity. The house featured a grid-linked solar power system which generated nearly a third of the electricity used in the home, about 2000kWh per year; the occupants directly used 1000kWh, the rest was returned to the grid and the homeowners received credits in their power bills.

The HomeSmart Home was an exceptionally low energy home, using only a very low 3980kWh per year. It compares particularly well to other monitored homes, the Waitakere NOW Home (7400kWh per year) and a typical group builder home in Rangiora (14400kWh per year).

The family living in the HomeSmart Home appreciated the significant cost savings, particularly of the hot water system, and noted the house was very cheap to run. Compared to an average house in Auckland, the savings could have been as much as \$1625 per year from the energy efficiency and generation measures.

The family was clear about the health benefits of living in a warm, dry, well-ventilated house: no-one had been sick since arriving in the house and asthma inhalers were no longer needed.

Using the Earth's resources wisely

Research shows that more resources, materials, energy and water are being used, per person, than ever before. In New Zealand nearly a third of all electricity is used domestically – in heating, lighting and running appliances. The generation of energy, particularly by the burning of fossil fuels, depletes natural resources and pollutes the atmosphere.

The national average for water consumption is 241 litres per person, per day. However, only about 5 litres per person per day (l/pp/pd) needs to be suitable for drinking and cooking – the rest of the expensively treated and reticulated water is flushed down toilets and waters our gardens.

The mounting cost of energy and water to New Zealand

If we could reduce our demand for energy and water:

- Our current supply would go further and supply more people
- We could defer expensive new infrastructure
- Our rates and taxes would not need to meet as many future infrastructure demands

Beacon's *National Value Case for Sustainable Housing Innovations* calculated the value to the nation of making five simple home improvements to New Zealand homes: Each year New Zealand could:

- save enough energy to power 500,000 homes,
- reduce CO2 emissions by 360kt, equivalent to \$54m worth of tradeable emissions
- save 130 million cubic metres of water.

Overall New Zealand households would save 1% of GDP by 2017 or about \$2 billion.

For more information:

- Visit www.mfe.govt.nz/publications/sus-dev/value-case-sustainable-building-feb06/ to read the Ministry for the Environment's *Value Case for Sustainable Building*.
- Visit www.beaconpathway.co.nz/further-research/article/the-national-value-case-for-sustainable-housing to read Beacon's *National Value Case for Sustainable Housing Innovations*.