Centre for Housing Research
AOTEAROA NEW ZEALAND

Kāinga Tipu

RESEARCH BULLETIN

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The Impact on Housing Energy Efficiency of Market Prices, Incentives and Regulatory Requirements

New Zealand is lagging behind other developed countries in improving household energy efficiency, due to its relatively mild climate, historically cheap energy, institutional and behavioural inertia, and a historic lack of strong government leadership.

The application of regulations has been inconsistent – world-class standards for hot water cylinders sit alongside insulation codes that have changed little in 25 years – although there are signs this may now change, and the history of incentives in New Zealand has been stop-start.

Based on research by Taylor Baines and Associates, Christchurch (Ian McChesney, Norman Smith and James Baines). The research examines the effect of prices, incentives and regulation on energy efficiency within New Zealand households, and reviews international approaches to residential energy efficiency to underpin research on options for improving future outcomes in New Zealand. The research was jointly funded by CHRANZ and Building Research through the Building Research Levy.

New Zealand households have benefited from the introduction of energy efficient products – from household appliances to new heating systems – through international market mechanisms. However, the market cannot deliver the optimum level of investment in energy efficiency in the national interest.

Given there is only modest public understanding or acceptance of the value of energy efficiency, and that significant numbers of households have little or no cash surplus, there is little prospect of major progress in the next 10 years without the use of a range of incentives and other government-led initiatives.

It is recommended that policy design and programme delivery would benefit from a focus on outcomes – such as air quality, CO_2 emissions, healthy indoor temperatures and energy security – and a “whole-of-government” approach.

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Key Points

- The household sector is responsible for 13% of the nation's energy consumption, including 35% of electricity consumption.
- Current scenarios predict ongoing increases in energy demand of about 1.5–2% per annum as a result of trends in income, expectations and demographic change.
- A continuation of current trends is unlikely to lead to investment in substantial energy efficiency measures.
- There is a lack of widespread experience of locally successful energy efficiency programmes. Overseas experience suggests it is the mix of market mechanisms, incentives and regulations, supported by information and appropriate institutional responses, working together and targeting different parts of the market that provide the recipe for success.
- Pursuing energy efficiency improvements per se as a public policy goal is problematic unless the outcomes to be achieved are clear, as energy efficiency provides the means to a wide range of public and private benefits with trade-offs between them.
- Outcomes of energy use for human health and atmospheric emissions are currently focal points of research and public policy debate. A significant proportion of our households fail to reach World Health Organisation recommendations for indoor temperatures; 30 areas in the country do not meet National Environmental Standards for air quality, mainly due to residential open fires and burners; and carbon dioxide emissions attributable to the residential sector are 50% higher than 1990 levels on which our Kyoto Protocol commitments are based.
- It is recommended that a key policy focus should be to adopt an "outcomes" approach to provide a framework for coherent policy design and programme delivery.
- Key areas in which energy efficiency effort should be focused are new dwellings, existing dwellings and appliance standards.

Findings

Energy Use in New Zealand Houses

New Zealand's housing stock comprises about 1.5 million occupied houses and a further 100,000 more that are unoccupied at any particular time. It reflects our history, climate, culture, resources and lifestyles. In the last decade, new houses have been built at the rate of about 25,000 per year, leading to regional disparities in the age profile of houses between areas of high and low growth.

In terms of energy services, the largest end use of energy is for space heating and cooling (35%), followed by water heating (27%). Energy use for appliances and electronics is about 21% of the total and growing strongly. Over 70% of energy used in homes is now electricity.

Household energy consumption can be segmented meaningfully by factors including household income, composition (numbers of persons), geographic location and tenure (home owners vs. landlords/tenants). A continuation of current trends is unlikely to lead to investment in substantial energy efficiency measures. Some trends (eg, towards more rental housing) are likely to inhibit energy efficiency investment.

Relative expenditure on fuel and power by New Zealand households appears to be similar to those in the UK, despite climate and lower per capital energy use advantages.

Disbenefits from present household energy use patterns include an increase in attributable CO_2 emissions by 50% since 1990, negative impacts on local air quality, and a failure to provide warm healthy temperatures in a proportion of our houses.

The Concept of Energy Efficiency

The Energy Efficiency and Conservation Act 2000 defines energy efficiency as "…a change to energy use that results in an increase in net benefits per unit of energy". Energy efficiency can provide a wide range of public and private benefits with outcomes that may include decreased energy use but could also include increased use depending on the benefit sought. For example, in the trade-off between heating and energy saving, substantial energy savings in most households are unlikely until basic indoor comfort levels are reached.

Barriers to investment in household energy efficiency include lack of information, length of payback, relative size of effort versus benefit and capital constraints.

Energy Efficiency Achievement

Despite an economy-wide Government target of a 20% improvement in energy efficiency by 2012 (about 2% per year), the residential sector is estimated to have improved only 0.3% per annum between 2001 and 2004. The low improvement is illustrated by estimates that a third of New Zealand homes still have no or inadequate ceiling and floor insulation, and about half of homes have little or no wall insulation.

Market: Historically, it has been the development of new, more efficient products and services in the market that has provided the initial stimulus for energy efficiency gains, from home insulation to home heating. Limits to market penetration, including access to information, finance, suitable products/services and demand, mean large segments of the household sector are relatively "untouched".

Regulations: Minimum insulation requirements were first mandated for all new homes in 1978. About 550,000 homes (36% of the current total) have been built since. Three sets of domestic products/appliances have to meet Minimum Energy Performance Standards (MEPS) – fridges/freezers, electric hot water cylinders and air conditioners – and a further nine have been identified as potential candidates for MEPS.

Incentives: Financially assisted energy efficiency programmes to date have been stop-start or have limited coverage and overall effectiveness. A government low-income focused scheme, the EnergyWise Home Grant, has resulted in 8,000 houses receiving energy efficiency upgrades in the last year. The extent of incentives offered through non-government sources is significantly higher, with stand-out examples including Environment Canterbury's Clean Heat programme, which will incentivise some 25,000 households to use approved heating appliances and insulation over 10 years, and a promotion led by Lines Trust South Canterbury, in partnership with a supplier and distributor, that has seen energy efficient light bulbs introduced to 75–80% of South Canterbury households.

International Residential Energy Efficiency

Overseas experience in incentivising change offers invaluable guidance for the development of ways to encourage change in home heating and energy efficiency in New Zealand. The US, UK and Australia have taken different approaches – the US has a strong electricity utility demand-side orientation; the UK has a more government coordinated focus on fuel poverty and CO_2 emissions reductions; Australia's recent emphasis has been on incentivising renewable energy systems. There are common elements to the approaches, including Home Energy Rating Schemes (HERS), and some generic observations relevant to New Zealand include that domestic energy efficiency requires a long-term approach, with clear policy commitments aligned to specific outcomes, a variety of complementary measures and involvement from all sectors. US estimates are that 45% of all energy efficiency is driven by building code requirements, incentives and subsidies account for 30%, and the remaining 25% is the result of market choice.

Exploring Possibilities for New Zealand

A reference projection depicts household energy demand increasing at 1.5% per year to a per capita energy use of 19GJ/person by 2031, and with

attributable CO_2 emissions rising by a further 65% (an increase of 150% over 1990 Kyoto Protocol commitment levels. An alternative scenario modelling an aggressive "outcomes" focused energy efficiency approach involving a range of measures – including HERS, improved Building Code energy standards, lighting retrofits, new technology hot water systems, tighter MEPS standards for appliances, and incentives for "healthy" home heating – indicates a potential reduction in household energy use by over 15% compared with the reference case, and a reduction of attributable CO_2 emissions by about 25%.

Policy Implications

Lack of clarity of purpose has hindered progress in improving household energy efficiency. A focus on outcomes would provide a coherent framework for energy efficiency policy and programme design. One outcome that relates to residential energy use has already been established – achieving the National Environmental Standards for air quality by 2013. Other areas that could provide a specific outcomes focus include CO_2 emissions reductions, healthy indoor temperatures and energy security.

This is not simply a matter for the energy policy community to address through the NZ Energy Strategy and National Energy Efficiency and Conservation Strategy processes. It requires collaboration and aligning the efforts of those in other policy areas, namely environment, health, social development and housing, and aligning effort between central and local initiatives.

The development of a Home Energy Rating System, regulatory approaches through MEPS, and the Building Code review are positive developments, but there are gaps in leveraging energy efficiency market activity, and the provision of incentives is an area for real improvement.

Further Information

This bulletin is based on the report *The Impact on Housing Energy Efficiency of Market Prices, Incentives and Regulatory Requirements.* A copy of the report and this bulletin can be found on the CHRANZ website under 'Our Publications'.

Other useful reports include:

- *The Future of Housing in New Zealand,* Scion and BRANZ (February 2006)

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