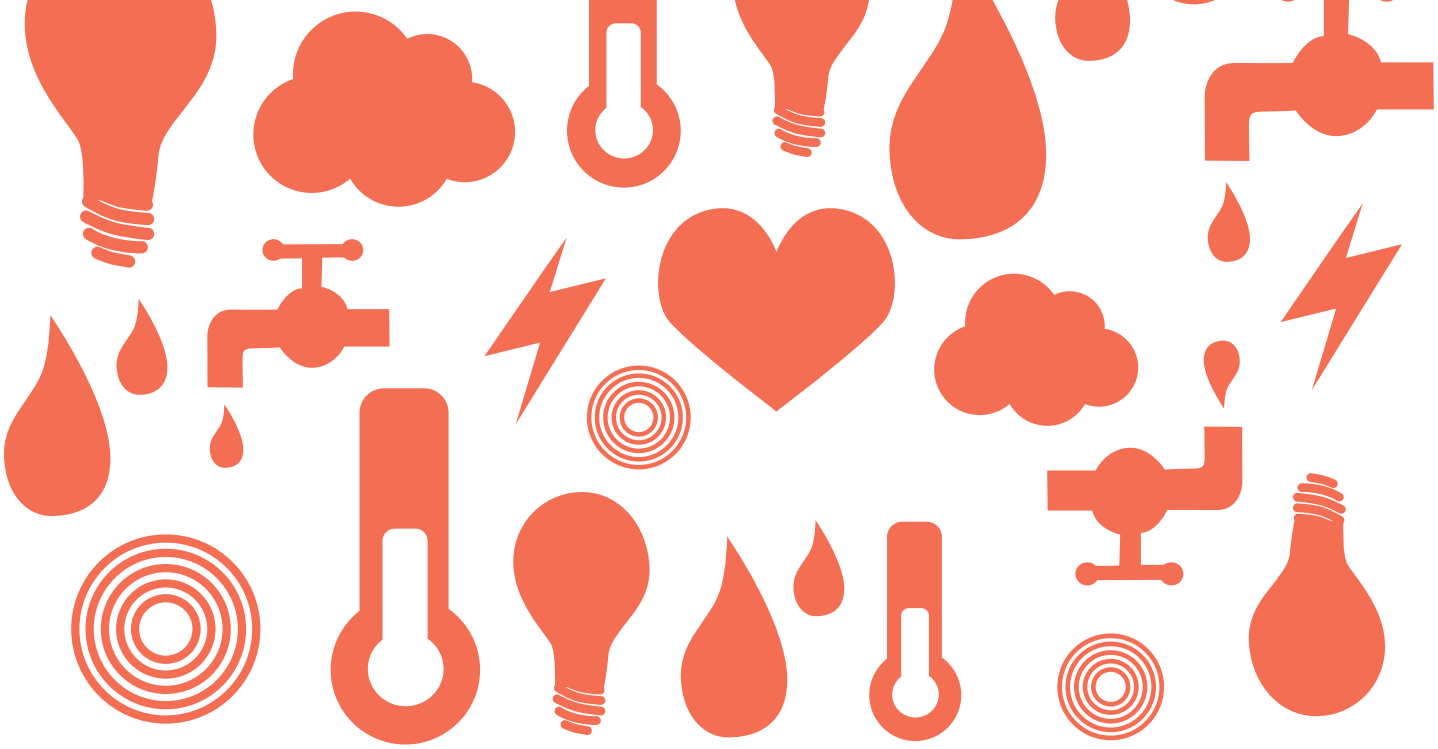

Policy Options for Sustainable Homes

A Resource Manual for Local Government

April 2010

Beacon

Creating homes and neighbourhoods that work well into the future and don't cost the Earth

About this report

AUTHOR

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ABSTRACT

This Resource Manual sets out to assist councils to understand the need for sustainable homes, define what makes a sustainable home, establish the basis for action, and evaluate the options for action. It provides information and examples to support councils to build their own, locally-specific, value case for sustainable building policies and programmes.

REFERENCE

Howell, M., Birchfield, D. (2010). Policy Options for Sustainable Homes: A Resource Manual for Local Government. Report HR2420/6 for Beacon Pathway Limited.

ACKNOWLEDGEMENTS

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Executive summary

Beacon believes that New Zealand homes can and should perform better – for the sake of our health, our resources and our nation.

If councils provide the right signals and advice at the right time, they can have a positive influence on decisions people make about their homes. Beacon's assessment of existing council policies and programmes suggests that councils can make it easier for homeowners to build and renovate better-performing homes.

This Resource Manual sets out to assist councils to:

1) Understand the context: the need for sustainable homes
2) Define the outcomes: what makes a sustainable home
3) Establish the basis for action
4) Evaluate the options for action

Beacon Pathway's research suggests that many people would find it easier to build and retrofit their homes to perform better if council policies, plans and processes were more supportive of sustainable design. Where sustainable building approaches are different to conventional building practices, policies and plans may make it hard for people to make the more sustainable choice. Even when policies are neutral or supportive of sustainable building, Beacon's research has identified that council administrative processes can be a disincentive.

For councils, there is a strong value case for being involved in promoting more sustainable homes in their regions, districts, and cities. Homes that perform well have benefits that go beyond direct financial savings; they benefit the whole economy, local council budgets, and, most importantly, families.

High-performing homes promote the health, economic efficiency, and environmental well-being of communities. They can reduce demand for infrastructure and services provided by councils. Building and renovating sustainable homes can also offer significant employment opportunities. For every 1,000 houses that are retrofitted, a total of 392 full time equivalent jobs would be required to deliver on-site retrofitting services and provide the products and services involved in the renovation activity.

In the course of developing this Resource Manual, council officers have told us that there is strong interest in sustainable building within councils, but many feel that they are only at the beginning of the journey. Currently, there are limited resources, knowledge gaps, and a generally piecemeal approach to policy initiatives to support sustainable residential building. However, some exciting new policies and programmes are emerging around the country.

Figure 1: What councils can do to promote more sustainable homes

There is a good legislative basis for councils to promote more sustainable building choices, and there are a range of tools that councils could employ to this end. Opportunities exist in council strategies, regulation, design guidance, economic tools, community education, and — importantly — in council's own administrative practices.

This Resource Manual provides detailed assessment of the initiatives that councils could develop, identifying the scope, pros and cons, and existing examples of the different methods. It concludes that councils which want to effectively support more sustainable homes in their regions, districts and cities need to:

- Secure a mandate for change
- Develop a package of tools
- Support whole-of-house solutions
- Ensure district-wide systems reinforce sustainable housing choices
- Recognise indirect opportunities
- Bridge the implementation gap
- Build officer capabilities
- Recognise the "long game"
- Extend the available tools

Although there is no single, simple mechanism for councils to implement, they can capitalise on the numerous small opportunities that exist across all aspects of council operations, to develop a comprehensive and effective approach to encouraging better performing homes. Building on the policies and programmes that are already in place in different councils, there is considerable scope to strengthen and extend the range of initiatives that councils offer.

Note: Creating homes and neighbourhoods that are more sustainable will require interventions at all different scales, and from different sets of stakeholders. **The focus of this Resource Manual is on what can be achieved by councils to support efforts at the house and site level.** Although they are just as important, the Manual does not cover actions by other bodies, or consider wider neighbourhood, district, or city-scale interventions.

Contents

Introduction: The purpose of this Resource Manual

Beacon Pathway's research suggests that many people would find it easier to build and renovate their homes sustainably if council policies, plans and processes were more supportive of sustainable design.

Where sustainable building approaches are different to conventional building practices, policies and plans may make it hard for people to make the more sustainable choice. Even when policies are neutral or supportive of sustainable building, Beacon's research has identified that council administrative processes can be a disincentive.

There are a range of tools that councils could employ to support more sustainable building. This Resource Manual uses earlier Beacon research to address the range of barriers found at a local government level to the development of a more sustainable housing stock. It outlines a range of possible techniques and solutions to address those barriers, and uses case studies to assist in identifying priority actions and to offer examples of best practice for individual councils. It sets out to make it easier for councils to learn about the range of available policy mechanisms that could help drive sustainable building innovation.

Creating homes and neighbourhoods that are more sustainable will require interventions at all different scales, and from different sets of stakeholders. The focus of this Manual is on what can be achieved by councils to support efforts at the house and site level. It does not cover actions by other bodies, or consider wider neighbourhood, district, or city-scale interventions. There are significant sustainability improvements that councils can make at other levels, such as repairing water supply leaks and addressing transport efficiencies. Any initiatives at house level should be supportive of, and supported by, such wider efforts.

Part I of the Resource Manual examines the need for better performing, more resource-efficient housing (context). It provides 'big picture' information about the benefits of sustainable homes and the value case for local government involvement, including benefits for the health, economic efficiency, and environmental well-being of communities.

Part II of the Resource Manual explains what makes a sustainable home (outcomes). Beacon's approach to sustainable homes is explained and supported by the results of new and retrofit research projects. It introduces the key performance areas of Beacon's HSS High Standard of Sustainability® – energy, water, indoor environment quality (IEQ), materials, and waste – and outlines methods to achieve sustainable outcomes within the design, construction and renovation of houses. This information is intended to support councils in building their own, locally-specific, value case for sustainable building policies. For example, the evidence presented in this section could be included in council reports, used as part of staff training, and shared in communications with the public.

Part III considers the broad number of ways in which local government can influence the sustainability of New Zealanders' homes (basis for action). It presents relevant findings from Beacon's research into local government barriers to sustainable building, and it sets out the legislative bases for action.

Part IV provides a more detailed analysis of different policy approaches employed by councils to support sustainable building (options for action). It sets out the key findings for councils wishing to promote more sustainable homes in their regions, districts and cities. Eight detailed sections focus on councils' strategies and plans, RMA policy statements and plans, development standards and guidelines, Building Code administration, bylaws, economic tools, community education, and council administrative practices. Each section discusses the scope for action to promote sustainable choices for homes, pro's and con's of the approach, and identifies examples where methods are already in effect. The analysis also suggests where further innovation may be possible.

The Resource Manual is designed to principally be of use to local government, but should also have interest for central government, property developers and investors, design professionals, educational institutions and other groups interested in creating more sustainable New Zealand housing.

Framework of Resource Manual

PART I: UNDERSTAND THE CONTEXT	PART II: DEFINE THE OUTCOMES	PART III: ESTABLISH THE BASIS FOR ACTION	PART IV: EVALUATE THE OPTIONS FOR ACTION
• The need for sustainable homes • Future challenges • The value of sustainable homes	• What makes a sustainable home? • Beacon's HSS High Standard of Sustainability® • 2008 benchmarks and examples of methods • Research in action: new and retrofitted homes • Getting specific: the potential of different housing typologies	• Local government: a door or a wall? • How local government interacts with homes • Legislative basis for action	• Strategic policy signals • RMA policies and plans • Development standards and guidelines • Building Code administration • Bylaws • Economic tools • Community education • Council administrative practices

PART I

Context: The need for sustainable homes

This section provides background information about sustainable homes: what goes into them, and the value that they generate.

Sustainable homes

Beacon Pathway believes that New Zealand homes can, and should, perform better. They can be warm, healthy, cheap to run, and kind to the environment. Sustainable homes are affordable both to construct and to operate, and designed to flexibly meet changing needs into the future.

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Research has demonstrated that there is considerable scope to improve the performance of New Zealand's new and existing homes. New Zealand homes are generally cold, damp, unhealthy and inefficient in energy and water use[1]. Some of the facts:

- New Zealand homes are on average 6°C below World Health Organization recommended minimum temperatures in winter.
- 45 percent of all New Zealand homes are mouldy.
- New Zealand has the second highest rate of asthma in the world, and an excess winter mortality rate of 1,600 not seen in other OECD countries.
- 300,000 New Zealand homes have unflued gas heaters, which are inefficient and can be detrimental to health.
- The air inside New Zealand homes can be more polluted than outdoor air.
- Cold damp homes pose serious health risks, particularly for the most vulnerable groups in the community who spend the most time at home.

Even new homes do not perform as well as they could. Although insulation standards are much higher than they used to be, new building techniques can bring their own problems, particularly for homes' ventilation and indoor environment quality.

In short, the challenge for New Zealand is to improve the 1.6 million homes that we already have, and to ensure that we don't continue to make the same design mistakes when we build new homes (averaging around 16,000–20,000 per year). Beacon's research is helping to understand the steps we need to take to meet this challenge. This Resource Manual provides information about a range of actions local government can take in order to play a part in the change.

1 Clark (2007)

Future challenges

A central concern for Beacon is to ensure that today's sustainable homes are flexible enough to meet tomorrow's changing needs and challenges. We already know what some of these needs will be, such as preparing for the housing requirements of an ageing and diversifying population, anticipating changing activities and technologies within homes, and ensuring our homes can withstand the consequences of climate change. Other as yet unforeseen challenges are also likely to emerge.

FUTURE CHALLENGE	POSSIBLE HOUSING CONSEQUENCES
Ageing population	• Increasing difficulty with accessibility and functionality around the home (e.g. entryways, toilet, shower, stairs).[2] • Smaller household size, less discretionary income to spend on maintenance, heating etc., different time-use patterns in the home (e.g. more daytime energy use). • Changing demand for different housing typologies.
Diversifying demographic profile	• More diverse housing needs for small and large households, provision for different uses of spaces.
Changing lifestyles, technologies and activities within houses	• Diverse demands on space — conversion of spare bedroom into office. • Increased services/infrastructure needs (energy, telecommunications). • Installation of new services. • Reorganisation of spaces and structural changes (e.g. move to open-plan living and kitchen areas with more glazing). • Changing character of residential areas (e.g. more daytime vehicle movements).
Changing urban form (increasing density)	• Smaller units. • Proximity issues (noise, odour, privacy). • More expectation of meeting leisure needs outside the home.
Greater proportion of rental occupancy	• Landlords less likely to undertake major structural change to homes to meet tenants' changing needs. • Greater need to be able to make changes to space without structural change.
Impacts of climate change	• Summer overheating leading to thermal discomfort, heat stress and health problems.[3] • Flooding leading to damage of building contents, possible contamination from sewage, structure collapse. Subsidence risk for concrete slab foundations. • Greater storm damage affecting building facades and internal structures and leading to more rain penetration around openings.
Increasing cost of resources and infrastructure	• Services such as electricity, water supply and waste collection become more expensive.

Table 1: Future challenges for New Zealand homes

2 Saville-Smith et al. (2007)
3 O'Connell and Hargreaves (2007)

There are direct design responses for many of these issues, including:

- Using lifetime design principles to ensure homes are functional for people at different stages of life (see www.lifemark.co.nz)
- Reducing the home's load on resources and services to extend the life of existing infrastructure and reduce costs for residents
- Improving house design to work effectively with the sun (to assist heating and prevent overheating)
- Building in flexibility and adaptability for future unspecified changes

The value of sustainable homes

Making our homes more sustainable will deliver benefits to the home's occupants (be they owners or tenants), the wider community, and also the nation and the environment (see Figure 2). The benefits extend well beyond the homeowners, but the costs usually fall directly to them, with some small-scale support from subsidy programmes.

The *National Value Case for Sustainable Housing Innovations*[4] concluded that a more sustainable housing stock could help to deliver improved health and productivity, greater resource efficiency, reduced demand on infrastructure services, and houses that are more resilient to change (e.g. changes in climate, demographics, and resource availability). By way of example, Beacon estimates that there is potential for direct savings in household energy consumption of almost 22PJ per year. That's enough to power over 500,000 New Zealand homes for a year.[5]

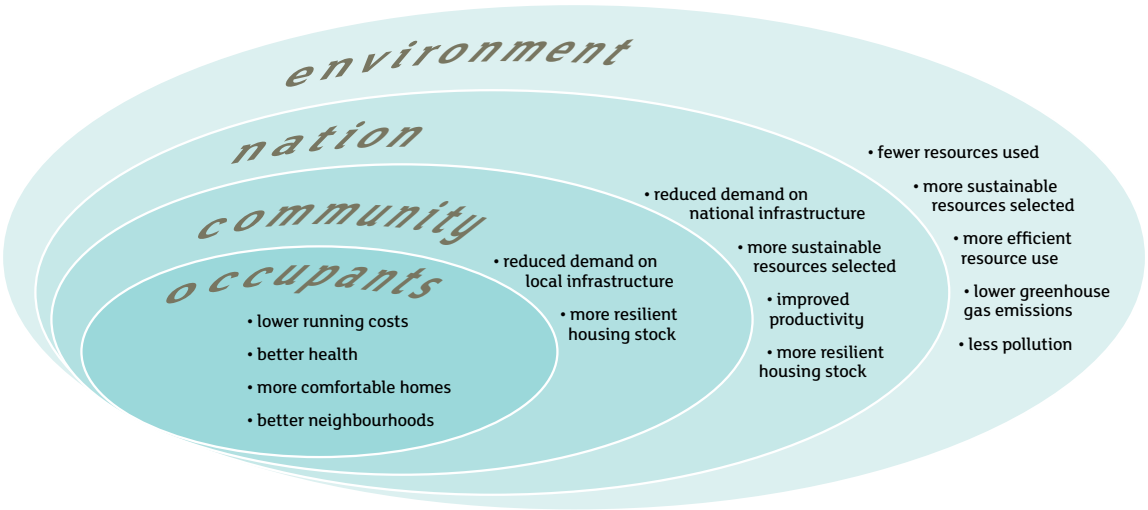

Figure 2: Benefits of sustainable homes

4 Clark (2007)
5 Clark (2007), p.4

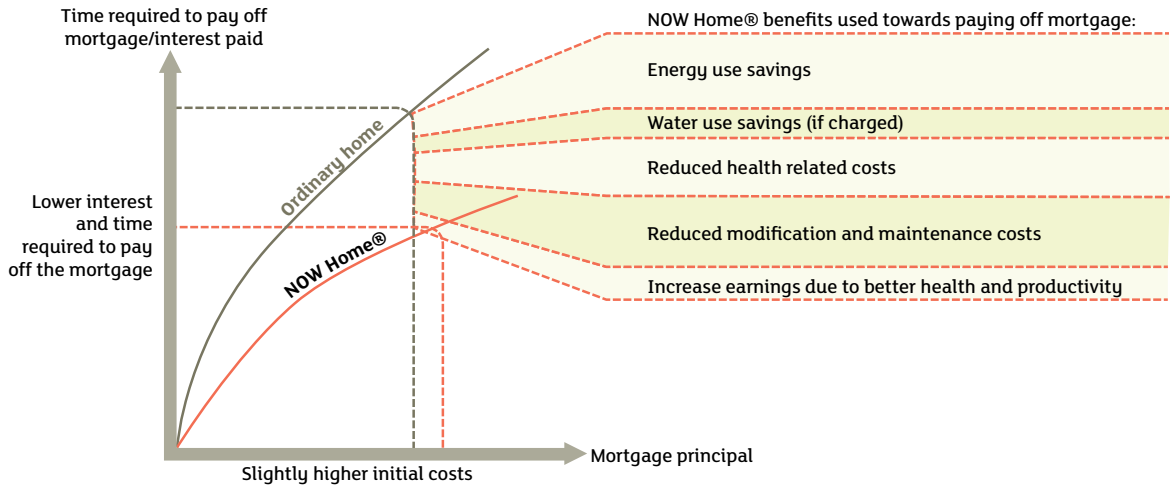

Figure 3: Long term savings of the NOW Home®

Most of the energy savings are in electricity use, implying a reduction in CO_2 emissions of 3,600kt per year, the equivalent of $54 million in tradeable emissions (at $15/tonne). Even allowing for takeback effects in the form of warmer and healthier homes and spending of household savings from energy on travel and other commodities, net economy-wide CO_2 savings of 1,600kt could still be produced.

Furthermore the residential sector is a large source of employment — the house building and renovation industry is worth in excess of $12.0b annually and directly employs about 5% of the workforce. In addition to the social- and economy-wide benefits, there are significant employment gains in redirecting this resource to improving the current housing stock in recessionary times.

Beacon's briefing for the February 2009 Job Summit[6] calculated that a standard 1940–1960 home[7] renovated for improved performance[8] would require an estimated 277 hours of labour split between a variety of sub-trades. The data indicates that, for every **1,000 houses retrofitted,** a total of **151 full time equivalent jobs** would be required for delivery solely of on-site retrofitting services, and a total of **392 full time equivalent jobs**[9] would be required to provide the products and services involved in the renovation activity. By encouraging sustainable renovation, councils can provide a substantive economic stimulus to their local economies.

Some benefits of sustainable homes are more directly relevant to local government than others. Because local government usually has a direct role in managing water-related infrastructure, efficiencies that can be gained at the household level will be beneficial at the community scale. The benefits from improving energy efficiency may be less immediately obvious, except for their effect on general health and well-being as provided for under the Local Government Act.

At the household level, some sustainable housing choices are sometimes dismissed as too expensive, with the prospect of additional upfront capital expenditure overshadowing the longer-term operational savings. Yet, operational costs can be significant over the life of the house, and will increase if resource and service costs continue to rise. For example, domestic energy prices have risen 5% faster than inflation since 2000.[10]

As demonstrated in the conceptual diagram above (Figure 3), if homeowners direct the financial benefits from a more sustainable home towards their mortgage repayments, they could pay their home off quicker, and the savings on interest will outweigh any higher initial capital costs.

6 Beacon Pathway Limited (2009)
7 Ryan et al. (2009)
8 A standard renovation package for the house has been assumed. This incorporates ceiling and under-floor insulation, ground polythene vapour barrier, wall insulation, efficient heating device, heat transfer system, solar hot water heating, low flow water devices and low flush toilets, rainwater tank, hot water cylinder and pipe wraps, extract fans in kitchens and bathrooms, double glazing retrofitted into existing timber window frames (or secondary glazing/thermal curtains), on-site assessment of house and project management.
9 These figures represent total numbers of full time equivalent employees required to carry out the work. The numbers have been developed from detailed analysis of the time required to undertake the variety of renovation tasks outlined in the footnote above. The standard employment multiplier of 2.6 for the industry sector is then used to account for the additional employment generated through manufacturing, retailing and servicing of retrofit interventions e.g. manufacturing and retailing insulation, solar water heating systems, extraction fans, etc.
10 Domestic Energy Users Network (2008)

PART II

Outcomes: What makes a sustainable home?

This information explains Beacon's approach to sustainable homes, and is intended to support councils in building their own, locally-specific, value case for sustainable building policies. For example, the evidence presented in this section could be included in council reports, used as part of staff training, and shared in communications with the public.

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Beacon's HSS High Standard of Sustainability®

Beacon has developed a HSS High Standard of Sustainability® (HSS®) — a set of benchmarks to support homeowners to understand how their home performs in terms of energy, water, indoor environment quality (IEQ), and materials and waste.

As far as possible, the HSS® benchmarks have been established as measurable units. Occupants can regularly measure their home's performance against the benchmarks, and better understand where they can make improvements. For some performance areas, such as reticulated energy, the measurement can be easily obtained from power bills. The same applies to reticulated water in places where it is metered. Indoor environment quality is a more complicated set of measurements, and a simple monitoring tool for New Zealand homes is in development as part of Beacon research.

Figure 4: Beacon's HSS High Standard of Sustainability®

The HSS® identifies five key performance areas, and does not prioritise one area over the others. This is because focusing on a single issue can lead to compromises and under-performance in other aspects of the home as illustrated in Figure 4, the performance areas are inter-dependent. Energy efficiency can be achieved through under-heating the home, but this compromises indoor environment quality. Conversely, heating the home to improve the indoor environment (without also improving the dwelling's thermal performance) can lead to high energy demand. High water use also has energy implications — approximately 30% of typical New Zealand household energy consumption is spent heating water. In addition, there are energy and infrastructure costs for collection, storage, transport, treatment, use and disposal of water.

This Resource Manual focuses on how local government can support the outcomes specified in the HSS®.

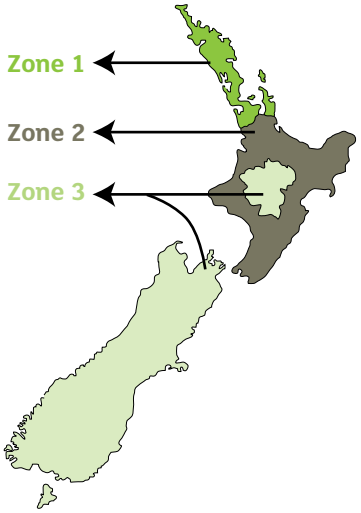

Figure 5: New Zealand climate zones as defined in the Building Code

2008 benchmarks for the HSS High Standard of Sustainability® (HSS®) and examples of methods

HSS® BENCHMARKS FOR RETICULATED ENERGY USE		
	New homes:	Existing homes:
Climate Zone 1	5,800kWh/yr	6,200kWh/yr
Climate Zone 2	6,300kWh/yr	7,300kWh/yr
Climate Zone 3	7,300kWh/yr	8,400kWh/yr

Examples of methods to achieve outcomes

- Passive solar design: orient daytime living areas to north. Shading that allows protection from summer sun and allows winter sun to heat house. No more than 20% glazing on western and southern facades.
- Efficient thermal envelope: high R-value insulation in ceiling, walls and floor; double glazing; insulated slab on ground.
- Hot water from solar, solar-gas, solar-electric or heat pump, or low emissions wetback or ground source hot water heat pump system.
- Use efficient heating devices (Energy Star rated or at least a 6 star rating for room heating under the HERS scheme, e.g. heat pump, wood or pellet burners, under-floor heating utilising solar hot water system, or ground sourced heat pump system.
- Use natural lighting where possible.
- Efficient lighting: ensure all light fittings are suitable for CFLs or LEDs, separate switching circuits for different zones, movement detectors on external lighting.
- All appliances (such as fridges, freezers, dishwashers) to be 4 star rated or higher.
- Provide washing line outside.

Rationale and benefits

More energy efficient homes will provide better comfort, reduce energy use, reduce greenhouse gas emissions, and improve health year round.

The energy benchmarks focus on reticulated energy because making efficiencies here can reduce national costs of energy supply, reduce climate changing emissions, and have resilience benefits for the environment and community.

Benchmarks are set at different rates for each climate zone to account for different heating needs.

Given 34% of total energy use goes on heating the home, cost savings on heating can reach $600 per year. Hot water systems use an average 30% of the energy in a home.

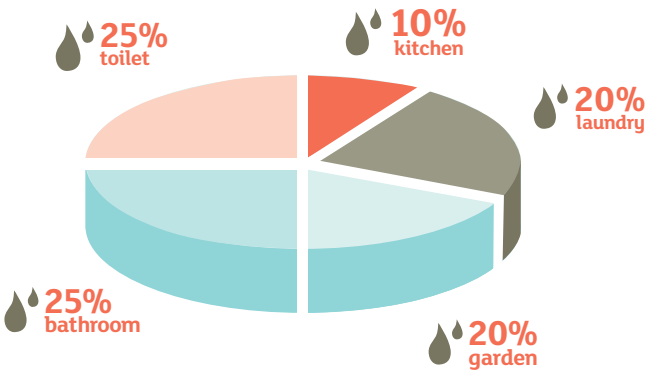

Figure 6: Typical home water use

HSS® BENCHMARK FOR RETICULATED WATER USE

125 litres/person/day

Examples of methods to achieve outcomes

- Efficient (3 star rated or equivalent) shower heads, taps, toilet, and appliances (4 star rated washing machine and 3 star rated dishwasher).
- Water meter for each dwelling.
- Non-reticulated water sources (e.g. rainwater collection, greywater systems) to supply toilets, washing machine and garden use.

Rationale and benefits

The benchmark focuses on reticulated water use. Reduced demand for potable water lessens pressure on infrastructure and therefore on overall local authority charges. Water and wastewater typically account for about 30% of local rates. Also, treating and pumping water is energy intensive, and one of the local government sector's biggest single energy uses (and sources of greenhouse gas emissions).

100% of water supplied in reticulated systems is treated to the highest drinking standards — but less than 5% of it is used for drinking or cooking. The rest is used for washing, bathing, flushing the toilet, and watering the garden.

In areas where there are water charges, saving water reduces water charges.

The benchmark for water use is the same for all kinds of houses, because the same kinds of water saving devices can be installed regardless of house type.

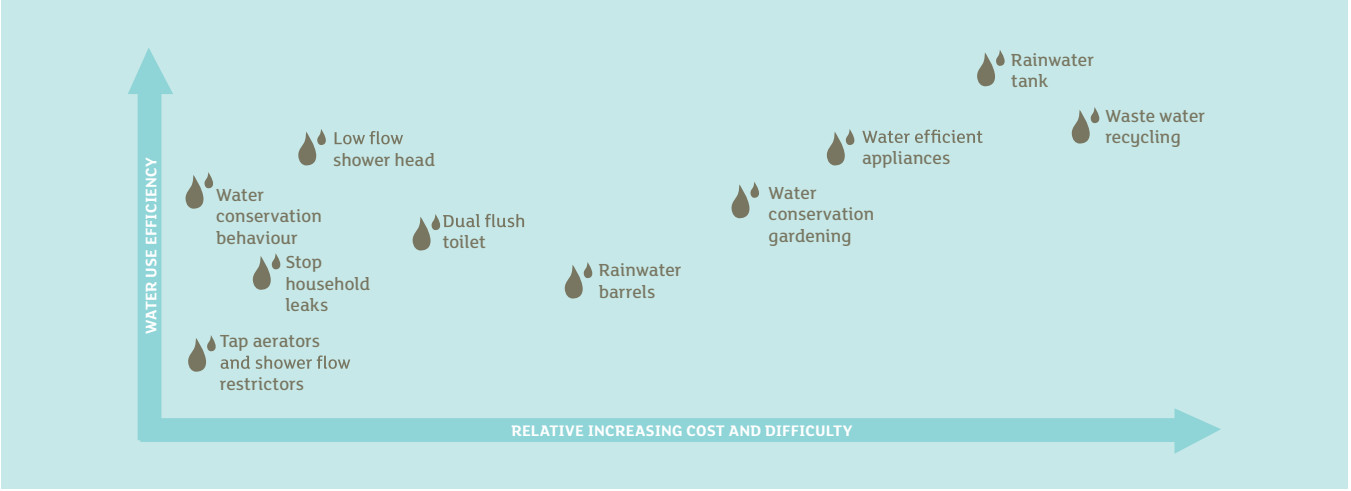

Figure 7: Estimation of effectiveness of interventions against cost and difficulty

HSS® BENCHMARKS FOR INDOOR ENVIRONMENT QUALITY		
Temperature:	Relative humidity	Checklist
• Living room evening in winter >18°C • Bedroom overnight in winter >16°C	• Living room evening in winter 40–70% • Bedroom overnight in winter 40–70% • Surface relative humidity <80% year round	• Mechanical extract ventilation of kitchen, bathroom and laundry • Means to passively vent dwelling • No unflued gas heaters • No indoor clothes drying • Under-floor vapour barrier

Examples of methods to achieve outcomes

- Windows that can open in all rooms.
- Extraction fans in bathrooms, ensuites and rangehoods in kitchens.
- Passive vents in bedrooms and living spaces.
- Low toxicity products and materials used, especially considering volatile organic compound [VOC] content.
- Vapour barrier on ground under floor.
- No unflued gas heaters.
- No indoor clothes drying and all dryers vented to outside

Rationale and benefits

Improvements in insulation help bring the consistent temperatures of New Zealand homes above the World Health Organization minimum standards of 16°C in bedrooms and 18°C in living rooms. This has positive health impacts e.g. in reducing respiratory problems such as asthma. Improved health reduces health-related expenditure, days off work and school.

Adequate ventilation and removal of moisture generated in the home is critical to preventing mould growth, and the resultant health impacts and deterioration of building fabric.

Using building materials which contain low levels of volatile organic compounds is expected to impact positively on health by reducing exposure to polluted indoor air.

Unflued gas heaters, indoor clothes drying and moisture rising from the ground are very significant sources of moisture in the home. Removing these moisture sources will make the house healthier, as well as easier to heat.

HSS® BENCHMARKS FOR WASTE

For new building, a maximum of 2.6 tonnes per house or 16kg/m^2 of construction waste.

Separate construction wastes for collection, recycling and reuse.

Waste management plan produced for site in accordance with REBRI guidelines.

Provide space in kitchen for organic collection — 5 litres minimum capacity.

Provide space for non-organic recycling bins in or near kitchen — 20 litres minimum capacity.

For detached dwellings on suburban lot sizes, provide space in garden of at least 1m^3 for composting of organics. On sites of 250m^2 or less provide for worm farm, communal composting or kitchen waste collection.

Examples of methods to achieve outcomes

- Incorporate waste reduction provisions in contract documents.
- Ensure someone on the site (foreman, supervisor, head contractor etc.) has undertaken training in waste minimisation and has authority to require adherence to waste management plan.
- Use prefabricated and modular design of core elements where possible.
- Pre-nail framing timbers off-site to minimise offcuts.
- Require contractors to order and pay for materials as a method to encourage waste minimisation.
- Recycle all construction wastes that can be recycled.
- Reuse all offcuts where possible.
- Provide on-site sorting facilities and require workers' personal waste to be included.

Rationale and benefits

The negative effects of waste can include the emission of greenhouse gases and toxic leachate escaping into or over the ground from waste decomposing in poorly managed landfills. Landfills require the allocation of valuable open space, creating a nuisance for neighbours and limiting future land use.

Reducing waste to landfill has environmental, health and economic benefits. 40% of waste to landfill in New Zealand is from construction and demolition.

Overall 8% (189kg) of waste produced during construction can be diverted from landfill by using standard material sizes, and pre-nailing framing timbers off-site.

HSS® BENCHMARKS FOR MATERIALS

NEW HOMES

Materials which:

- promote good indoor air quality e.g. through use of Environmental Choice certified paints and finishes.
- have minimal health risks during construction or retrofitting.
- are durable and have low maintenance requirements.
- reuse existing or demolished building materials or can readily be reused.
- are made from renewable or sustainably managed resources.
- have low embodied energy including minimal impacts due to transport.
- minimal impact on the environment (air, water, land, habitats and wildlife).
- have third-party certification (e.g. NZ Environmental Choice, Forest Stewardship Council).

EXISTING HOMES

Retrofit or renovation applies principles from materials checklist where appropriate.

Examples of methods to achieve outcomes

Materials use up raw resources, require manufacturing or processing, and must be stored, transported and disposed of.

- Choose materials which are suitable for the task and which are durable. Constantly replacing poor quality or inappropriate materials is a waste of resources.
- Minimise the use of materials. Make sure you have sufficient material for the task, but try to avoid over-ordering materials and excessive wastage. Try to reuse or recycle materials where you can.
- Choose materials carefully. Find out about the source of the material, where and how it was made. Product descriptions often include information about VOC levels and supply chain. Look for environmental or energy labels such as the Environmental Choice NZ label or FSC (Forest Stewardship Council).
- Use materials which suit the local climate and heritage of the neighbourhood/site, and which support local industry employment.

Rationale and benefits

Materials produced at a rate that allows regeneration of the resource, do not exhaust the resource and are still available for future generations.

Materials with low environmental impacts over their life cycle: avoid emitting pollutants into the water, air and land; using up valuable resources such as water and old-growth timber; and changing land use such as forest clearance which can lead to loss of biodiversity.

Materials which minimise embodied energy i.e. the energy used throughout their life cycles, use resources efficiently, delaying new energy generation infrastructure and emitting fewer greenhouse gases.

Research in action: new and retrofitted homes

To demonstrate that more sustainable homes can be built today, using technology that is already available, at an affordable price, Beacon has built two, new, NOW Homes® in Waitakere and Rotorua. They have also renovated nine existing homes in Papakowhai, Porirua, with a range of different technology packages. All these homes have been monitored to verify their performance, and the results are very encouraging.

New

The Waitakere NOW Home®, completed in August 2005, was designed to have mainstream appeal and future flexibility, and was built to budgets and constraints typical of ordinary New Zealand housing. The 146m^2 house, including a 24m^2 garage, was built for $218,000 +GST, excluding landscaping and soft furnishings (2005 prices). Although a small footprint by today's standards, good design means that the house still feels spacious.

For detailed information on the design and performance of Beacon's NOW Home® and renovation projects, see the reports on **www.beaconpathway.co.nz**

Planning, careful use of materials and an emphasis on recycling or reusing where possible meant that less than 2.5 tonnes of construction waste was produced, compared with a study of "conventional" new 3-bedroom homes, which each produced 6 tonnes of construction waste.[11]

Passive solar design, resource efficiency, healthy environment, and minimisation of hazardous materials were all key considerations in designing and building the home. As a result, the on-site monitoring from the Waitakere NOW Home® demonstrates just how efficient new homes can be:

- In the first year, the occupants used 7,400kWh electricity (45% less than they used in their previous home), and needed supplementary space heating for only two days.[12]
- Water use dropped to 100L reticulated water + 89L rainwater/per person/day in the first year and 85L reticulated water + 87L rainwater/per person/day in the second year.[13]
- In addition, the quality of the indoor environment and occupant satisfaction were very high, and the health of the family living there improved.[14]The Waitakere NOW Home® was rated eight out of ten stars under the Home Energy Rating Scheme for thermal envelope and seven out of ten for hot water performance.

(See Table 2 for a summary of NOW Home® features and benefits.)

11 Kazor and Koppel (2007)
12 French et al. (2007)
13 Pollard et al. (2008)
14 French et al. (2007)

A second NOW Home® was built in Rotorua, in partnership with Housing New Zealand Corporation. This home received 5.5 stars out of ten under the Home Energy Rating Scheme. Its features include passive solar design, high levels of insulation and double glazing, a low-emission pellet burner, solar water heating, water efficient taps, rainwater tank, active and passive ventilation, natural lighting, and flexible living spaces to cater for extended family.

Residents have reported satisfaction with the sunny, dry and airy qualities of the home. The passive elements of the design (such as the solar orientation and high levels of insulation) have worked well. At 6,800kWh per year, the Rotorua tenants' energy use was lower than that of the Waitakere NOW Home® — even though they live in a colder climate and their appliances are older and less efficient.

FEATURES	BENEFITS
• Northern orientation • Passive ventilation (opening windows which can be locked, window position in rooms) • High performance insulation • Double glazing • Thermal mass in floors • Efficient water heating (solar or heat pump) • Efficient space heating (pellet burner, wood burner or heat pump) • Energy and water efficient appliances • House size matched to occupants' needs • Sunny external washing line and vented/condensing dryer • Externally vented rangehood and bathroom extractor fan • Low toxicity products and materials • Rainwater collection • Space for composting and recycling • Located within walking distance of community facilities	• Even, comfortable temperatures all year round • Unpolluted air indoors • Smaller environmental impacts • No condensation or mould • Lower utilities and transport costs • Reduced maintenance and modification costs • Privacy and connection to neighbourhood • Healthy families and reduced healthcare costs • Increased resale value • Beacon case study occupants report improved family relationships[15]

Table 2: Features and benefits of sustainable homes

15 Trotman (2008)

There have been some interesting findings relating to some of the more technical features of the home. The home sometimes fell below World Health Organization (WHO) minimum standards for indoor temperatures, partly because the residents covered rather than exposed the polished concrete floor intended to absorb the sun, and partly because the pellet burner was not used optimally to heat the house. Energy was consumed by needing to boost the solar hot water more than should have been the case, a result of less-than-optimum orientation of the solar panel. This has generated useful insights into the critical importance of correct installation, and ensuring that residents learn how to operate systems optimally and understand how the sustainable technologies in their homes work. The HSS High Standard of Sustainability® gives a useful set of measures for people to be able to check their home's performance.

Retrofitted

Nine homes in Papakowhai, built in the 1960s and 1970s, have been retrofitted to different levels of sustainability by Beacon, in order to identify cost effective and easy-to-implement packages of retrofit options. After some pre-retrofit evaluation and monitoring, the homes were fitted out with different combinations of insulation, double glazing, efficient space and water heating systems, and water efficiency devices. The cost of the retrofits ranged from $1,380 up to $74,000. The homes were then monitored for another two winters — to measure any takeback effect (where the residents effectively take back some of the savings they have made, for example, by heating more rooms in the house, or taking longer showers).

All of the homes experienced some improvements in temperature, humidity or energy use. The best results came where a combination of full insulation, efficient space heating and solar hot water systems were installed. The homeowners enjoyed significant energy savings, but what they valued most was the improvement in comfort and well-being they experienced in their renovated homes.

The results have helped Beacon to establish some **core principles for effective retrofitting:**

- **Insulate the full thermal envelope.** To maintain healthy temperatures in winter time, walls must be insulated along with the floor and ceiling. Despite energy savings and temperature improvements, none of the homes that received partial thermal envelope upgrades had healthy mean minimum temperatures in July.
- **Efficient heating must accompany thermal retrofit.** It is not enough to insulate the home — a heat source is still necessary to reach healthy mean minimum temperatures in winter.
- **Hot water cylinder wraps are a great energy efficiency measure and should be widely applied.** With efficiency increases of 11–30 % of hot water energy demand, wraps proved worthwhile even on the newer, A grade cylinders. Being a very affordable intervention and great value for money supports their wide use.
- **Solar hot water systems can perform really well even in winter.** When properly installed, solar hot water systems can provide for the majority of hot water needs (up to 100% in summer and 55–70% in winter[16]). For a moderate increase in costs, a wetback is a very effective combination with a solar hot water heater.
- **Low flow shower heads should accompany hot water conversions.** Electric hot water cylinders tend to limit people's hot water use (when the tank runs empty, the shower runs cold). With more abundant hot water available from solar or instant gas heating, there is a discernable increase in hot water use. Low flow shower heads can help to reduce this water wastage.

Beacon HomeSmart Renovations

Rolling out the retrofit programme

The findings from the Papakowhai Renovation Project have been applied to Beacon's Home*Smart* Renovation Project. 530 homeowners from across the range of New Zealand's climate, who were intending to renovate their homes, participated in this large scale project.

Each home was assessed by both a homeowner self assessment, and by a trained assessor, and the information collected was used to generate a renovation plan individualised to the home.

The renovation plan prioritises the steps the homeowner should take for their home to perform to the benchmarks set in the HSS High Standard of Sustainability®. Beacon's experience in other renovation projects has shown that having a clear plan to address identified problems, making step-by-step cumulative improvements, and taking a whole-of-house approach, is more effective than a "quick fix" solution.

Monitoring and homeowner interviews will indicate whether offering homeowners an individualised renovation plan and information on sustainable renovation is effective in stimulating consumers to improve their home's performance. Information from this project will provide a deeper evidence base to support councils in their efforts to promote sustainable homes.

16 Burgess et al. (2009)

Getting specific: the potential of different housing typologies

Retrofitting existing homes to be more sustainable requires different approaches for different styles of design. To better understand the sustainability potential of New Zealand's homes, Beacon has analysed housing typologies, and assessed 12 standard house types (see Table 3)[17]. Whilst water and waste retrofits can usually be done in the same way regardless of housing age, differences in housing design are particularly important for energy and IEQ retrofits. For example, pre-1960s homes are more likely to have a chimney, which can be simply retrofitted with flued wood burners and pellet burners. It can be difficult to install insulation into:

- Low roof spaces (estimated to be more than 20% of 1940s, 1960s, and 1970s houses)
- Skillion roofs (estimated to be more than 20% of 1960s and 1970s houses)
- Low sub-floor spaces (less than 300mm clearance under the bearer, very common in pre-1940s housing, and again in the 1990s with the increased use of often uninsulated concrete slabs)

Each district has a different mix of housing age (see Table 4). If your council is interested in the retrofit potential of its housing stock, it may help to undertake an assessment against the following tables.

17 Ryan et al. (2009); Page and Fung (2008)

HOUSE TYPE AND ERA	NUMBER OF HOUSES	RENOVATION POTENTIAL
Villas pre-1920	86,000	Good candidates for retrofit — particularly for better energy performance, moderate effort needed to improve indoor environment. Challenge to double glaze windows. Possible heritage restrictions.
Bungalows 1920–36	113,000	Good candidates for retrofit — particularly for energy and indoor environment quality. Possible heritage restrictions.
Art Deco 1925–40	18,000	Likely to require moderate to considerable effort and cost to retrofit. Ceiling/roof can be difficult to retrofit with additional insulation. Relatively complicated cladding and stucco systems make retrofitting insulation in walls difficult.
Mass Housing 1940s–1960s	479,000	Good candidates for retrofits — the "50s classic" is particularly good. Good "bones", orientation, roof pitch for solar water heating, and levels of access to ceiling cavities and underfloor.
Multi-units pre-1960	34,000	A challenge — likely to require considerable effort and cost to retrofit. Often built on uninsulated concrete slab, with skillion roofs and small roof cavity spaces. Multiple ownership can be a major impediment; however, comprehensive multi-unit solutions are possible.
Multi-units 1960s–70s	133,000	A challenge — likely to require considerable effort and cost to retrofit. Multiple ownership can be a major impediment; however, comprehensive multi-unit solutions are possible.
Mass Housing 1970–78	151,000	Wide variation in styles and generally moderately easy to retrofit. Unlikely to have any insulation built into them (unless already retrofitted). This is because mandatory standards for insulation only came into effect after 1978.
Housing 1978–80s	182,000	Wide variation in styles and generally moderately difficult to retrofit. Insulated to lower standards and may require replacement. Aluminium windows more amenable to double glazing but not likely to have thermal break in window frames. May need to improve ventilation.
Multi-units 1980s–90s	68,000	Generally moderately difficult to retrofit.
Housing 1990-96	112,000	Wide variation in styles and generally moderately difficult to retrofit. Some insulation, but often developer-built to minimum Code standards.
Housing post-1996	201,000	Daunting retrofit option. Seek expert advice as each case needs to be considered on its merits. Insulation should perform relatively well. May need improvement in ventilation.
Multi-units 2000s	28,000	Generally moderately difficult to retrofit.
TOTAL	**1,606,000**	

Table 3: Housing typologies and renovation potential

DWELLING STOCK NUMBERS BY TERRITORIAL AUTHORITY													
DECADE STARTING	PRE 1900	1900	1910	1920	1930	1940	1950	1960	1970	1980	1990	2000 TO MAR 2006	TOTAL
Far North District	40	54	202	467	613	1091	2333	3279	4861	4854	4166	2320	24281
Whangarei District	14	70	324	1070	607	1494	3048	6374	6563	4581	3443	3611	31200
Kaipara District	15	66	195	375	279	574	1647	1364	1628	1156	773	876	8948
Rodney District	35	48	156	288	437	739	2970	4054	7264	7873	7722	6453	38037
North Shore City	27	178	1702	1908	739	1737	5449	14068	19726	10275	12740	7628	76179
Waitakere City	10	7	180	1055	642	1651	8009	11297	14489	9860	10479	7634	65313
Auckland City	0	5350	6461	12792	7738	13070	17219	19839	16255	12500	24655	20769	156648
Manukau City	12	12	186	937	504	1670	8421	20817	22954	13636	16368	13256	98774
Papakura District	1	8	60	221	85	263	1662	3133	3970	2637	1829	1616	15485
Franklin District	5	12	167	593	527	810	2593	3105	3799	3300	4047	2983	21941
Thames-Coromandel District	74	116	129	237	180	280	1532	2010	4711	5085	3884	2680	20919
Hauraki District	11	195	298	297	370	331	894	935	1417	1127	1061	520	7458
Waikato District	2	14	214	830	689	1360	2755	2352	3243	2122	853	1780	16215
Matamata-Piako District	2	6	144	738	635	827	2230	1887	2013	1611	1177	700	11969
Hamilton City	9	25	451	1620	1048	1975	5020	8941	9988	6473	7186	5599	48335
Waipa District	0	8	293	521	685	823	2473	2081	2922	2749	2096	1828	16479
Otorohanga District	2	1	31	187	226	315	831	627	586	358	207	200	3570
South Waikato District	1	4	17	128	163	298	2323	2593	2639	567	109	185	9027
Waitomo District	0	3	178	304	229	434	858	802	579	390	144	134	4055
Taupo District	0	0	8	22	137	685	1389	3749	3415	3407	2412	2020	17244
Western Bay of Plenty	0	5	42	188	384	459	2021	2172	3648	3880	2929	1933	17661
Tauranga District	0	11	45	78	331	774	3242	5088	7525	8382	11299	7236	44010
Rotorua District	8	4	49	215	439	1082	3471	5530	6493	4978	2282	1466	26018
Whakatane District	1	3	55	203	306	458	1996	2616	2839	2439	1299	740	12955
Kawerau District	0	0	0	0	0	5	797	594	767	406	16	16	2600
Opotiki District	2	9	89	149	182	229	583	592	639	847	344	194	3859
Gisborne District	0	305	844	1408	801	1276	3282	3157	2831	1441	1017	605	16967
Wairoa District	3	20	136	271	251	352	829	755	664	354	136	66	3836
Hastings District	19	86	823	1636	1253	1738	3723	4877	5670	3479	1719	1850	26874
Napier City	33	131	1260	1418	804	1129	3022	4182	4754	2361	2313	1325	22734
Central Hawke's Bay District	2	21	373	500	368	368	1070	719	813	640	293	329	5497
New Plymouth District	22	322	706	1921	1006	1814	4100	4176	6590	4027	2227	1455	28367
Stratford District	3	45	237	293	302	274	712	514	608	370	229	115	3704
South Taranaki District	13	189	1000	983	598	969	2112	1776	1869	882	479	266	11136
Ruapehu District	2	11	314	741	386	518	1059	1080	839	1067	316	199	6531
Wanganui District	65	353	1599	2561	393	1203	2886	2703	3048	1978	973	506	18269
Rangitikei District	5	0	539	678	262	515	1160	1344	930	531	260	138	6361

Table 4: Housing age by territorial authority

DWELLING STOCK NUMBERS BY TERRITORIAL AUTHORITY													
DECADE STARTING	PRE 1900	1900	1910	1920	1930	1940	1950	1960	1970	1980	1990	2000 TO MAR 2006	TOTAL
Manawatu District	32	173	513	552	494	640	2088	1597	2126	1480	1040	607	11342
Palmerston North City	29	284	693	1854	1235	2108	3955	4868	5647	3445	3113	1933	29165
Tararua District	43	178	542	771	495	681	1450	1019	1043	755	308	182	7467
Horowhenua District	16	113	352	409	337	1206	2773	2899	2312	1649	954	860	13879
Kapiti Coast District	2	49	128	339	507	733	2545	2983	4781	3911	3183	2776	21938
Porirua City	4	4	70	171	160	258	2706	4044	4081	2429	1391	858	16174
Upper Hutt City	2	10	133	341	349	934	2994	3106	4021	1221	742	949	14801
Lower Hutt City	5	246	1148	2751	2689	5955	4706	6789	6758	3034	2133	984	37197
Wellington City	1177	4772	3522	8455	4730	4210	5415	9676	10617	5595	7376	6752	72296
Masterton District	44	455	398	707	455	600	1747	1918	1643	914	603	588	10072
Carterton District	4	56	198	253	117	197	500	524	461	341	151	288	3087
South Wairarapa District	15	74	276	291	134	231	688	851	792	527	357	367	4605
Tasman District	20	29	482	465	589	888	2218	2810	3044	2353	3699	2496	19091
Nelson City	119	198	558	560	679	1301	2386	2536	2800	2224	3135	1538	18035
Marlborough District	23	106	590	578	382	893	2023	2942	3900	2862	3149	2156	19605
Kaikoura District	3	5	31	21	68	137	259	309	350	196	211	218	1809
Buller District	1	7	823	387	488	658	584	297	586	373	315	287	4805
Grey District	5	17	736	608	995	675	629	440	672	401	419	271	5867
Westland District	0	4	18	393	365	337	421	225	1124	365	337	298	3887
Hurunui District	6	7	82	155	262	330	847	685	746	716	817	687	5339
Waimakariri District	22	109	373	387	383	575	1212	1755	3197	1876	3981	2591	16461
Christchurch City*	344	2133	5153	8162	4725	8437	17760	21727	25521	14083	22553	12117	142714
Selwyn District	0	109	117	584	540	751	1020	1676	1630	1838	1581	2682	12528
Ashburton District	0	169	355	667	516	941	1142	2169	2177	1727	1089	927	11881
Timaru District	63	152	1374	1895	1169	1200	2928	2854	3706	1411	1180	868	18801
Mackenzie District	0	0	75	56	39	50	134	185	1364	137	176	309	2527
Waimate District	19	14	201	444	235	349	597	465	648	202	101	122	3398
Chatham Islands District													na
Waitaki District	250	200	494	969	513	622	2038	1640	1591	797	565	390	10070
Central Otago District	63	58	243	187	228	298	1176	1060	1804	1463	832	974	8386
Queenstown-Lakes District	8	8	87	37	60	70	502	1177	1577	2353	2699	3742	12321
Dunedin City	2000	2604	3570	4515	3435	3894	7035	6468	6638	2909	3129	1751	47948
Clutha District	250	314	437	492	509	365	1464	1386	1403	562	467	289	7939
Southland District	5	17	654	965	756	909	2043	2572	2462	1268	758	667	13074
Gore District	4	2	476	269	431	312	834	1065	1037	444	237	152	5265
Invercargill City	0	456	908	1438	1515	1610	2951	4145	4597	1991	1112	660	21383

* Including Banks Peninsula District

PART III

Basis for action: Local government's role in sustainable homes

This section explores the broad number of ways in which local government can influence the performance and sustainability of New Zealanders' homes. It sets out the legislative basis for action. It presents relevant findings from Beacon's research into local government barriers to sustainable building.

PART I: UNDERSTAND THE CONTEXT	PART II: DEFINE THE OUTCOMES	PART III: ESTABLISH THE BASIS FOR ACTION	PART IV: EVALUATE THE OPTIONS FOR ACTION
• The need for sustainable homes • Future challenges • The value of sustainable homes	• What makes a sustainable home? • Beacon's HSS High Standard of Sustainability® • 2008 benchmarks and examples of methods • Research in action: new and retrofitted homes • Getting specific: the potential of different housing typologies	• Local government: a door or a wall? • How local government interacts with homes • Legislative basis for action	• Strategic policy signals • RMA policies and plans • Development standards and guidelines • Building Code administration • Bylaws • Economic tools • Community education • Council administrative practices

What council officers have told us

In developing this Resource Manual, the research team has conducted in-depth, questionnaire-based interviews with officers from 17 local authorities. The interviews revealed that:

- There is strong interest in sustainable building within the councils interviewed.
- The main drivers for council officers carrying out activity on sustainable building are the social, environmental and long-term financial benefits, as well as political drivers where councils are committed to sustainability.
- Almost all the officers interviewed saw their councils as being at the beginning of a transition pathway to improved residential sustainability.
- Currently, there are limited resources, knowledge gaps, and a generally piecemeal approach to policy initiatives.
- There is some uncertainty as to the parameters of possible interventions — particularly around what can be specified in a district plan (due to the relationship between the Resource Management Act and the Building Act), and the scope of application of financial incentives.

Local government: a door or a wall? (what our research has told us)

Local government's role in promoting sustainable home building is grounded in the purposes of:

- Section 3(d) of the Local Government Act 2002: to provide for local authorities to play a broad role in promoting the social, economic, environmental, and cultural well-being of their communities, taking a sustainable development approach.

- Section 3(d) of the Building Act 2004: to ensure that buildings are designed, constructed, and able to be used in ways that promote sustainable development.
- Section 5(1) of the Resource Management Act: to promote the sustainable management of natural and physical resources.

Local councils also have a significant role in the provision of infrastructure and services to houses, including potable water supply, stormwater and wastewater infrastructure, transport infrastructure, and household waste collection. The level of household demand can affect the efficiency and effectiveness of these services for the whole district or city. In recognition of this, many councils now offer incentives to promote aspects of sustainable building (e.g. subsidies for rainwater tanks, reductions in development levies) and information and guidelines on aspects of sustainable building (e.g. ways to conserve water).

There is a great deal of enthusiasm for sustainable building within many councils. From our interviews, we know that officers have developed a range of initiatives to encourage people to make more sustainable choices in their homes, and are seeing some good results.

However, at the same time, Beacon has found that a number of people building sustainable homes perceive local government policies and processes to be a significant barrier to their objectives. (Beacon's own experience in building and retrofitting sustainable homes would support this finding.) Often, the barriers are unintentional — the result of trying to achieve something new or different in an already time-consuming and costly bureaucratic process.

Beacon has undertaken several research projects to understand local government policy and regulatory frameworks, to review potential barriers to sustainable building within those frameworks, particularly district plans, and to consider in greater depth the policy and regulatory frameworks for market transformation, water conservation and water use efficiency through demand management.[18]

Policy and regulatory barriers to sustainable building choices were found to exist in:

- Administering the Building Act and Building Code;
- Inflexible conventional infrastructure standards (particularly for water); and
- District Plan provisions that provide no allowance for sustainable designs such as passive solar orientation or features such as rainwater tanks (e.g. traditional development controls for height, yards, and height-in-relation-to-boundary).

Of particular note for this research, Easton et al.[19] concluded that barriers to sustainable building "are generally more at the generic (e.g. lack of information) level than as a result of specific policies, plans or practices of the individual council." In other words, process issues were found to be a major barrier to sustainable building choices. Additional costs, uncertainty and delays of getting consent for discretionary and non-complying activity consents (including the need for written approvals) can have the effect of deterring people from incorporating sustainable features.

Interestingly, the two situations can be happening simultaneously in the same council — at the more general level of education and advocacy, there is a great deal of support and encouragement for people to make sustainable choices, only for people to then hit a "brick wall" within the more exacting requirements of consenting processes.

18 O'Connell (2005); O'Connell (2006); Easton et al. (2006); Trenouth and Mead (2007); Stancu et al. (2007); Lawton et al. (2007)
19 Easton et al. (2008) p.8

How local government interacts with homes

Life cycle of a house

Local government is involved at each stage of a home's life cycle, as a regulator and a provider of services. Each of the points of interaction between council and a home, identified in Table 5, could represent an opportunity to promote more sustainable choices — in construction, operation and (eventually) demolition.

LIFE CYCLE STAGE	COUNCIL'S INTERACTION WITH THE HOUSE
Subdivision	• District Plan rules set site sizes, orientation etc. • Council Codes of Practice set development standards (e.g. infrastructure specifications) and establish the infrastructure that the home will connect to. • Development contributions levied.
Design and construction	• District Plan sets building envelope for the house. • Building Code sets minimum performance standards for the house — Council is the administrator and carries out compliance checks. • Construction waste may go to council cleanfill or landfill.
Day-to-day operations	• Council infrastructure provides essential services (water, wastewater, transport, waste collection). • Rates are levied. • By-laws are enforced (e.g. environmental health officers). • The neighbourhood is generally maintained — affects quality of life and property values.
Significant renovations	• Building consent and possibly resource consent required.
Demolition	• Building consent required • Generally a "safe and sanitary" matter, ensuring pipes are sealed, etc. • Demolition waste may go to council cleanfill.

Table 5: Points of interaction between a council and a house

Legislative basis for action

The Local Government Act 2002, the Building Act 2004 and the Resource Management Act 1991 are the three primary pieces of legislation that frame council's approach to sustainable housing. The Health Act 1956 and Waste Minimisation Act 2008 also have an important influence.

The Local Government Act sets out general responsibilities that apply to all council activities, as well as some more specific provisions that apply to housing (e.g. development contributions and rating).

All but minor building developments are subject to local council approval under the Building Act, and in many instances, the Resource Management Act. Because many sustainable building methodologies are innovative (e.g. efficient hot water systems), or require significant forethought (e.g. passive solar design), the regulatory processes to implement these Acts have potential to help or hinder sustainable building outcomes.

The Health Act shapes how councils manage their water and sanitary services, including how houses connect to reticulated systems, and how alternative (on-site) systems are designed.

The Waste Minimisation Act specifies the waste management responsibilities of territorial authorities and includes requirements to promote effective and efficient waste management and minimisation.

This section briefly introduces the relevant sections of each Act, and discusses how councils implement the provisions in the context of sustainable home building.

Local Government Act 2002

s. 3 Purpose.

The purpose of this Act is to provide for democratic and effective local government that recognises the diversity of New Zealand communities; and, to that end, this Act—

d) provides for local authorities to play a broad role in promoting the social, economic, environmental, and cultural well-being of their communities, taking a sustainable development approach.

s. 10 Purpose of local government.

The purpose of local government is—

a) to enable democratic local decision-making and action by, and on behalf of, communities; and

b) to promote the social, economic, environmental, and cultural well-being of communities, in the present and for the future.

s. 14 Principles relating to local authorities.

1) In performing its role, a local authority must act in accordance with the following principles:

   h) in taking a sustainable development approach, a local authority should take into account —

      i) the social, economic, and cultural well-being of people and communities; and

      ii) the need to maintain and enhance the quality of the environment; and

      iii) the reasonably foreseeable needs of future generations.

The primary driver in the Local Government Act (LGA) for councils to support sustainable house building and renovation is the requirement for councils to promote the well-being of communities, in the present and for the future.

Housing is an important contributor to community well-being, providing the basic necessity of shelter, and also significantly affecting residents' health and well-being. Building more sustainably can reduce financial cost to residents and to the community in general (e.g. through water conservation techniques). As already discussed, cold, damp and draughty housing contributes to illness and lost productivity, and undermines the community's social and economic well-being in particular.

A second component of community well-being comes in the form of employment. The building and construction sector contributes 5% of New Zealand's GDP and 8% of its jobs.[20] Housing is a substantial component of the construction sector's activity. Beacon[21] calculates that renovating a standard 1940–1960 home for improved performance would require an estimated 277 hours of labour split between a variety of sub-trades. By supporting employment in the sector and making it easier to build more sustainable building stock, councils are also supporting the well-being of their communities.

Further, there are environmental benefits to be gained from improving the resource efficiency of houses, particularly with regard to water, energy, and materials (waste).

Examples of council activities to promote sustainable home building and renovation under the LGA include support for home energy retrofit programmes, Eco Design Advisors, various other education initiatives, and the application of voluntary guidelines such as the REBRI Construction Waste Guidelines. These initiatives (and their funding) are often formalised through inclusion in the Long Term Council Community Plan (LTCCP) and recognised as a contribution to Community Outcomes.

Other specific provisions under the LGA provide for councils to collect development contributions and levy rates. These are discussed further in the Economic Tools section in Part IV.

Resource Management Act 1991

s. 5 Purpose.

1) The purpose of this Act is to promote the sustainable management of natural and physical resources.

2) In this Act, **sustainable management** means managing the use, development, and protection of natural and physical resources in a way, or at a rate, which enables people and communities to provide for their social, economic, and cultural wellbeing and for their health and safety while—

   a) Sustaining the potential of natural and physical resources (excluding minerals) to meet the reasonably foreseeable needs of future generations; and

   b) Safeguarding the life-supporting capacity of air, water, soil, and ecosystems; and

   c) Avoiding, remedying, or mitigating any adverse effects of activities on the environment.

Until recently, the Resource Management Act (RMA) has not been actively used as a tool to promote more sustainable building practices — even though sustainable management of natural and physical resources is the core purpose of the Act. This is slowly changing, with the growing introduction of policies and objectives in second generation regional policy statements and regional and district plans to promote sustainable building. There are only a few examples of rules to require sustainable building, with the notable recent instance being Kapiti Coast District Council's initiative to introduce rules to require on-site rainwater collection (yet to be made operative).

If enacted, proposed National Policy Statements for Renewable Electricity Generation and for Freshwater Management will provide clearer direction for councils to include more sustainable provisions in their plans.

20 Department of Building and Housing (2008) Briefing for the Minister of Building and Construction
21 Beacon Pathway Limited (2009)

Building Act 2004

s. 3 Purpose.

The purpose of this Act is to provide for the regulation of building work, the establishment of a licensing regime for building practitioners, and the setting of performance standards for buildings, to ensure that —

c) buildings are designed, constructed, and able to be used in ways that promote sustainable development.

The role of territorial authorities[22] under the Building Act is set out in section 12 of the Act:

s.12 (1) Under this Act, a building consent authority—

a) issues building consents, but not if a building consent is required to be subject to a waiver or modification of the building code; and

b) inspects building work for which it has granted a building consent; and

c) issues notices to fix; and

d) issues code compliance certificates; and

e) issues compliance schedules.

s.12 (2) Under this Act, a territorial authority—

a) performs the functions of a building consent authority set out in subsection (1)(a) (including the issue of building consents subject to a waiver or modification of the building code) if—

II) the territorial authority is also a building consent authority; and

III) an owner applies to the territorial authority for a building consent; and

b) issues project information memoranda; and

c) grants exemptions under Schedule 1; and

d) grants waivers and modifications of the building code; and

e) issues certificates of acceptance; and

f) issues and amends compliance schedules; and

g) administers annual building warrants of fitness; and

h) enforces the provisions relating to annual building warrants of fitness; and

i) decides the extent to which buildings must comply with the building code when—

I) they are altered; or

II) their use is changed; or

III) their specified intended life changes; and

j) performs functions relating to dangerous, earthquake prone, or insanitary buildings; and

k) carries out any other functions and duties specified in this Act; and

l) carries out any functions that are incidental and related to, or consequential upon, the functions set out in paragraphs (a) to (k).

22 Note that regional authorities are prescribed a role only in relation to dams, which are outside the scope of this Resource Manual.

In short, territorial authorities have a role in administering the implementation of the Act, and primarily the Building Code. Councils have little influence over the content of the Building Code, except through advocacy to central government. Their role is simply one of administration.

The Code "prescribes functional requirements for buildings and the performance criteria with which buildings must comply in their intended use" (s.16 Building Act). Some recent changes to the Building Code have increased the sustainability of new buildings — for example, increasing the minimum standards for insulation.

However, the Code specifies minimum standards and performance criteria and, under section 18, prevents the imposition of any additional performance criteria:

s. 18 (1) A person who carries out any building work is not required by this Act to –

a) achieve performance criteria that are additional to, or more restrictive than, the performance criteria prescribed in the building code in relation to that building work: or

b) take any action in respect of that building work if it complies with the building code.

s. 18 (2) Subsection (1) is subject to any express provision to the contrary in any Act.

This means that the relationship of the RMA and the Building Act is an important area of uncertainty, with differing opinions as to the scope of efforts possible under the RMA, where it addresses issues also covered by the Building Code. Even if there is a sense of possibility, the risk of court challenges and extensive legal proceedings means that councils can tend to be hesitant to develop policy initiatives in this space.

EXAMPLE OF SUSTAINABILITY PROVISIONS IN THE BUILDING CODE

Clause H1 in the Building Code relates specifically to the energy efficiency of buildings. The Code states that buildings are intended to facilitate efficient use of energy. Specifically in issuing the energy efficiency Compliance Code, clause H1.3.3 says:

"Account must be taken of physical conditions likely to affect energy performance of buildings, including—

a) the thermal mass of building elements; and

b) the building orientation and shape; and the airtightness of the building envelope; and

c) the heat gains from services, processes and occupants; and

d) the local climate; and

e) heat gains from solar radiation."

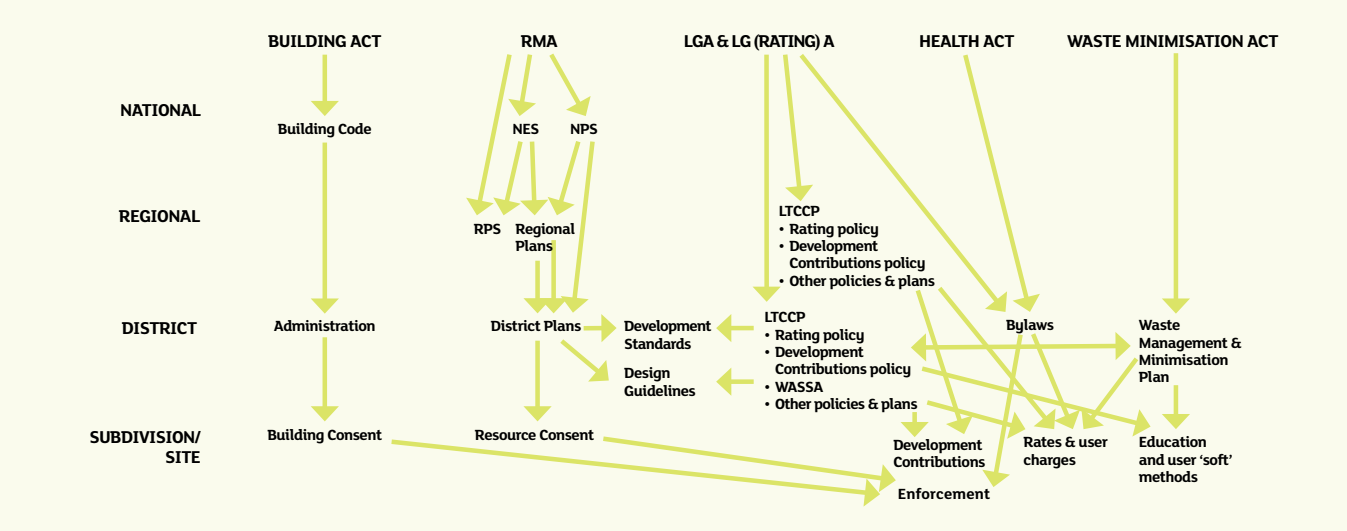

Figure 8: Legislative and policy mechanisms that affect houses

Health Act 1956

The Health Act 1956 also has an effect on how councils respond to proposals for sustainable homes, relating in particular to public health, drinking water, and sanitary requirements for dwelling houses. Section 39(1) of the Health Act requires all dwellings to provide access to "an adequate and convenient supply of wholesome water." This is often seen as a constraint on the use of rainwater for potable uses in urban situations; however, provided rainwater is used as supplementary supply for non-potable purposes, and backflow to municipal supply is prevented, the Act would seem to place no barrier to rainwater collection and reuse.

Some Regional Public Health Authorities have expressed concern about rainwater and greywater reuse, and have been involved in opposing dual reticulation, rainwater as supplementary supply and greywater reuse in some situations. Technical solutions to ensuring the safety of these "other waters" for non-potable uses can be put in place. Section 120c of the Health Act enables regulations to be developed for construction of houses; drainage, sanitation and ventilation; supply of water; protection from damp, excessive noise and heat loss; and dimensions of rooms. Such regulations, if developed, could all be relevant to the provision of sustainable building features.

Waste Minimisation Act 2008

Section 42 of the Waste Minimisation Act requires a territorial authority to "promote effective and efficient waste management and minimisation within its district." Key provisions that could help to promote more sustainable housing include the requirement that all councils must have a Waste Management and Minimisation Plan, which sets out objectives, policies and methods for achieving effective and efficient waste management and minimisation within the territorial authority's district.

Since July 2009, waste disposal facility operators are required to pay a waste levy of $10 per tonne of waste disposed at their facility. This money goes into a Waste Minimisation Fund, of which territorial authorities receive around half. The money must be spent to promote waste minimisation, in accordance with their Waste Management and Minimisation Plan.

How legislation is implemented at house level

The diagram above (Figure 8) illustrates the range of legislative and policy mechanisms that have an influence on sustainable housing construction and renovation. As the diagram illustrates, the connections are many and overlapping.

PART IV

Options for action: What councils can do

The information within this section of the Resource Book should be seen as a set of ideas and potential methods for councils to promote greater sustainability within the residential built environment. It is not specifically a toolkit; however, it does offer a wide range of case studies and approaches that could be applied by other councils.

PART I: UNDERSTAND THE CONTEXT	PART II: DEFINE THE OUTCOMES	PART III: ESTABLISH THE BASIS FOR ACTION	PART IV: EVALUATE THE OPTIONS FOR ACTION
• The need for sustainable homes • Future challenges • The value of sustainable homes	• What makes a sustainable home? • Beacon's HSS High Standard of Sustainability® • 2008 benchmarks and examples of methods • Research in action: new and retrofitted homes • Getting specific: the potential of different housing typologies	• Local government: a door or a wall? • How local government interacts with homes • Legislative basis for action	• Strategic policy signals • RMA policies and plans • Development standards and guidelines • Building Code administration • Bylaws • Economic tools • Community education • Council administrative practices

What councils can do to promote more sustainable homes

Beacon's assessment of existing council policies and programmes suggests that councils who want to successfully promote more sustainable homes in their districts can make it easier for homeowners to build and retrofit more sustainable homes. The following sections set out the detail of different options – their scope, the pro's and con's of different approaches, and examples of implementation within New Zealand. A wide array of options is identified in council policies, regulations, guidelines, economic tools, community education, and council administrative practices. As illustrated in Figure 9, such programmes range from those that are mandated (i.e. that councils are required to deliver) and those that are voluntary. Table 6 (p.37), below, provides a summary of the potential of each initiative.

LOCAL ROLE MODELS

Around the country, exciting new policies and programmes are emerging to support better performing, more resource efficient homes. If your council is looking for good ideas, think about paying a visit to:

- Environment Canterbury – the Clean Heat Programme helps to cover the cost of replacing inefficient, old heating systems with new, clean systems and insulation
- Kapiti Coast District Council – Plan Change 75 introduces a requirement for new dwellings to harvest rainwater and/or greywater for garden irrigation and toilet flushing.
- Nelson City Council – by providing finance, working with industry, and simplifying council red tape, the Solar Saver Scheme will see up to 1,700 solar water heaters installed by 2012/13.
- Tauranga City Council – since introducing meters in 1999, the city has achieved water demand savings of 25%.
- Waitakere City Council – one of several councils to provide a rebate for installing a rainwater tank.
- Any of the councils who employ an Eco Design Advisor, including Hamilton City, Kapiti Coast District, Nelson City, Tauranga City, Western Bay of Plenty District, and Waitakere City Councils.

Figure 9: What councils can do to promote more sustainable homes

Key findings: making it easier to build and retrofit more sustainable homes

Some exciting new policies and programmes are emerging around the country.

Beacon's research has demonstrated that council requirements and processes can be a disincentive for people who want to build or renovate more sustainably. Making sustainable choices can be perceived as adding time, cost, and complexity to consenting processes. Yet, as demonstrated by schemes such as the Eco Design Advisors and Nelson's Solar Saver Scheme, if councils provide the right signals, advice and support at the right time, they can have a positive influence on decisions made by homeowners.

In the course of developing this Resource Manual, Beacon has identified the following key findings as to how councils can most effectively support more sustainable homes in their regions, districts and cities:

Secure a mandate for change

There is a clearer mandate for council action on issues where the community expects council leadership. This expectation can be developed where:

1) There is **an identifiable community-wide issue** to be managed (e.g. water shortages, poor air quality, energy security of supply, health). Many New Zealand communities face such issues, but are not necessarily aware of the situation, or the potential long-term costs. By clearly and consistently communicating issues through their publications and their engagement with communities, councils can help to build a groundswell of understanding and desire for change.

2) There is **a regulatory requirement to act**. Increasingly clear, national-level direction provides a stronger basis for councils to develop policies and programmes that promote more sustainable homes. Examples include the Waste Minimisation Act 2008, National Environmental Standard for Air Quality, and the proposed National Policy Statement for Renewable Electricity Generation.

3) **Council manages assets and provides services** such as water supply and waste collection. Regular reviews of levels of service and future demand are opportunities to introduce demand management tools as part of providing efficient and cost-effective infrastructure and services.

4) **Council owns housing stock** and can undertake upgrades as part of being a good landlord. This is also a way of demonstrating to the community exactly what is possible, and stimulating local economic development in the sustainable building sector.

5) Council can develop **partnerships with other agencies** to meet shared goals and leverage greater benefits from their investment.

Develop a package of tools

By capitalising on the numerous small opportunities that exist across all aspects of council operations, councils can develop a comprehensive and effective approach to encouraging more sustainable homes. For example, Clean Heat Programmes are included in LTCCPs, regional strategies and plans, and are supported by economic tools and community education efforts. Nelson City Council's Solar Saver Scheme provides streamlined administration, financial leverage and improved industry performance – all in one package.

Packages can be staged over time; pilot programmes, economic tools and community education are important steps to prepare the ground for any regulatory changes.

Some initiatives within the package of tools will be needed to remove barriers such as regulatory constraints within district plans. Other initiatives will be focused on promoting more sustainable choices through supportive policy signals and consent assessment criteria, economic incentives, education and advice.

Support whole-of-house solutions

As determined in Beacon's retrofit research, a whole-of-house approach to creating sustainable homes is the most effective. It allows for positive interdependencies between the different features of homes, particularly between energy efficiency, water consumption and indoor environment quality, where improvements in one area can lead to compromises and under-performance in other areas.

Councils can support this finding by broadening their approach to promoting more sustainable homes to consider the full range of key performance areas (energy, water, indoor environment quality, materials, and waste). They can also help by connecting various initiatives that may already be in place across different units of council, so that prospective developers and renovators receive a comprehensive response to their proposals.

In terms of the HSS High Standard of Sustainability® key performance areas, the strongest areas of council action to date are water, energy and indoor environment quality (as justified by air quality requirements and health/well-being concerns). There is also considerable scope for addressing waste, through councils' waste minimisation and management plans. Initiatives to address materials choices remain scarce.

Ensure district-wide systems reinforce sustainable housing choices

Provisions that apply to whole districts or neighbourhoods, such as bylaws and asset management practices can directly shape what happens at the house level, including design choices for new building and significant renovations. For example, water metering and volumetric charging will encourage installation of more efficient water devices and appliances.

Recognise indirect opportunities

Often, the opportunities to promote sustainable homes will emerge as a result of other council priorities and actions. For example, improving indoor environment quality can be achieved as a consequence of wider air quality programmes. The rainwater harvested through stormwater attenuation measures can contribute to efficiencies in domestic potable water use. Programmes to stimulate local economic development could be targeted to improving homes.

Bridge the implementation gap

Policies are an important signal of a council's priorities and intentions. However, policies that "promote", "support", or "encourage" sustainable home building choices can be viewed as soft and generally inconsequential. The challenge for councils lies in specifying and delivering effective methods to achieve those policies. The examples of effective council initiatives identified in this Resource Manual are where policies have been actively implemented through an array of regulatory, economic, and educational methods. Policies are tied to action through the LTCCP process, and – perhaps more importantly – through the efforts of officers across council units.

Build officer capabilities

Council officers need to understand and be receptive to sustainable building options. Without this, any new policies and methods risk languishing on paper, and prospective sustainable home developers and renovators will be frustrated by the lack of a consistent council position.

Making this change requires work across council units and professions, and skills in translating between the different professions' "languages" and priorities. Offering in-house training, continuing professional development, practice notes and using collaborative processes for reviewing consent applications are all opportunities to improve officers' expertise as it relates to sustainable building.

Recognise the 'long game'

Successful packages of tools can take time to introduce and to take effect. For example, Kapiti Coast District Council's Water Demand Management Plan Change (Plan Change 75) comes five years after the issue was signalled in the District's Sustainable Water Management Strategy. Even then, only a small proportion of a district's houses are likely to be directly affected each year, whether through consent processes, education or economic support.

Extend the available tools

Looking at the various council initiatives that are currently being used, it is clear that there is scope to extend the available tools:

1) **Economic tools could be more effectively applied,** particularly in terms of:

    a) ease of uptake – better promotion, clear eligibility criteria, simplified application processes

    b) the scope of what could be funded – for example, extending to whole-of-house retrofits

    c) the mechanisms for funding – for example, greater use of targeted rates, as is now emerging, and possibly rates remissions and postponement mechanisms

2) Some initiatives, such as more sustainable **codes of practice and design guidelines, could be standardised** for application throughout New Zealand. Particularly for smaller councils with fewer resources, it is useful to be able to 'cut and paste' provisions (e.g. from New Zealand Standards). However, most available examples of standards do not provide for sustainable building choices in any depth.

3) **Proven initiatives could be adopted by other councils.** This includes water metering, the Clean Heat Programme, healthy housing retrofit programmes, the Solar Saver Scheme, and one-to-one advisory services such as the Eco Design Advisors. In these cases, there has been a discernable improvement in sustainability performance as a result of the initiatives' introduction.

4) **Regulation should always be a choice of last resort.** There are legislative constraints as to how much can be achieved through regulatory methods such as rules in regional and district plans and bylaws. A lack of national standards and guidance (e.g. on the relationship between the Building Act and the Resource Management Act) has most likely contributed to the low level of promotion of sustainable building through regulatory mechanisms. Councils can continue to advocate to government for **greater national guidance and support**.

5) **The body of knowledge needs to be extended.** Examples of council initiatives already in practice are thinly spread across the country, although this appears to be changing with the latest round of policy reviews. Opportunities to share experiences across councils would be valuable.

Summary of initiatives' potential

The following Table 6 sets out a summary of the potential of the different initiatives that councils could pursue to encourage more sustainable housing in their regions and districts. It identifies:

- When in the housing life cycle the initiative has an effect
- The areas of the HSS High Standard of Sustainability® that are most likely to be effectively addressed
- The potential scale of effect, that is:
  - whether it generates a deep or minor change to a home's performance as compared to the HSS High Standard of Sustainability®; and
  - whether that change is likely to take place broadly (e.g. across the whole of the region/district's houses) or be limited to a much smaller pool (e.g. a few houses).

INITIATIVE	HOUSE LIFE CYCLE STAGE WHERE INITIATIVE HAS AN EFFECT	HSS® AREAS MOST LIKELY TO BE ADDRESSED	POTENTIAL SCALE OF EFFECT	NOTES
Council Strategies and Plans (NB these rely on other methods for direct effect on house)				
LTCCP	Setting policy and budgets, with potential for effect at all stages	• All, especially water and waste	• Minor change • Broad reach	Sets council policy and enables other projects to proceed.
Water and Sanitary Services Assessment	Subdivision, new build, significant renovations, occupancy	• Water	• Deep change • Broad reach	Potential to introduce demand management planning, e.g. promotion of rainwater harvesting and efficiency measures.
Waste Management and Minimisation Plan	New build, significant renovations, occupancy	• Materials • Waste	• Deep change • Broad reach	Potential for programmes on construction waste and household waste. Introduction of waste levy as source of funding.
Other issue-based strategies	Framing policies, with potential at all stages	• All, especially water, energy, waste	• Minor change • Limited reach	Strategies can be prepared to address local issues, but can be weak on implementation.
RMA Policies and Plans				
Regional Policy Statement	Subdivision, new build, significant renovations, occupancy	• Energy • IEQ • Water demand • Waste	• Minor change • Limited reach	Opportunity for identification of regionally significant issues. Regional and district plans must give effect to the Regional Policy Statement so can improve consistency. Relies on other plans and methods for successful implementation at house level.
Regional Plans	Subdivision, new build, significant renovations, occupancy	• Energy • IEQ • Water • Waste	• Deep change • Limited reach	Addresses regional-scale resource management issues, which can have house-scale impacts (e.g. regulation of emissions to air affecting energy use and IEQ).
District Plans — land use	New build, significant renovations	• Energy • Water	• Deep change • Limited reach	Important step to remove development control barriers for sustainable devices. Potential to require more where there are significant local issues. Good opportunities with medium density housing controls.
District Plans — subdivision	Subdivision (and consequently new build)	• Energy • Water	• Deep change • Limited reach	Critical step to ensure potential sustainability of site and subsequent development is preserved. Scope will be affected by nature of subdivision (greenfields, infill). Potential to improve solar orientation, on-site water management.

INITIATIVE	HOUSE LIFE CYCLE STAGE WHERE INITIATIVE HAS AN EFFECT	HSS® AREAS MOST LIKELY TO BE ADDRESSED	POTENTIAL SCALE OF EFFECT	NOTES
Development Standards and Guidelines				
Codes of Practice	Subdivision, new build, significant renovations (with infrastructure dimensions)	• Energy • Water	• Deep change • Limited reach	Prescriptive and traditional. Providing detailed design guidance for alternative methods could transform development practices.
Design Guidelines	Subdivision, new build	• Energy • Water	• Minor change • Limited reach	Broader scope but given lesser weight than Codes of Practice
Building Code administration (NB councils have administration role only)				
Building Code administration	New build, significant renovations	• Energy • IEQ • Water • Materials • Waste	• Deep change • Limited reach	Consenting process a major disincentive to sustainable building, especially where alternative solutions required. Opportunity for better informed and streamlined processing. Ability to require change limited by minimum performance standards of the Building Code.
Bylaws				
Bylaws	Subdivision, new build, significant renovations, occupancy	• Water • Waste	• Deep change • Broad reach	City- and system-wide changes to regulate household design and behaviour (e.g. water efficiency). Should be method of last resort.
Economic tools (linked to council strategies and plans)				
Development contributions remissions	Subdivision, new build, significant renovations	• Water • (and potentially all areas)	• Deep change • Limited reach	Need to demonstrate that a sustainable feature mitigates the need for additional council-provided infrastructure as a result of growth.
Financial contributions	Subdivision, new build, significant renovations	• Water	• Deep change • Limited reach	Charged to offset environmental effects, but (so far) no evidence of use in promoting sustainable building.
Fee reductions and waivers	New build, significant renovations	• Energy • Water	• Minor change • Limited reach	Relatively low-cost initiative, signals council support. Low uptake to date, incentives may be too low.
One-off grants and subsidies	New build, significant renovations, occupancy	• IEQ (air quality) • Energy • Water • Waste	• Deep change • Limited reach	House-by-house situation — can be time consuming but leads to effective changes.
Loans	Significant renovations	• IEQ (air quality) • Energy • Water	• Deep change • Broad reach	House-by-house situation — can be time consuming but leads to effective change. Potential for wider eligibility criteria than grants and subsidies.
Raising funds-targeted rates	Occupancy	• Water • IEQ (air quality)	• n/a	Method to support other initiatives by spreading costs of across ratepayer base. Effectiveness depends on how funds used.

INITIATIVE	HOUSE LIFE CYCLE STAGE WHERE INITIATIVE HAS AN EFFECT	HSS® AREAS MOST LIKELY TO BE ADDRESSED	POTENTIAL SCALE OF EFFECT	NOTES
Raising funds-co-funding	n/a	• Energy • IEQ (air quality) • Waste	• n/a	Method to support other initiatives. No direct impact on houses. Effectiveness depends on how funds used.
Rates remissions	New build, significant renovations, occupancy	• Water	• Minor change • Limited reach	Remitting rates to recognise on-site efficiencies could influence design and renovation choices.
Rates postponement	Significant renovations, occupancy	• Potentially all	• Deep change • Limited reach	Removes barrier to sustainable renovations for asset-rich, cash-poor owners.
Community education				
Community education	Subdivision, new build, significant renovations, occupancy	• Energy • IEQ • Water • Materials • Waste	• Minor-deep change • Broad reach	Wide range of options from one-on-one advice to websites and events. Can be tailored to local issues. "Soft" method so relies on champions and community enthusiasm rather than regulatory standards.
Council administrative practices				
Council administrative practices	Any point of contact with council	• Energy • IEQ • Water • Materials • Waste	• Deep change • Broad reach	Critical to ensure consistency of approach between council units, and adequate levels of knowledge in-house. Response from council can be "make or break" for developers and home renovators considering sustainable options — especially where they require consent.

Table 6: Summary of the potential of council initiatives

A consumer perspective

A survey of 200 homeowners,[23] who had applied for and been granted a Building Consent for Additions and Alterations in Waitakere City and North Shore City during 2006, asked "what is the best way for local government to encourage sustainable renovations?" Out of six possible incentives, most homeowners selected financial incentives and discounts on products and services (see Table 7). Regulation was the least-selected incentive. Respondents also identified that the biggest barrier between residents and sustainable renovation is the cost of the product and installation.

PREFERRED COUNCIL INCENTIVES	PERCENTAGE
Financial incentives	29%
Discount on products and services	26%
In-house advice	16%
Education	12%
Demonstration	10%
Regulation	7%
TOTAL	**100%**

Table 7: Consumer preferences for council incentives

23 Hall (2007)

1. Strategic policy signals

Councils prepare a number of strategies and plans, some required by legislation, and some prepared to meet their own particular needs. Combined, they communicate a council's priorities and intentions. Including sustainable housing issues in council strategies and plans introduces the issues to the public and secures a mandate (and funding) for any planned council activities.

Key strategies and plans include:

- Long Term Council Community Plan
- Water and Sanitary Services Assessment
- Waste Management and Minimisation Plan
- Other issue-specific regional and local strategies addressing issues such as energy, water, and economic and urban development.

Scope

There is scope to address a wide range of sustainable housing issues within this bundle of strategies. It is easier to address the issues within where there is an identifiable local issue and a clear council mandate, for example, when there is national regulatory direction, or where council provides services and has control over infrastructure assets (including council-owned housing stock). Other issues can be addressed under the broad responsibilities to provide for community well-being under the LGA (see Table 8).

HSS® KEY PERFORMANCE AREA	MAIN MANDATE(S) FOR ACTION
Energy	RMA, LGA community well-being
Water	LGA (including requirement to prepare WASSA), Health Act, as service provider, infrastructure assets
IEQ	LGA community well-being
Materials	Waste Minimisation Act, RMA, LGA community well-being
Waste	Waste Minimisation Act, as service provider, infrastructure assets

Table 8: Main mandates for council action on HSS® key performance areas

Pros: Communicates council's priorities and intentions, and secures a mandate for activities around sustainable housing. Relatively straightforward processes to develop, consult on, and adopt policies.

Cons: Challenge to move from strategy to implementation — can be difficult to develop and fund appropriate methods, at the necessary scale. Inclusion in a strategy does not automatically equate to community awareness and buy-in.

Long Term Council Community Plan

Local authorities must have a Long Term Council Community Plan (LTCCP) at all times (s.93, LGA). With a minimum 10-year focus, the LTCCP describes the activities of the local authority, provides an opportunity for public participation, and provides a basis for accountability to the community (s.93). It provides "a formal and public statement of the local authority's intentions in relation to the matters covered by the plan" (s.96).

An LTCCP must set out intended levels of service provision for council activities, including performance targets. In regard to council assets, it must state how the local authority will assess and manage the asset management implications of changes to (a) demand for, or consumption of, relevant services, and (b) service provision levels and standards. Where changes are forecast, the plan must set out estimates of additional capacity requirements, how that additional capacity will be provided, estimated costs (and how they will be met), and how maintenance, renewal and replacement of assets will be undertaken (and how those costs will be met) (Schedule 10 LGA). Any decisions to significantly alter levels of service provision must be signalled in the LTCCP (s.97).

Forecasting changes to supply and demand provides an opportunity to introduce demand management and house-level solutions, especially for water and waste issues.

Examples

- **Kapiti Coast District Council's 2009-2019 LTCCP**[24] clusters various activities as part of a Supporting Environmental Sustainability activity, including community advisory services (sustainability options, water conservation, biodiversity, energy efficiency), funding assistance, support for community environmental sustainability projects, and tāngata whenua satisfaction with, and involvement in, environmental sustainability projects. Inclusion in the LTCCP allows KCDC to identify the contribution to Community Outcomes, and also risks (such as lack of external funding) to the achievement of programmes.
- **Waitakere City Council's 2009-2019 LTCCP**[25] signals as a priority for the next 10 years: "Seeking long term alternatives for maintaining current water, roading, parks and community infrastructure, and creating more affordable services".
- **Western Bay of Plenty's 2009-2019 LTCCP**[26] signals Council's intent to phase in metering and volumetric charging of all reticulated customers.
- **Kapiti Coast District Council's 2009-2019**[27] **LTCCP** establishes a standard of peak water consumption of no more than 400 litres per person per day, and supports this with a work programme to explore methods, and an indicator: "Peak water consumption of no more than 400 litres per person per day (lppd) by 2012/13 at all times - 250 lppd for essential use, 150 lppd for non-essential use."
- **Christchurch City Council's 2009-2019 LTCCP**[28] establishes the Christchurch Agency for Energy – a charitable trust to implement the Sustainable Energy Strategy for Christchurch 2008–2018 action plan.

Water and Sanitary Services Assessment

Councils are required to undertake a Water and Sanitary Services Assessment (WASSA) (s.125 LGA), which includes statements of:

- Current and estimated future demands for water services
- Options available to meet these demands
- The territorial authority's intended role in meeting these demands
- The territorial authority's proposals for meeting these demands, including proposals for any new or replacement infrastructure.

Example

In some councils, the WASSA has been used to signal the need for demand management. For example, **Waitakere City Council's WASSA** (notified 2005) proposes to meet future increases in demand:

> "... primarily by implementing a water demand management programme with additional supplies provided by rainwater tanks.
>
> In order to meet this objective, this will require a reduction in domestic water use per person of 25% compared to 2004/05 usage, representing 125 litres per person per day."
>
> Council intends to implement a demand management programme over the next 10 years, based on a positive cost benefit analysis prepared by Maunsell Limited. This programme recommends the following measures:
>
> - Continue with pressure management and water loss programmes
> - Promote and retrofit rainwater tanks
> - Promote and retrofit water-efficient appliances
> - Continue and enhance water education programmes and survey water uses

24 Kapiti Coast District Council (2009)
25 Waitakere City Council (2009) p.43
26 Western Bay of Plenty District Council (2009) p.117
27 Kapiti Coast District Council (2009) p.127
28 Christchurch City Council (2009)

Waste management and minimisation plans

Section 43 of the Waste Minimisation Act requires that territorial authorities must prepare Waste Management and Minimisation Plans. These must set out objectives and policies, and methods for achieving effective and efficient waste management and minimisation within the district. Waste management plans prepared under the Local Government Act 1974 provisions will be treated as Waste Management and Minimisation Plans, and must be reviewed by 2012 and then every six years.

The following methods of waste management and minimisation must be considered in descending order of importance:

- Reduction
- Re-use
- Recycling
- Recovery
- Treatment
- Disposal

Examples

- **North Shore City Council's 2005 Waste Minimisation Plan** sets an ultimate target of zero waste to landfill. Identified priority areas for action include organic waste and construction and demolition wastes — both relevant to the creation of more sustainable homes.
- **The Kapiti Coast District Solid Waste Management Plan** sets out key objectives and activities for solid waste management and has a primary long term goal of zero waste by 2015. Specific activities in the Plan include promotion of waste reduction at source, waste audits, home composting, and use of direct disposal charges to encourage waste reduction.

Other issue-based strategies

Councils may also prepare strategies to assist them in responding to locally significant issues and carrying out their functions under the LGA. These strategies can be developed to inform other strategies and plans (e.g. the LTCCP and resource management plans), and to communicate council priorities to the community.

Pros: Able to focus on a specific issue across the range of council activities (and potentially other stakeholders too). Consultative processes can lay the groundwork for change in the community. Strategies can provide a clear statement of council's position.

Cons: Can take a lot of effort to develop, and then fall down on implementation. To be effective, they need to be well-linked to the LTCCP, financial planning processes, and work programmes.

Examples

- The **Hamilton City Environmental Sustainability Strategy,** released in 2008, was developed with Hamilton-based agencies, and has identified a series of flagship projects, including the District Plan Review, Breathe Easy (insulation retrofits), and a scoping study on how water is valued and managed by territorial authorities to support Hamilton City Council's own water management decisions (led by University of Waikato).
- **Gisborne District** faces electricity supply constraints as transmission and distribution lines reach capacity. Energy costs are some of the highest in the nation, and future changes in the energy sector could exacerbate this. The **Gisborne District Council Energy Strategy (2005)** sets out, inter alia, to promote energy efficiency, encourage investment in local generation (large, small and micro scales), and recognise energy impacts through resource planning management procedures and the LTCCP.
- **Environment Canterbury's Regional Energy Strategy (2007)** outlines regional options for moving to a more sustainable regional energy system and identifies existing homes and housing design and subdivision as priority areas for action. Actions include, inter alia, developing a Healthy Homes Standard for internal air quality, expanding the Clean Heat Programme, and providing the community with quality information.
- The **Kapiti Coast District Sustainable Water Management Strategy (2002)** sets out the approach that has underpinned Kapiti Coast District Council's strong water demand management programmes. It identifies (p.2) "the key long term issue is that of demand management. The Strategy takes the view that the community's role via the Council, is to support basic water needs and some lifestyle use — within the capacity of natural systems."
- **Christchurch City Council** has developed a **Water Supply Strategy 2009-2039,** for the sustainable management of public water supplies. The Strategy includes actions to study the potential for rainwater as an additional source for households.
- No examples of economic development strategies that include the job creation potential of sustainable homes have been identified in the course of this research. However, given the discussion in Part I. Context of this Resource Manual, it is a possibility worth considering.

Western Bay of Plenty's Built Environment Strategy provides a good example of sustainable housing outcomes. Developed during 2006/07, the Built Environment Strategy provides a framework for the Council's District Plan Review and Code of Practice Review, to ensure that future development will complement the surrounding natural and built environment. The Strategy includes consideration of house-level design, and sets out desired features, including for diversity and adaptability, and for environmental responsiveness:

Western Bay of Plenty's Built Environment Strategy

E2 Diversity and Adaptability: Family needs and sizes are dynamic and therefore housing should be able to respond to changing needs.

HOW WE WILL GET THERE	IMPLEMENTATION TOOLS
(a) Provide information on how residential units can be located on a site to allow for more useful outdoor areas.	• Package of Plans • Design Guidelines
(b) Assist households to plan houses that can respond to changing needs.	• Consultation & Education

E4 Environmental Responsiveness: Sustainable designs and development start at household level and therefore the Western Bay of Plenty District Council would like to encourage the following:

HOW WE WILL GET THERE	IMPLEMENTATION TOOLS
(a) Permeable driveways and gardens that reduce stormwater run-off.	• Code of Practice • Design Guidelines • Consultation & Education
(b)The installation of rainwater tanks with the aim to use the water in toilets and gardens.	• Consultation & Education
(c) The development of sustainable gardens that are green, but conserve water.	• Consultation & Education
(d) Apply best practices with regard to insulation to ensure buildings that are warm and dry during winter.	• Building Code • Consultation & Education • Design Guidelines
(e) Respond to local wind, rain, soil and sunlight conditions; use natural light and ventilation where possible.	• Building Code • Consultation & Education • Design Guidelines
(f) The installation of solar heating systems and other renewable energy appliances.	Consultation & Education Design Guidelines

2. Resource Management Act policies and plans

NOTE: The focus in this section is on how policies and plans prepared under the Resource Management Act (RMA) provide for standard or smaller urban sites, as well as medium density housing. This is because many of the development controls that constrain sustainable building do not tend to have an effect on larger rural lots.

The Resource Management Act is concerned with the sustainable management of natural and physical resources. Policies and plans prepared under the RMA contain many long-established development standards that contribute to a basic level of sustainability of homes. For example, height in relation to boundary rules ensure adequate sunlight is not blocked by neighbouring developments. Site coverage rules set maximum levels for impermeable surfaces (and therefore provide a low level of stormwater management).

To date, policies and plans prepared under the RMA have had only a limited effect in promoting more than an elementary consideration of sustainability in our homes. This is for a number of reasons, including a lack of national policy guidance, the distinction between activities and effects managed under the RMA versus those managed under the Building Act, and the simple fact of sustainable homes being only a recent concern for councils.

Regulation under the RMA operates hierarchically: national, regional, district/city. This Resource Manual focuses on the regional and district/city levels as these are areas where councils can make a difference. National environmental standards and national policy statements can have a significant influence on how regional and local councils promote sustainable homes through their RMA processes (for example, the introduction of the Air Quality National Environmental Standard). However, as their formulation is not the responsibility of councils, they are not considered in detail here.

Regional policy statements

Under section 59 of the RMA, the purpose of a regional policy statement is to provide "an overview of the resource management issues of the region and policies and methods to achieve integrated management of the natural and physical resources of the whole region." They must be given effect to by regional and district plans.

Many of the reviews of regional policy statements currently underway are including consideration of sustainability issues such as climate change in their review processes. Coupled with the introduction of requirements within the RMA that district plans "must give effect to" regional policy statements, there is potential to create a stronger policy basis for councils to promote sustainable housing.

Scope

Pros: Allows clear statement of regional issues and objectives and provides opportunity for identification of regionally significant issues. Regional and district plans must give effect to the regional policy statement (RPS). Regional policies can establish a consistent region-wide approach, covering multiple districts.

Cons: Potential for weak connection between policies and implementation, with a challenge to specify meaningful methods for sustainable housing issues at the level of individual houses. Identified methods are often vague, difficult to implement, and not clearly targeted. Regional policy statements rely relies on other council plans and programmes for successful implementation.

Examples

The following Table 9 provides a small selection of the types of policies and methods that can be included in regional policy statements to promote sustainable housing.

POLICY STATEMENT	POLICY	METHODS
Environment Canterbury Regional Policy Statement — Energy Policy 1	Promote settlement and transport patterns and built environments that will: (d) incorporate energy efficient approaches to building orientation, form and design.	1. The methods used or to be used by the Regional Council are: (a) Regional plans (b) Co-ordination (c) Information provision (d) Investigations (e) Resource consents (f) Encourage the preparation of iwi management plans 2. District/city councils in the preparation, variation, change or review of district plans, through the exercise of their functions should consider: (a) promoting settlement and transport patterns and built environments that result in increasingly effective and efficient use of resources particularly energy, reduce the rate of the use of non-renewable energy sources, minimise emissions into the atmosphere, and incorporate energy efficient approaches into building orientation, form and design.
Environment Canterbury Regional Policy Statement —Air Quality Issue 1, Objective 1, Policy 1	(a) Set standards to maintain minimum ambient air quality in urban areas of Canterbury based on concentrations of contaminants that cause adverse health effects and nuisance effects. (b) Where ambient air quality standards have not been set and existing ambient air quality is higher than required to avoid adverse health effects and nuisance effects, the discharge of contaminants into air shall only be allowed where the adverse effects of the discharge are minor. (c) Give priority to ensuring ambient air quality improvements are achieved in Christchurch and Timaru.	1. The methods used or to be used by the Regional Council are: (a)(i) Natural Resources Regional Plan — Air Chapter (b) Resource consents Note that the Natural Resources Regional Plan sets out more detailed methods, including: (a) Information and promotion (b) Financial incentives and assistance (c) Regional Energy Strategy (d) Regional rules; and (e) Compliance and enforcement
Greater Wellington Proposed Regional Policy Statement 2009, Policy 10	Promoting energy efficient design and small scale renewable energy generation — District Plans District Plans shall include policies that: (a) promote energy efficient design and the use of small scale renewable energy generation; and (b) provide for energy efficient alterations to existing buildings.	District Plan implementation (Method 1) Prepare and disseminate information about energy efficient subdivision, design and building development (Method 10) Identify sustainable energy programmes (Method 32)
Greater Wellington Proposed Regional Policy Statement 2009, Policy 18	Using water efficiently — Regional Plans Regional Plans shall include policies, rules and/or methods that: (a) promote the efficient use of water; and (b) promote water harvesting, including off-line water storage.	Regional plan implementation (Method 2) Prepare and disseminate information about water conservation and the efficient use of water (Method 11) Prepare a regional water strategy (Method 33)

Table 9: Examples of sustainable housing in Regional Policy Statements

POLICY STATEMENT	POLICY	METHODS
Greater Wellington Proposed Regional Policy Statement 2009, Non-Regulatory Policy 65	Promoting efficient use and conservation of resources — non-regulatory To promote conservation and efficient use of resources by: (a) reducing, reusing and recycling waste; (b) using water and energy efficiently; and (c) conserving water and energy.	Information about water conservation and the efficient use of water (Method 11) Prepare a regional water strategy (Method 33) Non-regulatory: Providing support (Method 55)
Environment Waikato Regional Policy Statement, Policy 3.9.5.1 Waste Management	Promote the management of wastes in accordance with the waste management hierarchy of: Reducing the amount of waste produced. Reusing waste items. Recycling waste materials by reprocessing and using them as raw material for other products. Recovering resources from waste. Residual wastes disposed of safely.	Multi-faceted, including: Advocacy to and liaison with councils and central government Information, advice, and assistance Set waste reduction targets for the Region based on figures established by surveys of the municipal solid waste stream. (Set out in Regional Waste Management Strategy.) Consider the use of economic instruments in regional and annual plans to encourage the adoption of less wasteful technologies

Table 9: Examples of sustainable housing in Regional Policy Statements (continued)

Regional plans

Regional plans may be prepared "to assist a regional council to carry out any of its functions in order to achieve the purpose" of the RMA (section 63). Regional plans must state **objectives** for the region, **policies** to implement the objectives, and rules (if any) to implement the policies. It may also state, inter alia, significant resource management **issues** for the region, and **methods**, other than rules, for implementing the policies (section 67).

The range of issues addressed in regional plans includes air quality, land, water, the coastal environment, and discharges to land.

Pros: Can be used to establish more specific objectives, policies and methods to manage regional issues, such as air quality, that have house-level implications. District plans must not be inconsistent with provisions in regional plans (s.75(4), RMA).

Cons: Plan changes can be costly and lengthy. To dates, regional plans have tended to specify a lot of non-regulatory methods (e.g. education) for issues related to sustainable housing, which need to be connected into other areas of council work programmes to be effective.

Example

Water efficiency — Auckland Regional Council Air Land and Water Plan

The **Auckland Regional Council Air Land and Water Plan (s.6.4.10)** requires that "any proposal for the taking and use of water for municipal supply shall provide... (a) a demand management plan/ programme [and] (c) a network efficiency and water conservation management plan..."

Auckland Regional Council (ARC) defines a demand management programme as: "a plan to influence patterns of water use practices and/or behaviour in all sectors of use (and distribution) with the objective of maximising water use efficiency and reducing discretionary water use, as far as practical."

Air quality — Environment Canterbury Natural Resources Regional Plan

Chapter 3 of **Environment Canterbury's Natural Resources Regional Plan** sets out objectives and policies for air quality. This includes an objective (AQL3) for ambient air quality that meets the National Environmental Standard:

> In the Christchurch Clean Air Zones 1 and 2, improve current poor winter ambient air quality so that by the year 2012 there is a reduction in the concentration of PM10 to less than 50 µg/m3 (24 hour average), with no more than one annual exceedence (averaged over three years), so as to reduce nuisance effects and adverse effects on human health.

The objective is supported by policies to transition to cleaner burning domestic heat sources. Methods for implementation include information and promotion, financial incentives and assistance, the Regional Energy Strategy, and regional rules, such as Regional Rule AQL9:

"Except as provided for in Rule AQL9A, the discharge of contaminants into air in the Christchurch Clean Air Zone 1 from the burning of any solid fuel in any small scale solid fuel burning device located in:

(a) any dwelling for which building consent was issued after 31 December 2002, including any extension or alteration to that dwelling; or

(b) any dwelling that did not have a small scale solid fuel burning device at 31 December 2002, including any extension or alteration to that dwelling;

(c) unless building consent was issued and any amendments were incorporated in the building consent in accordance with the Building Act 1991 for the installation of the small scale solid fuel burning device before 1 January 2003;

is a prohibited activity for which no resource consent shall be granted."

(Rule AQL9A provides limited discretionary status for installing pellet fires, providing they meet specified criteria, such as emissions and thermal efficiency.)

District plans

Under section 75 of the RMA, a district plan must state **objectives** for the district, **policies** to implement the objectives, and **rules** (if any) to implement the policies. It may also state, *inter alia,* significant resource management **issues** for the district, and **methods**, other than rules, for implementing the policies for the district. Examples of matters relating to sustainable housing can be found in all of these components of plans, and are discussed below.

Scope

Within district plans, there is potential to:

- Remove barriers to sustainable housing choices
- Promote sustainable housing choices
- Require some sustainable housing choices, in some circumstances.

In particular, there is scope within:

- Subdivision controls, to promote on-site water harvesting and site orientation for solar gain.
- Development controls affecting new construction and significant renovations (extensions to existing dwellings), to remove consenting barriers for rainwater tanks, solar water heating and small scale energy generation, and in limited circumstances to require installation of specific features.
- Assessment criteria for medium density housing and apartments (which generally require resource consent already), to consider sustainability features within design proposals.

Section 18 of the Building Act (discussed in Part III. Basis for action, above) sets an important constraint on the scope of district plans to require sustainable building outcomes. It prevents councils from imposing performance criteria that are additional to, or more restrictive than, the performance criteria prescribed in the Building Code.

In *Christchurch International Airport Ltd v Christchurch City Council* [1997][29] the High Court found that a territorial authority will be free to promulgate conditions and rules concerning the use of a building even if those rules affect the construction of the building, provided that such rules are "appropriate and necessary" to "promote the sustainable management of natural and physical resources" in the district. The case addressed whether Council was able to require noise attenuation in houses because of their proximity to the airport (which Council argued would make them unliveable). At the time, the Building Code contained noise standards, but none specifically addressing noise controls relating to airports.

The High Court judgement could support councils imposing additional performance standards in their district plans, if it is necessary to address a resource management issue (e.g. an issue that relates to the efficiency of the house). However, with no further case law on this issue, particularly as it relates to issues that are explicitly covered in the Building Code, the interpretation of the restriction remains uncertain. Even if there is a sense of possibility, the risk of court challenges and extensive legal proceedings means that councils can tend to be hesitant to develop policy initiatives in this space.

Pros: Can remove regulatory barriers that can deter homeowners from making simple improvements to their homes. Objectives, policies and assessment criteria can help to improve the designs of developments requiring consent (e.g. medium density housing). There is also some potential to require more sustainable housing options where there is a clearly identified resource management issue to be addressed.

Cons: The presumption in district plans is that it ought to be possible to build or renovate a home on a site as a permitted activity, without requiring resource consent. Consent procedures will only be triggered if there is an infringement of development controls. Introducing controls that specifically require sustainable building techniques may be too onerous a requirement, where that is the only trigger for requiring resource consent. Also, plan change processes can be lengthy and expensive, and the resulting provisions would only affect houses when they are newly built or undergoing extensive renovations.

Issues, objectives and policies

Some district plans include substantial discussion of sustainability and, to a lesser extent, sustainable housing in their identification of resource management issues.[30] Similarly, a number of plans use their objectives and policies as a place to promote sustainable housing choices; for example, around energy and water efficiency (see the Wellington City District Plan example).

Following the top-down hierarchy of the RMA, objectives and policies lead to the methods to achieve them. They therefore need to be clearly worded, describing the specific outcomes that they seek and the level of performance that is expected; for example, whether an activity "must" achieve an outcome, or "may" achieve it. (Note this is equally relevant to regional policy statements and plans.)

Objectives and policies can be achieved through district plan rules, and also through other methods, such as public education, non-regulatory policies and programmes, and advocacy to central government and other organisations. Methods for sustainability objectives are often identified as these sorts of non-statutory means, rather than the introduction of rules and development standards.

A plan's objectives and policies are important tests when considering applications for discretionary and non-complying activities and form the basis of the activity status, performance standards and matters of control for controlled and restricted discretionary activities.

Pros: Allows clear specification of the resource management issues associated with sustainable housing choices and statement of council objectives and policy in that area. Objectives and policies that recognise and provide for sustainability enable the wider positive benefits to be taken into consideration through resource consent processes, where this discretion is available.

Cons: Once written, district plan issues, objectives and policies can be left on the shelf. They function as a backup to the plan's rules and assessment criteria, meaning they are referred to only in considering discretionary and non-complying activities. Where an activity is discretionary or non-complying, and consideration of objectives and policies is necessary, it will most likely be non-complying for other reasons (unrelated to sustainable housing issues), although any sustainability features that relate to policies and objectives could be used as a balancing factor in assessing the activity. For restricted discretionary activities only, the relevant objective and policy relating to the matter of control can be considered.

29 Christchurch International Airport Ltd v Christchurch City Council [1997] 1 NZLR 573
30 As pointed out by Quality Planning (no date), issues can describe existing or potential problems that need to be resolved, or they can be opportunities to be taken advantage of to promote the purpose of the RMA

Objectives and policies about sustainable housing can be difficult to implement through district plan rules. Non-statutory methods for promoting the objectives and policies are dependent on work programmes outside RMA processes, which means there can be a disconnection between what is identified as desirable in the district plan and what actually happens. The example below illustrates that the majority of methods are non-statutory and rely on council's activity planning for its annual and 10-year plans and on third parties to implement.

Example

Wellington City District Plan

Objective:

4.2.1 To promote the efficient use and development of natural and physical resources in Residential Areas.

Policy:

4.2.1.3 Encourage subdivision design and housing development that optimises resource and energy use and accessibility.

The form of a subdivision or housing development can promote efficiencies, for example by making the most effective use of available land and by such measures as orienting developments to the sun and improving public transport and pedestrian access. Equally, it can promote greater equity of opportunity and choice for older people and all others with mobility restrictions by employing, wherever practicable, the accessible housing design criteria in NZ Standard 4121 (or its successor). Flexible siting provisions and design guides for subdivision and multi-unit residential development have thus been included in the Plan.

Methods:

- Rules
- Design Guide (Subdivision)
- National standard access design criteria
- Advocacy

Environmental result:

The environmental result will be improved subdivisions and housing developments

Christchurch City District Plan

Issues:

3.6.3 Summary of energy issues

a. the effects of increased use of fossil fuels for home heating and transport on a local and global environment, particularly air quality and global warming.

b. how to achieve long term energy efficiencies in a manner that does not impose unsustainable short term costs on businesses and households.

3.10.6 Summary of housing issues

o. The energy efficiency of housing...

Objective:

Energy Objective: The sustainable use of energy

The efficient use of energy, in both supply and consumption, whilst promoting the development of alternative renewable energy sources.

Policy:

3.1.1 Policy: Public awareness
To promote increased public awareness of the need for energy efficiency.

3.1.2 Policy: Renewable energy sources
To encourage the development and use of renewable energy sources.

3.1.3–3.1.5 Policies: Energy efficiency

3.1.3 To promote energy efficiency through:
(a) urban consolidation; and
(b) waste minimisation.

3.1.4 To encourage energy efficiency in transportation.

3.1.5 To minimise energy use through improved building design.

3.1.6 Policy: Tree planting
To increase tree planting throughout the City and encourage the development of alternative sinks for carbon dioxide absorption.

Methods:

Objective 3.1 and associated policies will be implemented through a number of methods including the following:

District Plan

- The identification of a pattern of land uses (through zoning) supporting a strategy of urban consolidation and a compact urban form for the City.
- Zone rules, e.g. Living Zone rules regarding outdoor living space, and sunlight and outlook for neighbours.
- City rules regarding subdivision, e.g. rules relating to allotment sizes and dimensions.

Other methods

- Promotion and provision of facilities to support and encourage cycling and walking as forms of transport, e.g. cycle parking and walkways, and publications such as "City By-Cycle".
- Provision of works and services e.g. maintaining and developing the City's tree resource, and the provision of public passenger transport infrastructure.
- Continuation of a Community Energy Efficiency programme for Christchurch.
- Promotion and provision of information to increase energy efficiency, e.g., maximising use of solar energy through site design and the orientation of buildings.

- Implementation of the Council's internal energy management programme including the strategic energy plan.
- Formulation and implementation of an Urban Energy Strategy for the City.
- While it is a major shareholder in Southpower, the Council may be able to influence the energy sources used for electricity generation, for example, wind power.
- Provision of policy allowing development contribution for public passenger transport infrastructure and infrastructure that encourages cycling and walking.

Key anticipated environmental results:

1. Increased use of energy efficiency measures.
2. Minimising the increase in energy use.
3. The development and increased use of renewable energy sources.
4. Reductions in the level of the City's air pollutants, including the emission of CO2 into the atmosphere.

Land use controls

Development controls manage such land use issues as height in relation to boundary, height, yards, and building coverage. They are predominantly set to allow a house to be developed as of right (that is, without requiring a resource consent) whilst protecting the sunlight, privacy, and outlook of neighbouring properties.

Removing barriers

Evaluation of the Auckland City, Hamilton City, Kapiti Coast, and Christchurch City District Plans[31] identified that development controls, which apply to new dwellings and to renovations, posed a number of barriers to more sustainable housing, particularly the orientation of the building and installation of features such as rainwater tanks, solar hot water and small scale energy generation.

A number of simple opportunities exist to remove the development control barriers to sustainable housing. Such controls would need to be supported by clear objectives and policies (as per discussion above) and definitions in some cases (such as small scale energy generation).

- To encourage more energy and water efficient buildings:
  - Make rainwater tanks, solar hot water, and small scale energy generation (up to certain size thresholds) explicitly permitted structures, OR
  - Exempt rainwater tanks, solar hot water and small scale energy generation within height in relation to boundary, height, building coverage, and yard rules.

Example

Christchurch City District Plan: General Rule 2.4.2(a)(ii) allows roof water tanks to intrude through recession planes, "provided that there is a maximum of one intrusion permitted for every 20 metre length of internal boundary, and the maximum dimension thereof parallel to the boundary for this structure shall not exceed 3 metres, and provided that the minimum distance between each of these structures shall be 20 metres, and provided that for buildings over three storeys, such features are contained within or are sited directly against the outside structural walls." In the Central City Zone, the maximum dimension parallel to the road boundary is increased to 5 metres. Similarly, the Plan's definition of height exempts water tanks in some residential zones, provided they do not exceed an additional 6 metres or 20% of the height of a building (whichever is lesser) and not more than 25% of the plan area of a building.

Many existing buildings, such as the high stud villas built almost to the side boundaries of their sites, could not be built as of right under today's planning rules. They exceed various thresholds such as yard and height in relation to boundary rules. As existing uses, this does not pose a problem. However, when homeowners want to renovate, they can find that they need to apply for resource consent for even the simplest of changes such as installing a solar hot water system or rainwater tank, or extending the rear of the house to catch the sun. All of which can create a disincentive to retrofit a home sustainably.

31 Trenouth and Mead (2007)

- Review the purpose and application of Height in Relation to Boundary (HIRB) and yard rules, particularly as they relate to northern boundaries and boundaries fronting streets. A solar hot water system is usually located on the northern side of a building — although it may add to building bulk, an HIRB infringement on the northern boundary will not generate an actual shadowing effect on the property located to the north. Rainwater tanks are often best located on the southern boundary, next to the laundry and bathroom. Tanks less than 5,000 litres are generally lower than a permitted fence but they may infringe yard rules.

- To encourage passive solar gain, use outdoor living court rules to ensure optimal solar orientation for the outdoor space and also for adjacent living rooms. The subtle choice of language can make all the difference here: outdoor living spaces are often required to have "convenient access from a living room" (e.g. Auckland City District Plan) but a more direct relationship could be required if the language was changed to "adjacent to".

Example

Christchurch City District Plan Rule 4.2.8(d) Outdoor Living Space: The required minimum area shall be readily accessible from a living area of each unit. At least half of the required minimum area shall be able to receive sunshine at midday on the shortest day of the year.

- Ensure standards for yard setbacks and outdoor living space requirements contain an allowance for eaves, which enables buildings to be designed to offer shade in summer months without infringing development controls.
- To improve on-site stormwater management, consider reducing permitted levels of building coverage and enabling two-storey dwellings.

Pros: Requiring consent for relatively minor works such as installing a rainwater tank can be a disincentive to homeowners. This removes such barriers, and signals council support for such initiatives. Removing the requirement for consent may also help address the significant issue that such work often proceeds anyway (without consent).

Cons: Any exemption needs to be balanced with the original purpose of development controls — namely protecting neighbours' sunlight, privacy and outlook. Such provisions will only affect a small number of homes. Plan changes can be time consuming and costly processes. (Consider tagging changes onto other, larger plan changes.)

Requiring sustainable features

In areas where there is a clearly identifiable resource management issue, it may be possible to introduce specific rules for sustainable housing into the district plan. Much has been done to require more sustainable treatment of stormwater through district plan provisions. For example, recent plan changes to the North Shore City District Plan require new houses on brownfields sites to attenuate their stormwater flows. However, there is sparse evidence of district plans being used to require sustainability in the HSS® key performance areas of energy, water (other than stormwater), indoor environment quality and materials and waste.

A notable recent example is Kapiti Coast District Council's (KCDC) Plan Change 75[32] (currently in Environment Court proceedings, with one appeal). This plan change introduces new water demand management provisions to address the local issue of increasing water demand and finite supply. The Council estimates that they have 45 years of supply remaining, but this will dwindle to 20 years if demand management measures are not put in place. Plan Change 75 requires new houses to meet a water demand management standard by installing a 10,000L rainwater tank or combination of a smaller rainwater tank and greywater re-use system (for garden irrigation and toilet flushing). If the houses do not meet this standard, a non-complying activity status will apply.

Making all new homes without demand water management a non-complying activity is a significant step – one that needs to be supported by clear objectives and policies and well-justified in the process of developing the plan change. (Section 32 of the RMA requires that any proposed plan change must be evaluated as to whether it is the most appropriate way of achieving the purpose of the Act. This evaluation needs to include benefits and costs of policies, rules or other methods, and the risk of not acting if there is uncertain or insufficient information.)

KCDC went through a rigorous process of analysis and consultation to support the decision to notify the plan change. They concluded that the preferable course of action was to provide two options within the standards (either a larger tank, or a smaller tank plus greywater re-use system), that the approach was consistent with the District's community outcomes and relevant strategies, and that the benefits of introducing the plan change outweighed the costs.

The hearing commissioners recommended a slightly revised approach, providing a restricted discretionary status for alternative non-potable water supply and storage facilities. In such instances, applicants will need to demonstrate "that the system proposed will permanently reduce water demand associated with the dwelling unit(s) by at least 30% from *Household 2007 Summer Average Water Use*, without adverse impacts on hydrological, ecological systems and public health."

32 Kapiti Coast District Council (2007)

Pros: A directive approach provides certainty in addressing a pressing local sustainability issue. A choice of methods to achieve targets can smooth the regulatory method.

Cons: Need to be able to demonstrate the resource management issue justifies the scale of prescription. Requiring some of the newer, relatively untried technologies can raise concerns (e.g. with risk-averse public health agencies). Methods can also involve more short-term costs for the development community.

Example

Kapiti Coast District Council Plan Change 75

Plan Change 75 introduces requirements for water demand management in new and relocated homes. Amendments are woven throughout the plan,[33] including:

Issues:

The demand for public potable water supply from new development reducing water available to existing residents.

Objectives:

Reduce the potable water demand from residential development on the public potable water supply and reticulation network by 30% from the 2007 average, in order to assist in achieving security of potable water supply, and reduce peak stormwater discharges from residential areas and to improve the community's resiliency in the event of a natural disaster.

Policies:

Ensure that the impacts of new residential development on the public potable water supply and reticulation network are reduced by approximately 30% per household by installing rainwater storage tanks, water re-use systems or other water demand management systems to supply water for toilets and all outdoor non–potable uses.

Ensure that public health is not compromised from cross-contamination from the use of non-potable water in residential situations by requiring separation and/or backflow prevention between potable and non-potable systems.

Anticipated environmental outcomes:

The total household potable water demand does not exceed 1,000 litres per day for 30% of homes in the district by 2013.

Rules:

D.1.1.3 (A) Restricted Discretionary Activity Rule

(iii) All new or relocated residential dwelling units that are to be provided with non-potable water supply and storage facilities that do not comply with permitted activity standards relating to Water Demand Management. Council has restricted its discretion to the supply, storage and use of non-potable water to the dwelling units and effects on public health, ecological and hydrological systems.

D.1.1.4 Non-Complying Activities (Residential Zone Rules and Standards)

(xviii) All new or relocated residential dwelling units unless they are provided with a rainwater storage tank complying with the Water Demand Management Permitted Activity Standard or the conditions of a resource consent which provided an alternative water demand management system to reduce demand for public potable management system to reduce demand for public potable water by at least 30% from the *Household 2007 Summer Average Water Use* and non-potable water for all outdoor uses.

D.1.2.1 Permitted Activity Standards

Water Demand Management

(i) All new or relocated dwelling units where public potable water supply is available to a dwelling unit shall be fitted with one of the following:

(a) Rainwater storage tanks with a minimum capacity of 10,000 litres for the supply of non-potable water for outdoor uses and indoor toilets.

(b) Rainwater storage tanks with a minimum capacity of 4,000 litres for the supply of non-potable water for outdoor uses and indoor toilets, and a greywater re-use system for outdoor irrigation. The greywater re-use system shall re-use all water from bathrooms (excluding toilets) and laundry washing machines.

The greywater re-use system shall be installed so that:

- [10 bullets specifying diversion to sewer for heavy rainfall, setbacks from boundaries and private bores, water is sourced from a single dwelling, irrigation design, greywater is not stored or treated, can be diverted back to sewer, surge attenuation is installed, a coarse filter is installed, there is no risk of cross-contamination of drinking water, and the system shuts off in times of sewage backflow]

The greywater irrigation system must be installed by an approved installer who must produce an installer's certificate demonstrating that the system meets requirements and will be installed correctly.

33 Note that this is a summary, without the more extensive explanations included in the Plan Change

A greywater installer's certificate must be provided with the building consent application and the greywater diversion device must be installed by a licensed plumber who has a greywater installer's certificate from the manufacturer and the system will be inspected and verified by a building inspector. Greywater re-use system set up and maintenance instructions must be added to the Land Information Memorandum for every property installing such a device.

(ii) [health requirements – separate plumbing and backflow devices, signage, gutter guards, top-up from public supply to allow toilet flushing]

(iii) [provision for common rainwater storage in multi-unit developments]

Definitions:

Greywater Means wastewater from domestic household use, excluding toilets and kitchen wastewater.

Household 2007 summer average water use Means the amount of water used in the 2007 in summer months averaged between November and April per person and assuming a 3 person household. This means that the household 2007 summer average water use is 1560 litres per household per day.

Greywater re-use system A device that disperses greywater for outdoor irrigation purposes in a manner that does not endanger public health.

Non-potable uses Uses of water which do not require treatment to Ministry of Health drinking water standards. This includes outdoor uses and some indoor uses where there is no risk of this source being ingested such as toilet flushing. Non-potable water sources include untreated rainwater, greywater (water collected from laundry and bathroom, excluding toilets) and bore water.

Potable public water supply Potable public water supply refers to the treated public reticulated water supply provided by Council. This supply is treated to meet Ministry of Health Drinking Water standards.

Water saving devices Range of water demand management tools which reduce reliance on public potable water supply and ensure that household water use from potable public supply does not exceed 1,000 litres per day.

Assessment criteria

Assessment criteria are applied when an activity requires resource consent. They identify the matters that are of particular importance in assessing a consent application. They need to be written to support objectives and policies. Assessment criteria are often included as matters over which control or discretion is retained in rules for controlled or restricted discretionary activities. Note that the RMA (s.104C) sets out that "when considering an application for a resource consent for a restricted discretionary activity, a consent authority (a) must consider only those matters specified in the plan or proposed plan to which it has restricted the exercise of its discretion."

Scope

Pros: Assessment criteria help councils to consider how an application contributes to objectives and policies, and to find a balance between competing outcomes (e.g. protecting the neighbour's sunlight versus making energy efficiency gains).

Cons: Assessment criteria only take effect when an activity requires resource consent. Even then, councils may be limited in what they can consider by what is specified in the activity status rules.

Medium Density Housing

Because proposals for medium density housing generally require resource consent, there is greater scope to address the kinds of sustainability considerations identified in the HSS®. There are also inherent sustainability benefits in medium density typologies. As noted in the Auckland City District Plan, multi-storey buildings with shared walls and floors between dwellings minimise construction costs and contribute to energy efficiency and density. Other sustainability benefits of medium density housing are generated at the neighbourhood scale, particularly by achieving densities to support public transport and local shops and services, and by reducing pressures for cities to sprawl, allowing for the protection of other more environmentally sensitive land. These issues are outside the scope of this Resource Manual, which is focused on the house-level benchmarks of the HSS High Standard of Sustainability®. For more information, see publications from Beacon's neighbourhood research at **http://beaconpathway.co.nz/neighbourhoods.**

Example

Auckland City District Plan CBD Plan Change 1 (Victoria Quarter) Assessment Criteria 14.10.7.2.14

14. Sustainability

a) Buildings should be designed to be sustainable through the use of durable low maintenance materials, inert exterior cladding (avoiding the use of materials containing copper or zinc), maximising solar access and natural ventilation and the incorporation of mechanical and electrical systems that optimise energy efficiency.

b) Where appropriate, on-site landscaping should consist of indigenous vegetation.

c) On-site stormwater conservation measures should be incorporated where appropriate including rainwater harvesting devices, green roofs, site landscaping, rain gardens and wetland treatment systems and stormwater planter boxes (subject to soil contamination considerations).

d) Separate infrastructure reports should be submitted with resource consent applications assessing infrastructure effects of proposed developments.

e) Adequate storage space and containers must be provided for rubbish and recyclable material, in a location which is clearly visible within the site and easily accessible to occupants and collection vehicles.

f) Building and demolition should be undertaken in such a way that maximises the use of waste materials for re-use and recycling.

Subdivision controls — rules and assessment criteria

District plans can manage the effects of subdivision through objectives, policies and rules, usually organised into different zones to meet different general development objectives, and also through structure plans/concept plans that are developed to a greater level of detail for specific areas. The need to provide objectives and policies for subdivision has been addressed in the sections above. This section focuses on the rules, assessment criteria and structure plans (or similar diagrams) that can be applied to subdivision.

Subdivisions generally require resource consent (i.e. they are not permitted activities), so including sustainability considerations in the subdivision rules and assessment criteria can have an effect on most (if not all) subdivision applications. Subdivision provisions are often supported by council codes of practice, development manuals and subdivision design guidelines — these are addressed in Section 3. Development Standards and Guidelines.

Scope

Sustainability considerations at the point of subdivision include:

- Designing lots to preserve opportunities for passive solar gain for the future dwelling and its living court;
- Encouraging land use and transport efficiencies (largely outside the scope of the HSS High Standard of Sustainability® issues considered in this Resource Manual);
- Working with natural topography and infrastructure constraints to improve water efficiency and stormwater flows.

The potential to include sustainability considerations at the point of subdivision will depend on the nature of the site being subdivided. There should be more scope to incorporate provisions that allow for sustainable house design in major greenfields sites, where multiple parcels are created and there are fewer pre-existing constraints. What can be achieved on infill sites, creating additional lots in areas that are already developed, will tend to be more constrained by existing development and need to be assessed on a site-by-site basis.

The choice of how to include sustainable house considerations into subdivision provisions depends on the format and style of the district plan. Essentially, considerations are likely to be included in the matters of discretion, assessment criteria, or through linkages between criteria and design guidance.

> "The design stage of the land development process is the stage at which the greatest effect on energy efficiency and sustainability can be applied to land use, yet it often fails to do so. Access to the solar energy resource sets the upper limit of dwelling energy efficiency on a site: simply put, with no access to the sun there can be no harvesting of solar energy. Maximizing solar access is therefore an energy efficiency goal, as is a more detailed knowledge of when solar energy is desired, and when it is not."[34]

Sites oriented to optimise passive solar gain to subsequent dwellings

In greenfields subdivisions, orienting streets north-south and east-west ensures that sites and houses are better able to benefit from solar gain. Ambrose[35] suggests the optimal orientation of streets is as follows:

- Align streets east-west and north-south wherever possible.
- Aim for north-south streets within 20° west and 30° east of true north.
- Aim for east-west streets within 30° south and 20° north of true east.

34 Duncan (2007)
35 Ambrose (2008)

He argues that north-south streets are preferable. Among other reasons, they maximise solar gain on the long side of buildings. L-shaped living areas can ensure all homes get a sunny living area and outdoor living court regardless of what side of the street they live on. Sites on east-west streets need to be wider to allow for adequate solar gain.

Calvin[36] suggests that, on skewed roads (i.e. not running north-south or east-west), side boundaries could be oriented north-south or east-west (rather than running at right angles to the road boundary).

Examples

Waitakere City District Plan Rule 4 Greenfields Subdivision — Assessment Criteria

4(f) The extent to which site orientation and site dimension facilitates the siting and design of dwellings which can maximise use of passive solar energy.

Papakura District Plan, Appendix 16B Subdivision Design Assessment Criteria (Residential 8 Zone[37])

Design Element 2 Block Size and Lot Type

2. Blocks and lots should be designed to enable dwellings with good solar access.

Manukau City District Plan Variation No. 13 – Flatbush Assessment Criteria Restricted Discretionary Activities

17.10.15.1.1(c) Road Standards: Orientation

(i) Whether the subdivisional road and lot layout and dimensions optimises the orientation of the lots to the sun in terms of their likely future development.

Explanation/Reasons

The layout of subdivisional roads can affect the amount of sunlight received by adjoining lots. Where narrow lots are proposed it is preferable to orientate the streets generally in a north south alignment, to ensure that properties receive an appropriate amount of sun within their private living courts. A predominance of east-west orientated streets which are dominated by small lots will result in half of the properties effectively receiving no solar access to rear located private outdoor living areas. This situation would create pressure to erect high fences in the front yard of north facing lots to create privacy for individuals, but with the consequence of lowering street amenity and safety through a loss of informal surveillance.

A different approach to solar access

The NSW Sustainable Energy Development Authority has prepared a Solar Access for Lots Guide[38] which takes a different approach to ensuring solar access than the height in relation to boundary method most common in New Zealand. Solar access requirements are calculated within the subject site boundaries, rather than for neighbouring sites. The proposed site is assessed against minimum requirements for solar access at subdivision stage — to allow full solar access to the walls built parallel to the northern boundary between 10.30am and 1.30pm at midwinter. Different setbacks are required for different latitudes. The tool then determines:

- A Flexible Solar Access Zone (FSAZ) — the reserved part of the lot that may not be built on, thereby allowing solar access to glazing and private open space; and
- A Minimum Solar Access Zone (MSAZ) — the minimum area of the FSAZ that may not be built upon. The MSAZ can be moved to any place within the FSAZ at development application stage to accommodate a range of house footprints. Once the MSAZ and the dwelling are located at development application stage, the FSAZ is no longer applicable and can be built upon.

Dwellings cannot be built to the north, northwest or northeast of the specified area. Heights of buildings on sites to the north will determine the extent of solar access zones. See Figure 10 for an example.

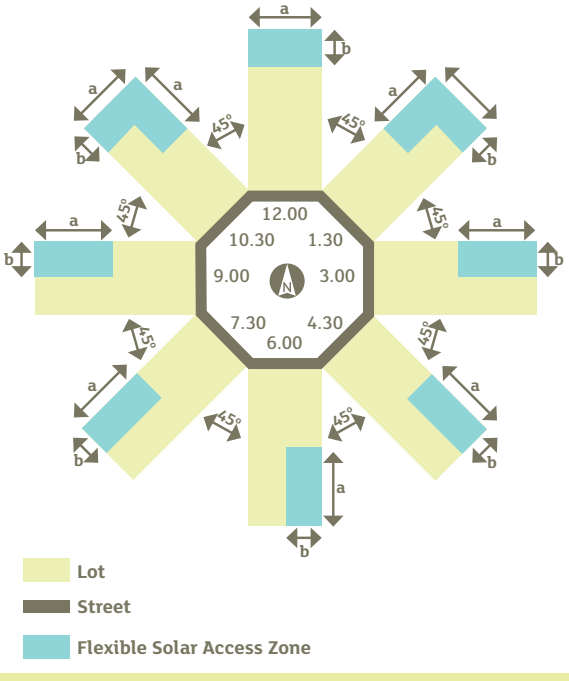

Figure 10: Solar Access Zones

36 Calvin (2007)
37 This zone applies to the Takanini Structure Plan Area
38 Sustainable Energy Development Authority (2005)

Sites designed for water efficiency

Water considerations at subdivision stage tend to focus on stormwater management, the details of which are outside the scope of this Resource Manual. However, stormwater considerations can have direct benefits for the efficient use of potable water. Requiring rainwater tanks will attenuate stormwater flows and can also be used for garden irrigation and toilet flushing.

Example

Kapiti Coast District Council includes water conservation in its District Plan subdivision rules, as follows:

D.1.1.2 Controlled Activities (iv) SUBDIVISION

The matters over which Council reserves control are:

- The design and layout of the subdivision including earthworks and the degree of compliance with the Kapiti Coast District Council Subdivision and Development Principles and Requirements 2005.
- The installation of water saving devices to land rezoned from rural to residential from 1 July 2002.

D.1.2.2 Controlled Activity Standards - Subdivision

(xvi) Water Conservation

Where subdivision occurs in the 'Waikanae Golf Residential Area'

- Public water supply be limited to a maximum of 1000 litres per property per day.
- Rain storage tanks shall be installed on each property for non-potable uses, such as for toilets and garden irrigation (minimum 3000 litres per household).

D1 Residential Zone Appendix 2

KCDC Ferndale Area Structure Plan and Notations

Additional Matters over which Council Reserves Control for Subdivision

(i) ...The provision of rainwater attenuation devices for stormwater storage, garden use and non-potable indoor use (toilets) e.g. rainwater tanks and dual plumbing.

3. Development standards and guidelines

Codes of practice

Usually based on New Zealand Standard NZS4404:2004, these manuals have several names, such as Code of Subdivision and Development Practice, Water and Wastewater Connection Standards, and Infrastructure Design Standards Manual. They define councils' engineering design and compliance requirements for their infrastructure assets such as: Geotechnical, Transportation, Stormwater, Water Supply, Wastewater, and Parks and Reserves. Engineering manuals give guidance on "how to build". They are not RMA or Building Act documents but rather local council infrastructure standards and can be changed by resolution of council. They are normally referred to in the district plan (e.g. the development must comply with the council engineering standards) but the standards themselves are not part of the plan.

Engineering manuals/standards lay out standards for council public infrastructure. Councils have the right to accept or deny infrastructure to be vested in them based on whether or not it meets the engineering manuals/ standards. As such, they can be very influential.

In some instances, adherence to codes of practice can result in less sustainable and efficient outcomes; for example, requiring highly finished driveways in rural areas, then requiring stormwater offsets to mitigate the increased runoff from the driveways. Codes of practice have not traditionally included alternative (more sustainable) options for infrastructure, although this is beginning to change. Introducing changes to the codes is procedurally quite straightforward, through a council decision; however, any changes need to be rigorously developed and specified, to ensure the results on the ground will be robust.

The New Zealand handbook, *Subdivision for People and the Environment*[41], identifies that "adherence to a set of traditional subdivision and engineering standards by local authorities is a barrier to those proposing alternative solutions... Before approval can be given to alternative designs and technologies, an assessment of the proposal's ability to meet health, maintenance and management responsibilities must be undertaken. This is made most difficult when there is a lack of accepted standards through which to assess alternative designs and technologies and offer an acceptable alternative code of practice."

Review of NZS4404

NZS4404:2004 [39] is currently under review, with a draft for discussion (DZ4404/V1.0) released in November 2009. Originally intended as a minor review, it quickly became apparent that a more detailed review was necessary to capture the new thinking in urban design that has emerged since 2004[40]. The content of the review includes ensuring road design addresses adjacent land uses and contributes to quality urban design, and improved stormwater management techniques. If accepted, these changes should be translated into local manuals over time.

DZ4404 extends the roading classification of NZS4404 to provide greater consideration of land uses. A matrix of land use (described as live and play, shop and trade, work and learn, make, grow and move) and area type (rural, suburban, urban, centre) suggests the likely transport needs. Road design standards are presented in the framework of this land use and area type matrix. A section on network connectivity identifies maximum walking distances from lots to a connector/collector road or arterial road.

In a significant change from NZS4404, DZ4404 describes low impact approaches to stormwater as "the preferred approach" with piped stormwater "nevertheless... often required either in support of low impact systems or as the primary system" (p.88). A range of low impact design devices are recognised, including detention ponds, rain gardens, rainwater tanks, detention tanks, vegetated swales, wetlands, attenuation devices and permeable pavements.

39 Standards New Zealand (2009)
40 Gawn (2009)
41 Standards New Zealand (2001)

Scope

Pros: A straightforward process to change the content of development standards. Can help drive councils' own practices in infrastructure renewal and extension as well as new development.

Cons: Standards are mostly applied to new development. Prescriptive nature requires detailed assessment before introducing new provisions within standards (or it may generate unintended consequences). There are few examples of standards for sustainable design to model from, although this is changing.

Examples

As part of its Environmental Sustainability Strategy[42], **Hamilton City Council** is reviewing its **Development Manual** to "expand the options to achieve development standards include a range of environmentally sustainable design and development mechanisms (e.g. swale technology, permeable surfaces and road widths)."

North Shore City Council's Infrastructure Design Standards include some provisions that provide explicitly for more sustainable stormwater infrastructure, some of which will allow for more efficient use of potable water. Section 4.6.3 addresses on-site stormwater mitigation, and states:

> The Council's preferred methods for on-site stormwater mitigation are those methods which provide multiple benefits. These include:
>
> 1) Rainwater harvesting using single or dual purpose rainwater tanks.
> 2) Bioretention using rain gardens, tree pits, stormwater planting and bioretention swales.
>
> Other methods of on-site mitigation include:
>
> 1) Permeable paving
> 2) Green roofs
> 3) Swales
> 4) Proprietary filtration devices
> 5) Oil and grease separators
> 6) Sand filters
> 7) Detention tanks

Design guidelines

Guidelines have a broader focus than codes of practice, setting out outcomes and methods that are considered desirable by council, for developers to draw from, but not requiring strict compliance. The level of specification is often more general than that of codes of practice. Current examples include guidelines for subdivisions, apartment and medium density housing design, as well as guidelines and practice notes for specific technologies and devices.

Guidelines and practice notes have no legal status unless they are made reference to through a district plan. A rule in the district plan can instruct developers to demonstrate that guidelines have been considered in determining design features of any particular site. Even then they have limited legal status, as it may be possible to meet the requirements of the district plan in different ways (other than what is specified in the design guideline).

Examples

North Shore City Council's Infrastructure Design Standards refer to **additional guidelines and practice notes** to provide support for implementing the standards, including:

1) Permeable Pavement Design Guidelines
2) Bioretention Guidelines
3) Raintank Guideline (covers water supply raintanks, detention tanks and dual purpose raintanks)
4) Long Bay Practice Notes

The **Long Bay Practice Notes** are of particular interest. As part of the development of Long Bay, North Shore City Council has issued supplementary Long Bay Practice Notes to its Infrastructure Design Standards. The practice notes demonstrate how developments can meet the requirements of the District Plan, and cover a number of sustainable technologies and designs, including:

- LB 102 - June 2006 - On-site Stormwater Mitigation
- LB 103 - June 2006 - Rainwater Harvesting
- LB 107 - June 2006 - Long Bay Water Supply System
- LB 108 - June 2006 - "Improved Traditional" Wastewater System
- LB 109 - June 2006 - Primary and Secondary Stormwater Systems
- LB 110 - June 2006 - Other Technologies
- LB 201 - June 2006 - Minimising Impervious Areas
- LB 203 - June 2006 - Permeable Paving
- LB 204 - June 2006 - Rain Gardens
- LB 205 - June 2006 - Swales and Filter
- LB 206 - June 2006 - Flow Dispersers
- LB 207 - June 2006 - Biofiltration Trench
- LB 208 - June 2006 - Greenroofs
- LB 209 - June 2006 - Worked Examples

Kapiti Coast District Council's Development Guide supports both traditional and alternative routes of infrastructure provision, with Minimum Engineering Requirements providing for a more prescriptive approach, and providing Design Guides as an alternative, less prescriptive method of achieving compliance with district plan requirements. KCDC has also prepared a **Best Practice Subdivision Design Guideline,**[43] to encourage developers "to look beyond the minumum standards and consent requirements of the District Plan to explore opportunities that deliver

42 Hamilton City Council (2008)
43 Kapiti Coast District Council (2008)

improved community environments — both now and into the future" (p.3). The document includes consideration of passive solar orientation and states that "resource consent and land use applications that exhibit quality design and careful consideration of the issues will be supported by the Council to ensure win-win outcomes" (p.3).

Street and Block Orientation: Design Elements (p.12)

- Maximise opportunities for sunlight access by:
  - Aligning roads north/south and lots east/west where possible.
  - Providing south facing lots with north facing backyards for outdoor living.
  - Ensuring sunlight access to roads, including the selection of appropriate trees to provide sunlight penetration through winter.

Auckland City Council's Residential Design Guide for Developments in Residential Zones in Specified Growth Areas (Appendix 10 of the Auckland City District Plan) is intended to provide guidance in assessing residential land use consent applications. It applies to intensive development proposals in specified growth areas, and is triggered by activity rules in the residential zones. The Guideline is concerned with urban design issues such as neighbourhood character, visual privacy, driveways and car parking, but it also includes specific objectives on energy efficiency:

Explanation
This element seeks to reduce energy consumption through dwelling design, orientation and layout, building techniques and the use of energy reducing technology. Dense developments close to shops, services and public transport, together with multi-storey construction where units have shared walls and floors make the most significant contribution to energy efficiency.

Objectives

- O1 To achieve density and energy efficiency through design and layout of multi-storey medium and high density developments.
- O2 To achieve energy efficient buildings and reduce energy costs.
- O3 To provide thermally comfortable environments.
- O4 To provide for a variety of uses and family structures.

Criteria

- C1 The design, orientation and layout of developments should encourage energy efficiency.
- C2 Development should take advantage of opportunities for natural ventilation, daylight admission and solar energy.
- C3 Developments should be designed and materials selected to reduce winter heat loss and make use of solar energy.
- C4 Developments should be designed to be flexible, to accommodate a variety of uses over time.
- C5 Developments should provide facilities for recycling of household waste as detailed in Element 11 Site Facilities.
- C6 Developments should be designed to contain materials that minimise resource use and consumption.

The Guideline then sets out a range of "good design suggestions" for energy efficiency, many of which align with the methods identified to achieve Beacon's HSS High Standard of Sustainability® — discussed in Part II. Outcomes.

North Shore City Council's Good Solutions Guide for Apartments identifies better design practice for apartments and medium density developments, including in the areas of energy and water efficiency, and the building envelope, for example (p.56):

Design the building envelope to ensure a healthy and comfortable environment inside the building:

- sufficient daylight access
- controllable natural ventilation
- insulating walls, floors and ceiling above minimum standards
- draught-proofing around external openings
- double-glazing external windows and doors
- providing an accessible connection for all residents to their private outdoor space

Increase the efficiency of the building and reduce lifecycle costs by:

- designing facades using environmental control elements such as sun shading, light shelves and bay windows that suit facade orientation
- using high mass elements to absorb solar gain during the day and release heat to internal spaces in the evening (elements must receive adequate direct sunlight)
- using green roofs to contribute positively to on-site storm water management and to maximise the amenity value of horizontal surface such as rooftops and podiums...
- using solar panels to harness solar heating for water heating or electricity generation
- choosing materials and colours that reflect or absorb radiant heat where required

4. Building Code administration

The Building Code has a significant influence on the sustainability of housing. Councils can't decide what's in the Building Code, but they can ensure that — as building consent authorities — their consent and inspection processes are streamlined, based on sound information and consistent practices.

There are two primary means for home builders and renovators to demonstrate compliance with the Code. These are either through demonstrating that their home meets the prescribed Acceptable Solutions within the Code, or by obtaining consent using an Alternative Solution. Alternative Solutions offer home builders who wish to build more sustainably using design innovations that are not presently covered within the current Acceptable Solutions, a method to do just that. However, any proposed Alternative Solution must still meet the Code's minimum performance standard to achieve compliance, and it is the onus of the home builder to demonstrate satisfactorily to the Building Consent Authority that the solution will indeed do that. This section of the Resource Manual therefore considers what scope there is for councils to assist home builders to more easily obtain consent, particularly via the alternative building solution route.

Barriers to sustainability

There are three principal barriers for councils looking to promote higher levels of residential sustainability in their jurisdiction as building consent authorities. The first of these is a regulatory barrier and relates to the limit on councils preventing them from requiring performance standards more stringent than those stipulated in the Building Code. As the Building Code prescribes only minimum standards, the overall building performance of a compliant house still falls short of what might be defined as a "more sustainable" house, meeting the HSS High Standard of Sustainability® performance standards.

The second barrier relates to the use of Alternative Solutions. Compared to Acceptable Solutions, they provide a less certain road to compliance they can lead to higher cost and risk for the home builder. Whilst providing an avenue for sustainable building innovation, proposals may be outside the experience of either the building consent authority, or a particular building consent officer, and are therefore likely to come under far greater scrutiny as well as requiring additional proofs supporting the proposed design solution. This makes it an option that is likely to be used only by those home builders who are deeply committed to employing sustainability within the household design and therefore willing to invest more to obtain consent.

The third potentially significant barrier relates to council process and particularly the tension that is often found between the consenting and strategic teams within councils. Whilst strategic teams may aspire to objectives beyond the scope of current practice, consenting teams are more aware of the need to operate within acceptable boundaries of risk. What may be required here is a reconsideration of council processes and how to best incorporate strategic direction into the functions and tasks of the consenting team within council.

Examples of sustainable technologies and approaches which can fall outside of the current Acceptable Solution framework:

- Dual reticulation with rainwater tanks providing for non-potable uses (in reticulated situations)
- Greywater re-use systems
- Atrium assisted ventilation (in apartments)
- Composting toilets
- Green roofs
- Stormwater tanks (to reduce rate of stormwater discharge)

Demonstrating compliance

Compliance documents provide the easiest route through the Building Consent process. Compliance documents correspond to the clauses of the Building Code, and contain at least one, and generally both, of:

- Acceptable Solutions (AS) — step-by-step building methods (for example, what insulation is needed to comply with energy efficiency requirements of the Building Code).
- Verification Methods (VM) — calculations or test (for example, the calculations necessary to show a building design complies with the structural requirements of the Building Code).

Under the Building Code, councils must issue a building consent where a building employs methods that are deemed to be Acceptable Solutions or Verification Methods. These solutions and methods are sometimes referred to as “cookbook” solutions because they prescribe a recipe for ensuring compliance.

Because designs based on compliance documents must be approved, they provide the cheapest and most hassle-free way for a building to achieve consent.

Alternative solutions differ from methods and materials specified in compliance documents, but must still demonstrate compliance with the Building Code. They provide an important avenue for testing new building technologies and methods. The greater the level of guidance that can be given to the home builder by both central and, in turn, local government regarding alternative solutions, the better, as it is a potentially critical method for achieving greater understanding and uptake of more sustainable building techniques, systems and products.

To date, Alternative Solutions have been accepted for entire projects or parts of a building and have included composting toilets, water supplies, effluent disposal, eco-houses and rammed-earth houses. Some previously "alternative" technologies have now been codified as Acceptable Solutions (e.g. for earth buildings and solar water heating systems). Both of these new solutions are intended to reduce the cost of compliance in using these technologies.

The Department of Building and Housing has released guidance on the *Means of establishing compliance: alternative solutions*[44] *(October 2008)*. This document offers guidance to applicants on the information they need to communicate when applying for building consents, and for building consent authorities in how to assess alternative solutions.

BC Number .....

Project .....

Name & Project Address .....

NELSON CITY COUNCIL

BUILDING CONSENT PROCESSING SHEET
SOLAR WATER HEATING (BAM 111)

Building Elements	Items to be checked	Checked	N/A	Comments Including Means of Verifying, Endorsements, Conditions and Requirements
Site Information	Property ownership / CT			
	Project value			
	Plumber name and registration number			
	Wind zone			
	Corrosion zone			
Drawn information	Site plan			
	Elevations			
	Location, orientation, inclination of collector			
Specifications	Testing certification to AS/NZS 2712			
	Leigonella protection			
	Relief valve(s)			
	Tempering valve			
	Support frame design – SED for v.high wind			
System specification	HWC location, size, valves, restraints, structural support			
	Collector size, weight, structural support			
	Frost protection			
Details	Collector connection to roof			
	Weathertightness of penetrations			

Signed:		Dated:	

Building consent may be issued.

Signed: Dated:

Figure 11: Processing sheet for solar water heating consent (Nelson City Council)

Examples

Solar Water Heating Consents, Nelson City Council
Nelson City Council has developed a streamlined building consent process for installation of solar water heaters. The information required for consent is summarised in a one-page checklist (see Figure 11, page 62 , for an example). The application form itself is only 4 pages long. The Council worked with installers to simplify a number of details (such as standardising fixings) and reduce the amount of paperwork needed to support a consent application. The result is an application that can be processed extremely quickly by one dedicated officer. This was an important step to support Nelson City Council's zero fees policy for solar water heating building consents and its Solar Saver Scheme (see discussion in Section 6. Economic Tools).

Auckland City Council has also developed simplified application for solar water heating, including example sheets that demonstrate to homeowners how to present the necessary information (see Figure 12 for an example).

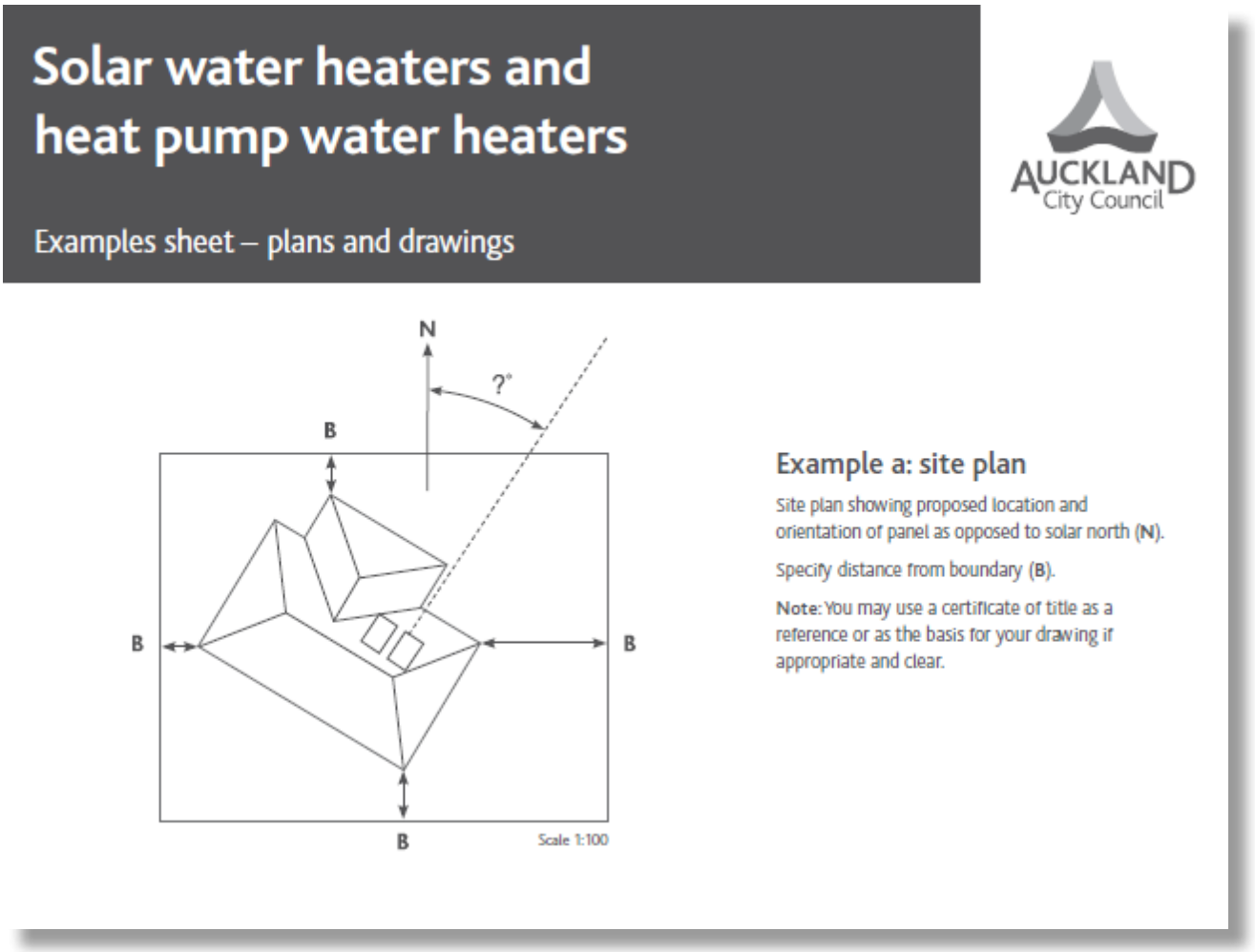

Figure 12: Examples sheet (Auckland City Council)

5. Bylaws

Local councils are empowered to make bylaws under a number of statutes, mainly to manage nuisance and public health and safety. Most relevant to sustainable homes are the powers under the Local Government Act 2002 and the Health Act 1956. This section concentrates on those provisions that could help to promote more sustainable homes.

Scope

There is scope to establish bylaws to address water and waste issues in particular, where council has a direct role in the provision of infrastructure and services.

Pros: The process for developing and introducing bylaws is relatively quick and straightforward. Bylaws offer opportunities to establish city-wide standards and practices that have a direct effect on household sustainability (for example, water metering and recycling).

Cons: Bylaws create an additional layer of regulation and enforcement, and should only be used where other methods are not appropriate. Bylaws cannot require buildings to achieve performance criteria additional to, or more restrictive than, those specified in the Building Act 2004, or Building Code.

Basis for action

The test for passing a bylaw that could contribute to more sustainable homes is twofold. Firstly, for a bylaw to be passed under section 145 of the Local Government Act, a territorial authority must demonstrate that the bylaw either:

- Protects the public from nuisance, or
- Protects, promotes or maintains public health and safety.

Secondly, under section 155 of the Local Government Act, the territorial authority must be able to demonstrate:

- Whether a bylaw is the most appropriate method for addressing the perceived problem
- Whether a bylaw is in the most appropriate form, and
- Whether it gives rise to any implications under the New Zealand Bill of Rights Act 1990.

Section 146(1) of the LGA sets out some specific issues that territorial authorities may make bylaws to address, including for the purposes:

(a) of regulating 1 or more of the following:
  (i) on-site wastewater disposal systems:
  (ii) waste management:
  (iii) trade wastes:
  (iv) solid wastes:

...

(b) of managing, regulating against, or protecting from, damage, misuse, or loss, or for preventing the use of, the land, structures, or infrastructure associated with 1 or more of the following:

...

  (ii) water supply:
  (iii) wastewater, drainage, and sanitation:

...

Section 64 of the Health Act sets out that local authorities may make bylaws for a range of matters, including:

(a) Improving, promoting, or protecting public health, and preventing or abating nuisances:

(b) Prescribing the minimum area of land on which a dwellinghouse may be erected in the district of the local authority or any specified part thereof:

(c) Prescribing the minimum air space adjacent to any dwellinghouse or to any specified class of dwellinghouse that shall be kept free of buildings or other structures; and generally for preventing the overcrowding of land with buildings:

(d) Prescribing for buildings a minimum frontage to a public or private street or road:

(g) Regulating drainage and the collection and disposal of sewage, and prescribing conditions to be observed in the construction of approved drains:

A significant constraint on the potential for bylaws relating to sustainable housing lies in section 152 of the LGA[45]:

(1) A council may not make a bylaw under this Act that purports to have the effect of requiring a building to achieve performance criteria additional to, or more restrictive than, those specified in the Building Act 2004 or the building code.

(2) For the purposes of this section, building, building code, and performance criteria have the meanings given to them by the Building Act 2004.

To meet the above tests, a council must be able to make the case that there is a direct nuisance or public health or safety implication through not regulating the activity, and also has to demonstrate why a bylaw is the most appropriate method for addressing the problem. Taken together, this may present a relatively high hurdle for the effective use of bylaws to promote sustainable housing.

Given the wording of the Act, it seems reasonably clear that bylaws relating to sustainability will be most likely to meet the two tests described above if they are directed at water and waste management issues that have a public health and safety consequence, and where regulatory prescriptions are focused on measures other than the performance criteria of buildings. The scope for bylaws that directly regulate the choices made when building or renovating a home remains untested and, on the basis of the legislation, does not look strong.

That isn't to say, however, that bylaws cannot have a strong influence over what happens within buildings. Bylaws that regulate a council's city- or district-wide activities can have direct effects on home occupants' behaviour and building choices. For example, setting volumetric charges for supply of water can encourage homeowners to install more water-efficient devices and appliances. Providing for collection of recyclable materials and green waste, and limiting the volume of general (unsorted) waste collection can encourage homeowners to separate and minimise their waste streams. If partnered with other initiatives such as education and economic incentives, bylaws can effectively support more sustainable choices within homes.

Examples of Implementation

New Zealand Standard Model NZS 9201.7: Part 7 Draft Model General Bylaws — Water Supply (2007) provides a widely used model for including a mechanism for demand management within councils' water bylaws. As part of the conditions of supply, the model bylaw separates water use into "ordinary" and "extraordinary", and states that it is under no obligation to provide for extraordinary use. There is provision for metering and charging for extraordinary use. However, as applied in many districts around New Zealand, the bylaw states that "an ordinary use of water shall not normally be metered" and provides only limited circumstances where a council may fit a meter — that is, where the council considers water use to be excessive, or at the customer's request.

This is a concern because it may discourage councils from installing meters as part of their general management of water supply. Beacon's research concludes that "there is substantial evidence of [meters'] effectiveness in reducing water use" and that "metering would be useful for all councils" to install[46]. Metering encourages residential efficiency and also helps to identify the scale of network leakage — usually a significant source of loss.

It is possible to build metering and charging into bylaws. For example:

- **Nelson City Council** uses its **Water Supply Bylaw** to set out metering and charging requirements for "both ordinary and extraordinary supplies of water". Section 16.1 states "the customer shall be liable to pay for the supply of water and related services in accordance with the Council's current schedule of rates and charges which will be reviewed, and set each year as part of the Council's Annual Plan Process."

45 A similar provision applies in section 65A of the Health Act 1956.
46 Lawton et al. (2008)

- **North Shore City Council** keeps its options open, stating "we may charge for ordinary and extraordinary supplies of water by either: (a) metering and charging ...; and/or (b) assessing rates in accordance with the Local Government (Rating) Act 2002" (North Shore City Bylaw 2000, section 18.5.3). (Note that water is currently metered and charged volumetrically.)
- **Auckland City Council** manages the details of its universal metering and volumetric charging through its Council Controlled Organisation, Metrowater. The Auckland City Water Supply Bylaw simply requires connection to a network supplier (the only network supplier in Auckland City being Metrowater).
- **Queenstown Lakes District Council's Water Supply Bylaw (s.7.13.2)** sets requirements for new developments:

7.13.2 Requirements for new developments

All new connections in any Water Supply Area shall meet the requirements of the Demand Management Plan for that Water Supply Area, including, but not limited to:

(a) installation of restrictors;
(b) installation of meters;
(c) installation of water efficient fixtures and appliances.

Draft Water Demand Management Plans have been prepared as part of the District's Water Demand Management Strategy, and are currently being consulted on.

Example

The Christchurch City Cleanfill Bylaw 2003 was created to promote resource recovery options such as re-use, recycling and recovery of materials over disposal (dumping at cleanfills). The bylaw required cleanfill operators to collect a differentiated waste minimisation fee (per cubic metre) on behalf of the council. In effect, this increased overall disposal costs and discouraged the dumping of recyclable materials. Site operators also started collecting waste flow information that was useful to the Council for waste planning purposes. This included location of source, type of activity generating the material, and volume of material.

A High Court judgement in 2007 determined the collection of disposal levies at waste sites to be an ultra vires activity. (The judgement related to Waitakere and North Shore bylaws as well as Christchurch's Licensed Waste Handling Facilities Bylaw.) The 2003 bylaw was subsequently replaced with the Christchurch City Council Cleanfill Licensing Bylaw 2008. This new bylaw does not impose a waste minimisation fee, but does require cleanfill operators to monitor the materials being disposed, and to pay an annual monitoring fee of $3,470 plus GST per site. Collection of this fee means there is funding for a fulltime staff member to closely monitor the sites and further encourage the level of recycling at cleanfill sites.

Ordinary and extraordinary use of water

Definitions vary slightly from council to council but, generally, ordinary use is for domestic purposes, including:

- Washing down a car, boat or similar
- Garden watering by hand
- Garden watering by a portable sprinkler (except when restrictions are in force)
- Household use for drinking, washing and laundry
- Use in a fire sprinkler system to NZS4517

Extraordinary use includes:

- Domestic spa or swimming pool in excess of $10m^3$ capacity, fixed garden irrigation systems
- Commercial and business, industrial, agricultural, or horticultural uses
- Fire protection systems other than sprinkler systems installed to comply with NZS 4517
- Out of district (supply to, or within another local authority)
- Temporary supply

6. Economic tools

Economic tools could be employed to encourage sustainable housing choices in a variety of different council operations. The options identified here are:

- Development contributions remissions
- Financial contributions remissions
- Fee reductions and waivers
- One-off grants and subsidies
- Loans
- Raising funds and co-funding

The development of economic tools is closely regulated by the Local Government Act. Incentives have to be able to demonstrate public benefit, such as reduced load on infrastructure. A transparent assessment of the distribution of benefits is important to ensure any economic provisions are robust and defensible.

To be effective, economic tools also need to be:

- Well publicised
- Easy to access
- Substantial
- Worth the effort for the developer/builder

Pros: The range of economic tools offers different solutions for councils' different needs. They can be applied for new construction and for retrofits of existing homes, and have been identified by homeowners as a preferred mechanism of council support[47]. Research for the Warm Homes Project[48] identified that publicly funded programmes can stimulate demand for new technologies, generate a flow of business activity, and also raise awareness in other households through associated programme promotions and word of mouth. As sustainable homes become more of a priority for communities (for example, due to increased public awareness and new regulatory requirements), it may become possible to introduce economic tools to address a wider range of issues.

Cons: To date, most economic incentives have had a low uptake rate. Many of the one-off grants and subsidies are available only to certain sectors (e.g. low income households), and are constrained in their focus (e.g. energy retrofits). Research for the Warm Homes Project suggests that "limited forms of incentive can't cater for a wide range of needs, and may increase public costs."[49] The cost of sustainable building can be high, and the level of funding available to incentivise sustainable choices may not be sufficient to act as a real incentive (as opposed to a reward for people who would have made the sustainable choice anyway). It may be difficult to provide an adequate evidence base to meet the legislative requirements needed to introduce more extensive economic tools.

47 Hall (2007)
48 Ministry for the Environment (2005)
49 Ministry for the Environment (2005) p.24

Scope

Based on the range of initiatives already in effect, the greatest scope for economic tools to promote sustainable housing would appear to be in the areas of water, energy and indoor environment quality.

Water

Councils have a direct role in providing water, and a responsibility to ensure services are efficient and sustainable. Water infrastructure and services can make up as much as 30% of a council's annual expenditure. Reducing household demand could generate significant financial savings for councils through a reduction in spend, and savings from deferring the need to invest in significant new capital projects.

Waitakere City Council's Water Demand Action Plan[50] models potential financial savings if the Council could reduce total domestic demand by 25% over a 20-year time horizon achieved, primarily through encouraging far greater use of rainwater tanks. This emphasis has been broadened in practice to focus on dual flush toilets and other water efficient technology.

Energy and indoor environment quality

Regional councils' responsibility for meeting the National Environmental Standards for Air Quality (NES) provides a strong basis for using economic tools to fund initiatives to upgrade home heating. The NES sets a limit of 50 micrograms of PM_{10} (fine particulate matter that is less than 10 microns in diameter) per cubic metre of air (averaged over 24 hours). Burning wood and coal for home heating is the main source of PM_{10} pollution in most urban areas in New Zealand. From 2013, regional councils will be unable to issue any more air discharge consents for airsheds where the NES is exceeded more than once a year. This could have significant economic effects for communities. Environment Canterbury, Nelson City Council, Otago Regional Council, and Environment Bay of Plenty have all responded to this risk by introducing economic incentive programmes to replace open fires and old wood burners with new efficient and clean home heating devices. This has consequential benefits for both energy use and indoor environment quality.

Note that in June 2009, the Environment Minister announced a review of the National Air Quality Standard, with particular focus on "whether the disallowing of industry consents is appropriate when industry contribute a small proportion of pollutants, whether the air quality standard has the right cost/benefit balance, and whether the 2013 timeline is reliable."[51] Depending on the direction taken, the results of the review may undermine the role of this standard as an incentive for sustainable building initiatives.

Basis for action

Section 101 of the LGA requires councils to manage their finances "prudently and in a manner that promotes the current and future interests of the community." Expenditure needs must be identified and provided for within the LTCCP. The primary factor that councils must consider is whether their spending on any given programme is a justified use of council funds. Section 101(3) states:

> 101(3) The funding needs of the local authority must be met from those sources that the local authority determines to be appropriate, following consideration of,—
>
> (a) in relation to each activity to be funded,—
>
> (i) the community outcomes to which the activity primarily contributes; and
>
> (ii) the distribution of benefits between the community as a whole, any identifiable part of the community, and individuals; and
>
> (iii) the period in or over which those benefits are expected to occur; and
>
> (iv) the extent to which the actions or inaction of particular individuals or a group contribute to the need to undertake the activity; and
>
> (v) the costs and benefits, including consequences for transparency and accountability, of funding the activity distinctly from other activities; and
>
> (b) the overall impact of any allocation of liability for revenue needs on the current and future social, economic, environmental, and cultural well-being of the community.

The reasons for offering an economic incentive (or remission) must be clearly stated and the justification must take into account the impact on individuals, council, and the community. While councils have a level of discretion when weighing up the public good of a sustainable initiative against the sectors of the community that are required to pay for it, it is important to link the initiative to the benefits it distributes.

The distribution of benefits between the community as a whole, any identifiable part of the community, and individuals (section 101(3)(a)(ii)) is a particularly important test when it comes to sustainable housing programmes. This is because many of the measurable benefits of sustainability initiatives often accrue to the individual as opposed to the community. For example, in the case of solar hot water heating

50 Waitakere City Council (2005)
51 Ministry for the Environment (2009)

it is relatively simple to measure the individual benefits of reduced water heating costs. Other benefits experienced by the wider community, such as reduced energy consumption and greenhouse gas emissions, conservation in energy production, transmission and consumption, can be considerably more difficult to measure.

In Neil Construction Ltd v North Shore City Council [2001][52], the High Court emphasised that councils must consider the five factors in section 101(3) when allocating costs between sectors of the community. The Court stated that s101(3) is a "critical filter" by which "funding sources in respect of each activity must be considered and determined". In addition, the Court held that councils must satisfy themselves as to the overall impact of each funding source determination on the four well-beings.

Barriers

de Blaauw and McGregor[53] identify three key impediments to implementing economic tools:

1) **Legislative barriers:** particularly in being able to adequately demonstrate the community-scale benefits of house-level activity or, in the case of development contributions, how the initiative mitigates the infrastructure requirements that councils must meet as a result of growth. de Blaauw and McGregor identified an inconsistent approach across incentives currently in place, with only limited consideration of section 101(3) and the legal and policy frameworks that should underpin economic tools.

2) **Acceptance barriers:** accepting that promoting sustainable housing is council business and should be funded by ratepayers, particularly where the initiatives are different from traditional council activities, and where some of the benefits go directly to the occupants of individual homes.[54]

3) **Lack of uptake:** Uptake has been low for some of the incentive schemes already in place (e.g. consent fee rebate schemes). De Blaauw and McGregor suggest two main factors in play: the threshold of the financial incentive is not high enough in monetary terms to be a real incentive and/or potential recipients are not aware of the incentive.

Responses

Councils can ensure greater uptake of economic tools by:

1) **Promoting them in ways that are meaningful to prospective applicants**

   Without promotion, potential consumers may be unaware of the existence and benefits of an economic incentive. The Environment Canterbury Clean Heat Programme is a good example where an increase in available information about the project, promotion and marketing led to demonstrable increase in the uptake of the incentive. Communicating in terms that are meaningful to homeowners is also important. For example, the Clean Heat Programme focused on the message that people would get warmer, more comfortable homes (and solve the air quality problem at the same time). Increased public awareness and acceptance led to a higher than anticipated level of uptake. Community leadership and enthusiasm was also an identified factor in encouraging uptake in relation to clean heat programmes in both Nelson and Canterbury.[55]

2) **Increasing the threshold of the incentive in monetary terms**

   Is the amount of money sufficient to act as an incentive, particularly in relation to the cost of the sustainability measure? For example, waiving consent fees for installation of solar hot water can be an important signal of a council's support for that choice, but is relatively minor compared to the actual cost of purchasing and installing such a system.

3) **Making them easy for applicants to access**

   The time it takes to apply for an economic incentive is another form of cost on the applicant. Eligibility criteria need to be clear and quickly understood, and paperwork kept to a minimum.

4) **Targeting the right market**

   Is the tool targeted at those households where it will really make a difference? Are the thresholds for eligibility set at the right level? Some programmes have lifted their eligibility criteria to include middle income households, who — with a little support — are more able to make the desired kinds of home improvements. There may be other examples where eligibility is better determined by location, or by house typology.

5) **Aligning local government incentives with central government incentives and frameworks**

   Offering incentives at a local level that leverage off central government initiatives can add strength to a sustainability initiative. Alignment will lead to greater national level consistency, thereby opening the opportunity to greater benefits on a wider scale. For example, Nelson City Council incorporates the $1,000 EECA subsidy into its "one-stop-shop" approach to solar water heating installation (described on p.78).

52 Neil Construction Ltd v North Shore City Council [2001] 3 NZLR 533
53 de Blaauw and McGregor (2008)
54 Gaudin and O'Connell (2007)
55 Ministry for the Environment (2005)

Development contributions remissions

Councils are empowered to require development contributions under section 198 of the LGA, when:

- A resource consent is granted under the RMA
- A building consent is granted under the Building Act
- An authorisation for a service connection is granted (that is, physical connection to services provided by, or on behalf of, a territorial authority)

The purpose of development contributions is to help recover some of the costs of growth associated with increasing the capacity of the city's or district's infrastructure. Development contributions are used to provide for reserves, network infrastructure and community infrastructure (section 199). This includes, for example, infrastructure for stormwater, community facilities, open space and transport.

The levying of a development contribution must be directly related to the growth of the community. This means that development contribution remissions require additional quantitative analysis over and above the qualitative justifications required under section 101(3) of the LGA.

Growth assumptions and sustainability

A development contributions policy must be prepared (under section 102(4)(d)), and must include (under section 201):

- An explanation of, and justification for, the way each development contribution is calculated
- The significant assumptions underlying the calculation of development contributions, including an estimate of the potential effects, if there is a significant level of uncertainty as to the scope and nature of the effects.

House-level sustainability initiatives, such as water metering and demand management programmes, can have a direct impact on how development contributions are calculated — reducing the projected load on infrastructure (as determined in WASSAs and LTCCPs) and therefore reducing the level of investment required. There is scope for further work to understand how changing assumptions about household demand for services could generate community-scale savings.

It is important to note that, while development contributions are levied on specific developments, the revenue from these is spread across infrastructure projects throughout the community, not solely in an isolated area. Where a remission on development contributions is offered for a sustainability initiative, the initiative itself must mitigate the need for additional council-provided infrastructure as a result of growth. Where the benefits of a sustainability initiative accrue primarily to an individual, as opposed to the community as a whole, this will not be sufficient to justify offering a development contribution remission.

Where the benefits of the sustainability initiative can be shown to mitigate the costs and effects of growth in the community, a remission may be justified. For example, Auckland City Council provides remissions on development contributions when a developer installs a rainwater tank on the property (see below for further discussion). In this case, the justification is that the rainwater tank reduces the demand on the council to provide stormwater infrastructure by reducing the discharge load on the public stormwater system.

Examples

Auckland City: Rebates for Rainwater Tanks

Auckland City Council's 2008 Development Contributions Policy (section 8.14.1) provides for rebates of development contributions for rainwater tanks, for purposes of water conservation and stormwater attenuation. Stormwater charges are set at $3,974 per Household Equivalent Unit (HEU). The policy offers partial remission of $1,000 for households with a rainwater tank. A 44-page *Manual for Development Contribution Rebate Programme for Rainwater Tanks (Stormwater)* sets out the rationale for rebates in greater detail, and interestingly places as much emphasis on re-use and conservation of water as it does on benefits to the stormwater network:

Re-Use:

- Encourages the wise/sustainable re-use of water resource
- Matches the conservation ethic promoted by Metrowater and Watercare
- Provides tank-owners with savings on Metrowater water and wastewater charges
- Assists, albeit only to a minor degree, in delaying the need for capacity increments in the Watercare water supply headworks system

Attenuation/Treatment:

- Matches the modern international stormwater management practice of achieving "at source" control
- Reduces the discharge load on the public stormwater system (i.e. important in areas where there are capacity issues with the City's existing system)
- The tank traps sediment which accumulates on the roof, thereby reducing the sediment/ contaminant loading on the receiving environment

Auckland City Council's 2009 Development Contributions Policy raises the stormwater development contribution to $4,533 (plus GST) per Household Equivalent Unit. In what could be a substantial incentive for multi-unit developments, it also includes explicit guidance that no stormwater development contributions will be assessed in respect of developments which can be demonstrated as having zero on-site impact on the public stormwater network:

> **8.2.5 Zero stormwater impacts**
>
> Where a development is shown to generate zero additional impact on the public stormwater network, even under extreme storm conditions, then no development contributions for stormwater will be assessed on that development.
>
> Where a developer requests a special assessment ... on this basis, that request must also identify a suitable mechanism for ensuring that the impact will remain at zero in perpetuity.

Council's evaluation of the proposal[56] suggests that this situation could arise where:

- Existing non-residential buildings are being converted to residential, creating no additional impervious surface area, or
- There is complete on-site mitigation or drainage to sea and the developer can demonstrate that the increase in impervious surface area on the site will not result in any additional stormwater run-off entering the public stormwater network, even during significant storm events.

Waitakere City: Remissions under Tool for Urban Sustainability Code of Practice

Waitakere City Council, in conjunction with the Sustainable Management Fund, has developed the Tool for Urban Sustainability Code of Practice (TUSC). This web-based rating system[57] measures the extent to which a new building or other development, whether greenfields or infill, minimises demand on infrastructure.

The tool recognises sustainability features such as recycled water, rainwater tanks, water saving showerheads and taps, planting of native trees and shrubs landscaping, increased site density to promote sustainable development and transport demand management, heat pumps or solar water heaters, gas space heaters, roof eaves, awnings, and wall and ceiling insulation.

Where applicants can demonstrate an improvement in their rating, compared against the rating of a "standard" 2005 HEU, they can seek a development contributions remission of up to $2,000 (see Table 10).

TUSC RATING IMPROVEMENT	REMISSION PER HEU
10%	$500
20%	$1,000
30%	$1,500
40%	$2,000

Table 10: Development Contributions Remissions under TUSC

56 Auckland City Council (2008)
57 Available at http://www.tusc.org.nz

Financial contributions remissions

Section 108 of the RMA enables councils to collect financial contributions from developers to avoid, remedy or mitigate the adverse environmental effects of a development. Expenditure of financial contributions can only be done within the purposes for which they were collected. For example, contributions may be made to provide funds to protect or restore water quality, to contribute land for the purpose of mitigating the adverse effects of land use activities or discharges on water quality, to provide measures to mitigate or remedy the adverse effects of discharges of stormwater and associated contaminants, or to undertake investigations of historic sites.

Remissions on financial contributions, or a waiver of the requirement for financial contributions, will only be justified where the sustainability initiative mitigates the adverse environmental effects of the particular development.

Financial contributions are more limited in scope than the development contributions, and can be harder to administer. For example, financial contributions need to demonstrate an environmental effect, whilst development contributions can more proactively plan and fund infrastructure provision. Financial contributions are subject to appeal in the Environment Court, whereas development contributions can only be challenged on points of law in the High Court.[58] As more councils move to replace their financial contributions provisions with a development contributions policy, innovation with this economic tool to promote more sustainable homes is not expected.

Example

Rodney District Council has levied financial contributions under its District Plan (note that these provisions have been replaced with a Development Contributions Policy under the Rodney District LTCCP 2009-19). The financial contributions provisions included an allowance for the reduction of money contributions payable for water supply where on-site measures mean there will be a lower than normal water supply required, and similarly for stormwater where there will be a lesser volume of discharge.

Rodney District Plan Rule 22.11.5.1

Reduction Criteria

The Council shall give consideration to whether a reduction of a financial contribution is appropriate and may charge less than the maximum amount determined in accordance with Rules 22.11.2 and 22.11.3. In considering whether to reduce the financial contribution and the amount of such a reduction, the Council will use the following criteria:

(a) The likelihood that the activity will not require to be connected at any stage to the public water supply system and will have no adverse effect on that system.

(b) The extent to which the scale or nature of the activity, or measures to be taken on the site, will result in a smaller quantity of water supply being required per unit than that normally associated with a "household unit" or "household unit equivalent" as the case may be.

(c) The extent to which changes in the activity carried out on "site" may occur without the need for a further resource consent.

(d) Any other particular circumstances in relation to the proposed subdivision and/or development which the Council considers a fair and reasonable justification for a reduction.

Pricing and charging regimes

Councils can recover the costs of providing services to households through fees and charges. These fees and charges can be set in ways that encourage more sustainable homes, particularly as it relates to waste collection and water supply.

Pricing of waste collection (e.g. charging for refuse bags) can encourage greater sorting of waste and recycling. Volumetric charging for water (via metering) raises awareness of water use and the value of water with customers. Beacon has identified metering as a top priority for implementing demand management programmes within councils.[59] Whether or not a pricing regime is introduced, metering enables the total domestic supply to be measured and unaccounted for water (i.e., leaks in the system) to be identified.

Any pricing regime needs to be developed so as to ensure equitable supply, ensuring everyone's essential water needs can be met. Similarly, charging for waste collection needs to be partnered with other initiatives, such as recycling collections and community education, to minimise the risks of illegal dumping.

Over recent times in some parts of New Zealand there has been a degree of community resistance to introducing water metering which some lobby groups fear is a step towards the privatisation of public services. One of the counter-arguments is that, by not managing water efficiently, the service is under more threat of corporatisation. A careful and comprehensive engagement programme, allowing the community to be fully involved in discussing the arguments, is essential.

Examples

- **Nelson City Council** has had water metering in place since July 1999. The maximum two day average water use has dropped from 42,000m^3/day in 1997/98, down to less than 35,000m^3/day.[60] Water savings have been achieved over 37% at peak summer times. Reducing the summer time peak demand was a key imperative for Nelson City Council: failure to implement a water reduction measure would require 100% extra capacity to allow for summer peak use, which is only approximately 10% of the year.[61]
- **Kapiti Coast District Council** has identified that introducing water meters "would not add new capacity to the overall [water supply] system but would release existing capacity as peak demand falls." They estimate that installing water meters and charging would provide sufficient capacity for 20 years and possibly 30 years, dependent on population growth and consumption figures.[62]
- **Tauranga City Council** has achieved water demand savings of 25% since introducing meters in 1999.

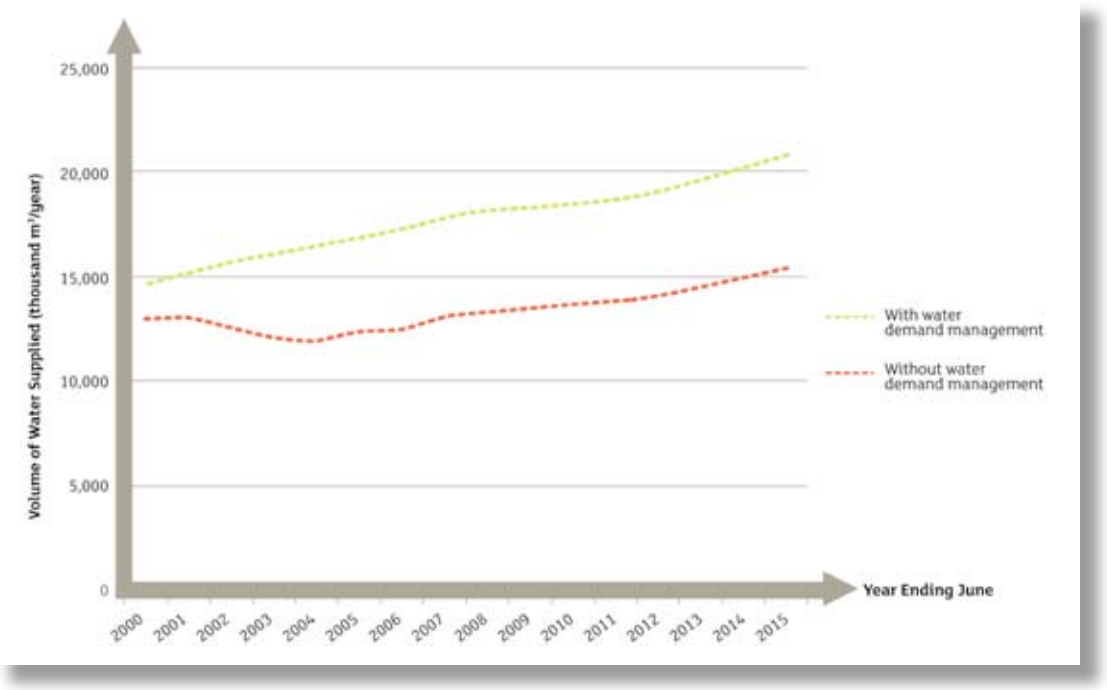

Figure 13: Comparison of volume of water required by Tauranga City, with and without water demand management strategies (actual and projected to 2015)[61]

59 Lawton et al. (2008)
60 Nelson City Council (2006)
61 Lawton et al. (2008)
62 Kapiti Coast District Council (2007)

The Canterbury Clean Heat Programme

Environment Canterbury's Clean Heat Programme is a good example of councils using economic tools to promote sustainable housing in New Zealand. The programme offers a mixture of subsidies and interest free loans, and is funded through a targeted rate. These types of economic tools are discussed in the following sections of this Resource Manual. To avoid repetition in the examples sections, the basic information about the Programme is introduced first, here.

The Clean Heat Programme was introduced by Environment Canterbury in 2003 as a method to help address the air pollution problems in Christchurch, and, latterly, to help achieve the National Environmental Standards for Air Quality (NES). Under the current NES, from 2013, regional councils will be unable to issue any more air discharge consents for airsheds where the NES is exceeded more than once a year. Currently, Christchurch has an average of 25-30 exceedences per year, with 80% of winter air pollution coming from open fires and wood or coal burners. The scheme now covers Christchurch, Kaiapoi, Rangiora, Timaru and Ashburton.

The Clean Heat Programme has been designed to encourage people to make changes to their home heating before regulation makes it necessary. Targeting 26,464 homes over 10 years, the Programme offers different levels of funding for insulation and heating for homes where an open fire or solid fuel burner installed before 1 January 2004 is used as the main form of heating in the main living area. For example, financial options in the Christchurch area are[63]:

- Full assistance available to owner-occupiers living in the Christchurch Clean Air Zone 1 or 2 who qualify for a Christchurch City Council rates rebate (assessed on income levels).
- Substantial assistance for homeowners who hold a Community Services Card (homeowner pays up to $1,000).
- Partial funding as a subsidy for homeowners and landlords. The subsidy includes (GST inclusive):
  - 33% of the cost of ceiling and underfloor insulation to bring a home up to Building Code standards.
  - $500 towards a Clean Heat Programme approved appliance such as an electric heat pump, pellet fire, fully enclosed fixed-flued liquid fuel or gas appliance, or ultra low emission solid fuel burner.
  - $100 towards the sealing or removal of an existing fireplace or ultra-low emission solid fuel appliance.
- Partial funding as an interest-free loan to cover the full cost of converting to cleaner heating, up to $5,200 (incl. GST). Costs are paid by the local council, then set as a targeted rate on the property for ten years (repaying 10% of the capital each year). The council pays the interest on the loan. If the home is sold, the vendor repays the loan in full to the council.

The Clean Heat Programme is funded through a **targeted rate** on Christchurch ratepayers.

As identified by the Ministry for the Environment[64], the "scheme has been able to be sustained largely by ratepayer contributions because:

- The ratepayer base is being used to fund less than 40% of households (i.e., the costs can be spread to a wider population)
- The scheme was intended to run for a 10 year period, allowing costs to be spread over time."

Pros: The Clean Heat Programme is connected to a clear community-wide benefit – better air quality with the associated health benefits, and the ability for the region to continue to develop and operate economic activities. This makes it easier to justify striking a targeted rate across all ratepayers.

Cons: The focus of the Clean Heat Programme is on air quality, which does make for some inequities in the provision of funding. Only homeowners replacing open fires or old woodburners are fully or partially subsidised, whilst people with cold, unhealthy homes heated by other means (e.g. unflued gas heaters) receive no funding support through the Clean Heat Programme. Of course, these households may be eligible for other subsidies, for example, under the EECA Warm Up New Zealand: Heat Smart scheme for insulation and efficient heating sources.

For the latest information on the Clean Heat Programme, visit www.cleanheat.org.nz.

63 Environment Canterbury (2009)
64 Ministry for the Environment (2005)

Fee reductions and waivers

For relatively low cost, councils can waive or reduce the consenting fees associated with building and retrofitting more sustainable homes. At least six councils offer waivers or reductions on fees for consents required to install solar water heating (Carterton District, Hamilton City, Nelson City, South Waikato District, Waitakere City, and Westland District Councils).

Fee waivers have had a low uptake to date, and on their own are not a sufficient incentive to generate sustainable technology choices. After all, the cost of consent is low compared to the overall cost of purchasing and installing a solar water heater or rainwater tank. (Anecdotal feedback suggests that the building consent process for solar hot water systems has been made more onerous by many councils, and this has offset any benefit that a fee waiver gives.)

There may, however, be a secondary benefit of communicating the message to potential applicants that council is supportive of such efforts, and that obtaining consent will not be a significant hurdle.

Examples

In 2008, **South Waikato District Council** waived its $160 building consent fee for solar hot water installations. The report to Council[65] identified a number of benefits, including:

- Supporting council's Local Action Plan that addresses the Community's Greenhouse Emissions
- Improving the social and economic well-being of the community
- Working with EECA to promote EECA's interest-free loan for solar water heaters
- Being a leader in the area of encouraging community energy efficiency within Local Government

Waitakere City Council waives fees for solar water heating as part of implementing its Waitakere Action Plan on Climate Change and Energy. It reallocated unused consent fee waiver money to fund prizes of solar water heating and rebates on installation costs. Waitakere City Council also funds the cost of building consents for plumbing rainwater tanks into household water supply systems. This is consistent with the Council's proposals for meeting current and future demand, as set out in the City's Water and Sanitary Services Assessment (discussed on page 41 above).

At the same time as waiving the fees for solar water heating, **Nelson City Council** streamlined the consent processing – meaning the cost implications of a zero fee consent are much less significant for the Council. (see Section 4. Building Code Administration)

65 South Waikato District Council (2008)

One-off grants and subsidies

Councils can offer one-off grants and subsidies to support specific actions, such as installing insulation or rainwater tanks. These can be limited by some eligibility criteria, or by a maximum number per year. As noted on page 67 above, the value of the grant is an important factor in uptake, as is the level of community awareness and the ease of applying.

Examples

In order to encourage installation of rainwater tanks in urban areas, **Waitakere City Council's** EcoWater division offers cash rebates on the purchase of tanks, as follows in Table 11.

Tank size:	4,500L or larger	3,000L or larger	2,000L or larger
Rebate value:	$500	$300	$200
Maximum number of rebates per annum:	50	30	20

Table 11: Rebates for rainwater tanks

The subsidy applies where the tank is used for supplying water to the laundry and/or toilet and watering the garden, is not the primary water supply, and is not a condition of building or resource consent. That is, it does not apply to rural properties where a rainwater tank is needed as the primary water supply, or to new developments where a stormwater connection is not readily available — i.e. where a rain tank is the only sensible method of disposing of rainwater and allows a building or resource consent to be granted. Preference is given to installations that are being retrofitted to existing houses and also to problem catchments where the tanks will be of benefit from reducing stormwater runoff.[66] A building consent fee waiver is also offered.

Rodney District Council runs a similar scheme, for the first 20 applications for tanks of a minimum size of 4,500L per year, with a rebate of $500 against the cost of the tank and up to $500 for associated consent costs (i.e. a total maximum of $1,000). Note that Rodney District's subsidy is for larger tanks only, whereas the more urbanised Waitakere City provides for smaller tanks appropriate to smaller sites.

A number of programmes involve councils and district health boards, working together to retrofit homes to be warmer and healthier. As well as the Canterbury Clean Heat Programme (discussed on page 74) and the Nelson Clean Heat Programme, other examples include the Snug Homes and Warm'n'Well programmes (see Table 12).

The **EECA Warm Up New Zealand: Heat Smart** scheme, launched in 2009, provides one-off funding for all homes built prior to 2000, to subsidise the cost of improving insulation and home heating. Many of the local programmes have worked in with the EECA scheme, and help homeowners to access the central government funding.

EECA also provides a $1,000 **Solar Water Heating Grant**. Nelson City Council has incorporated this into its Solar Saver Scheme (see page 78).

66 Waitakere City Council (no date)

PROGRAMME	PARTNERS	PROVIDES	ELIGIBILITY
Snug Homes (Auckland and Counties Manukau)	EECA, the ASB Community Trust, Auckland City Council, Manukau City Council, Papakura District Council, Starship Foundation, ProCare Network Auckland, Auckland District Health Board, and Counties Manukau District Health Board	Complete health and social assessment at home. Where possible, full insulation retrofit including ceiling and under-floor heating, hot water cylinder wraps, draught proofing of doors and provision of energy efficient light bulbs	Own or privately rent home built pre-1 January 2000, in Auckland, Counties Manukau, Papakura, or Franklin area Eligible for a Community Services Card Priority given to applicants if they have children (under 14), or seniors (over 65) years of age with respiratory problems living in their home
Warm'n'Well	Waitemata District Health Board, EECA, Tihi Ora Ma Po, North Shore City Council, Waitakere City Council, Rodney District Council, Auckland Regional Public Health Service, Eco Charitable Trust, Wai Health.	Free home visit from registered nurse. As needed: free ceiling insulation, under-floor insulation, hot water cylinder cover, draught seals around some doors, and energy efficient light bulbs	Own or privately rent home built pre-1 January 2000, in West Auckland, North Shore or Rodney Child aged 14 years or under living in home Eligible for a Community Services Card

Table 12: Partner programmes for sustainable housing

Loans

Scoping undertaken for the Ministry for the Environment's Warm Homes Programme[67] suggests that time payments and loans are an underdeveloped method for promoting change. Compared to one-off financial incentives such as grants, they offer the potential to:

- Provide greater coverage in the market and cater for households where the current system of grants may not be suitable (e.g. limits to Community Services Card holders)
- Go beyond the basic package of energy-efficient heating initiatives being offered at present to include higher-priced options such as double glazing (which would be effective and attractive to many households)
- Reduce the overall call on public money (or increase the total number of households benefiting from the same level of public expenditure).

"An appropriate loan scheme could reduce the social cost (e.g. government interest rates rather than private sector rates), and would have low compliance costs (e.g. security through a targeted rate on properties with a loan)."[68]

Several councils have now introduced targeted rates schemes to support central government's Warm Up New Zealand: Heat Smart scheme, as well as their own local air quality schemes. Arranged as a targeted rate, homeowners receive a sum of money to finance home heating and insulation improvements, and then repay that as a part of their rates bill for a period of up to ten years. This approach provides additional funding support to homeowners who may be interested in taking up the central government offer to part-fund improved home heating and insulation, but lack the liquidity to cover the balance of installation costs.

No equivalent examples of targeted rates have been identified in the other key performance areas of water, waste or materials. A case could be made for similar initiatives to support water efficiency, with installation of rain tanks, greywater systems and water efficient devices and appliances.

67 Ministry for the Environment (2005) p.24
68 Ministry for the Environment (2005) p.24

Examples

The Canterbury Clean Heat Programme and the Nelson Clean Heat Programme "Pay as you Heat" Scheme offer homeowners who are required to replace their open fireplace or old burner a loan of up to $4,999 (Nelson) and $5,200 (Canterbury) to be repaid via rates over a period of ten years, interest free.

Greater Wellington Region offers a loan of an additional $2,600 for ratepayers making use of the Warm Up New Zealand: Heat Smart scheme, up to a total of $3 million per annum (financing up to 1,150 households). Once contracts are signed, the payment is made direct from Greater Wellington to EECA or the service provider. The loan is to be repaid as a targeted rate over ten years.

Nelson City's Solar Saver Scheme As part of its Solar City Initiative, in 2009, Nelson City introduced an innovative scheme to support the installation of solar water heaters on residential dwellings. A feasibility study suggested some of the main barriers to residential solar water heating are the cost, long payback periods, and lack of subsidies. Another challenge was the difficulty of independently comparing products[69].

In response, Solar Saver is offered as a complete package, administered through the Council. The scheme's objectives include reducing per unit costs, ensuring systems installed are high quality and perform well, simplifying the selection and installation process for customers, and keeping administration costs low.

Homeowners must select a system from one of four approved suppliers, with whom Council has negotiated a discounted price. The Council and supplier then arrange the finance (including the EECA subsidy for solar water heaters), building consent and installation. The Council has anticipated providing loans for up to 1,700 solar hot water installations between 2009/10 and 2012/13, with a budget of up to $9.01 million. The Council has also waived building consent fees (see Section 4. Building Code Administration).

The cost of the system's purchase and installation is paid by Council and then applied as a targeted rate to the home, for a period of 10 years, at a fixed interest rate of 7.8% per annum. Depending on rates of hot water use in the home, it is expected that Solar Saver scheme participants will make savings to cover the cost of the system within six to ten years[70].

The loan includes payment of a fee of $300, to cover Council's administration costs. In introducing the scheme, the LTCCP identified a risk of low uptake meaning that the administration costs would not be fully covered. Fortunately, uptake of the scheme has been very popular, with many more applications than anticipated, so that a ballot was necessary to decide who would receive a loan in the first year.

Raising funds

Supporting sustainable home initiatives can cost a lot of money, and the benefits of programmes are not always evenly shared across the ratepayer base. Three options to source funding are targeted rates, co-funding with other organisations, and the new Waste Minimisation Levy.

Targeted rates

The Local Government Act (section 16) enables councils to set "targeted rates", either uniformly across all rateable land or differentially for different categories of rateable land user.

Targeted rates can be used to raise funds across the community for specific activities. For example, the Canterbury Clean Heat Programme has been estimated to cost ratepayers $51 million throughout its term. The money is being raised through a targeted rate on ratepayers (rates vary by district). The targeted rate is being raised during a 10-year period to make it more affordable for ratepayers, but the programme itself will run for only four more years, from 2009/2010 to 2013/2014.

Some concerns were identified at the outset of the programme, around inequities of all ratepayers subsidising a small number of households to improve their heating technologies. Environment Canterbury argued that a targeted rate is the price the community must pay to achieve a healthy air quality and — because the whole community benefits — every household must make a contribution.

As discussed in the section on Loans (above), targeted rates can also be used for single houses, providing a loan to be repaid through a targeted rate set for that house over a fixed period of time.

Pros: Establishes a clear link between council policy, funding mechanism and implementation. Rate can be targeted by area within the district or by services provided. Targeted rates set on individual properties can also be used as a form of loan repayment scheme.

Cons: Difficult to impose further rating burden on ratepayers.

69 Nelson City Council (2009a) p.96
70 Nelson City Council (2009b)

Co-funding

There is potential for councils to co-fund initiatives with other relevant parties, at local and national levels.[71] This can be a good way of piloting programmes, encouraging uptake across sectors, and spreading risk. As with any partnership, however, the scope of such programmes can be limited by other organisations' priorities and constraints.

Examples

Kapiti Coast District Council reports in its 2009–2019 LTCCP that central government funding is an important component of its sustainability activities (p.115). In the 2008/9 year, it received $230,000 in grants as well as access to low interest loans for energy projects.

Good examples of co-funding initiatives are:

- EECA's Warm Up New Zealand: Heat Smart subsidies
- Partnerships with District Health Boards and community organisations to promote healthy homes
- The Eco Design Advisor positions — in their pilot phase, a partnership between councils and BRANZ, supported by the Building Levy, the Ministry for the Environment's Sustainable Management Fund, and EECA.

Waste Minimisation Fund

The Waste Minimisation Act sets a waste levy of $10 per tonne. This goes into a Waste Minimisation Fund, half of which will be directed to councils. Under section 32 of the Act, councils may spend this money "on matters to promote or achieve waste minimisation." Spending must be in accordance with the council's Waste Management and Minimisation Plan. The remainder of the levy goes into a contestable fund.

Other possibilities (not yet in practice)

Rates remissions

The Local Government (Rating) Act 2002 provides that "a local authority may remit all or part of the rates on a rating unit ... if (a) the local authority has adopted a rates remission policy under section 109 of the LGA; and (b) the local authority is satisfied that the conditions and criteria in the policy are met."

Rates remissions policies must set out the objectives sought to be achieved by the remission of rates, and the conditions and criteria to be met in order for rates to be remitted. Councils must use the special consultative procedure to adopt a rates remission policy. It may be adopted as part of the council's LTCCP.

Rates remission policies already exist for a range of circumstances, including for properties used for community benefit and to protect heritage and natural features. Napier City Council has an Economic Development rates remission policy to support new businesses. Wellington City is proposing to remit the Downtown Levy Targeted Rate for property under development, as this property does not derive benefits from contributing to the targeted rate.

There may be potential to remit rates for properties that perform more sustainably, for example in terms of their stormwater runoff. Rates remission could offer an ongoing incentive for homeowners to maintain the sustainability of their properties and recognise the continued savings to council infrastructure, particularly in areas where there is a specific ongoing resource constraint or environmental problem. This ongoing recognition is something that one-off grants and subsidies cannot provide.

Introduction of such a policy would require careful preparation to ensure equity and transparency for other ratepayers. Successful introduction would also be likely to require public awareness of the issues such a policy was seeking to address and support for community-scale action. Uptake of rates remissions has been low to date, but could be improved through better promotion and simplification of the application process.

71 de Blaauw and McGregor (2008)

Rates postponement: EECA and the Rates Postponement Consortium Initiative

The cost of retrofits can be prohibitive for some homeowners. EECA and the Rates Postponement Consortium have developed a variation of the rates postponement schemes already run by councils, with the intention of applying it to home energy efficiency upgrades.[72] This would enable ratepayers to borrow the capital cost of their retrofits from their council, as a targeted rate; then defer the repayment (potentially until they sell the home or die). The council could legally recover the costs involved in administering the process and incorporate it in the sum of the targeted rate.

Because of councils' longevity and ability to acquire capital at favourable interest rates, they are in a good position to administer ratepayer loans schemes for housing sustainability upgrades. Such a scheme would allow homeowners to pay for sustainability improvements by drawing down some of the equity in their homes. Postponed rates are a first charge on the property ahead of all other charges, provided that the council registers a statutory land charge — a simple and low-cost process.Rates postponement is usually applied to help older homeowners who are asset-rich but cash-poor, and the period of postponement (before ownership of the property is transferred) is relatively short. Broadening rates postponement to younger homeowners means that there is a slightly higher risk to council — the period until repayment could be much longer than is usually the case with older ratepayers. However, given that the cost of EECA retrofits is a relatively low one-off cost, this is a reasonably small risk.

The Rates Postponement Consortium has developed a number of protocols to support older people who wish to postpone their rates indefinitely, and these could be applied to this scheme in much the same way. These protocols include:

- An independent counselling service to help people consider the implications of rates postponement for themselves and their families
- A detailed financial forecasting model to work through different scenarios
- Protocols with major lender groups for managing the relationship between postponed rates and mortgages.

72 The information in this section is sourced from Waitakere City Council (2008)

Legal advice to the Rates Postponement Consortium suggests the following process for implementing a rates postponement scheme for retrofits:

Year 1:

- The ratepayer contracts for the provision of energy efficiency services in terms of the EECA programme and applies to the council for inclusion within the targeted rates/rates postponement facility.
- Payment for the services is funded by a temporary advance from the council carrying interest at the council's marginal cost of borrowing.

  The advance can be unsecured — there is no risk to the council as this arrangement is part of a package deal under which the balance due to the council ends up being secured as a postponed rate.

  The ratepayer's application to the council covers both the temporary advance, and the application for postponement of the targeted rate, once that has been struck.

Year 2:

- The council levies a targeted rate on all of those properties which, in year one, benefited from a council advance to meet the cost of services within the EECA programme. The targeted rate is set as a standard amount calculated to ensure that it will be adequate to cover the cost of the most expensive individual package likely to be taken out under the programme.
- The difference between the amount of the targeted rate, and the temporary advance plus interest to the previous 30th of June, is remitted under a rates remittance policy adopted for the purpose.
- The ratepayer is granted rates postponement for the amount of the targeted rate less the remittance.

Four policies need to be adopted within LTCCPs to support this approach:

- A policy on supporting EECA in delivering residential energy efficiency services which sets out the council's commitment to funding the initial cost through an unsecured advance, including conditions of eligibility (e.g. age), and in terms of the advance — that the ratepayer has signed an application which covers not just the advance itself, but the targeted rate/rates postponement components as well.
- A targeted rate as a fixed amount to cover the repayment to the council of unsecured advances made for the purchase of residential energy efficiency services.
- A rates postponement policy under which that targeted rate will automatically be postponed.
- A rates remission policy to remit the difference between the amount of the targeted rate and the amount of the unsecured advance together with interest from the date of the advance to the 30th of June in the financial year the advance was made.

7. Community education

An increasing number of community education programmes are operating around the country, focused on providing sustainability education to households. The effectiveness of such programmes is varied, depending on the depth and breadth of their reach. For example, Eco Design Advisors can make a great deal of difference on a home-by-home basis. Information leaflets and product displays may be seen by a much wider audience but have less impact. This section gives a selection of examples where council is the lead agency, including:

Advisory services

Eco Design Advisors have been employed at Waitakere City, Auckland City, Hamilton City, Tauranga City/Western Bay of Plenty District, Kapiti Coast District, Wellington City, Nelson City and Queenstown Lakes District Councils. They provide free independent advice on energy, water and material choices in home building projects.

Having an identified specialist in-house means that there is a contact and education point for homeowners and for industry, and that councils can offer a service that has a direct impact on the sustainability of individual homes.

A survey of homeowners and designers who have made use of the pilot Eco Design Advisors (EDA) scheme[73] concluded that "a person who visits an EDA is more likely to include environmental technologies than those who don't." The change was particularly notable for designers, with 100% of those surveyed now discussing eco design options with their clients, compared to 41% of designers in a control group (who did not meet with an Eco Design Advisor). A survey after year 2 showed that 90% of homeowners and designers who had used the service would use it again for another project, and 95% would recommend it to others.[74]

The pilot phase of the BRANZ Eco Design Advisors project has been co-funded by the councils, the Building Levy, EECA and the Ministry for the Environment Sustainable Management Fund. As this phase comes to an end, councils will need to secure funding to continue the positions. (Several councils, including Hamilton City, Nelson City, Waitakere City and Kapiti Coast District, have made their EDA a permanent position, funded within their LTCCPs.)

73 Christie and Mathews (2007)
74 Jaques, R. (2009) Pers. comm.

Pros: One-on-one point of contact, with the added ripple effect of "spreading the word" and a source of independent information for homeowners, designers, council staff and developers. The EDA role generates goodwill for the council – at public meetings the free EDA service is often mentioned as an example of something positive the council is doing for the community. Most users express satisfaction with the outcomes of consultations, with comments like, "I wish this service had been available when I built my last house ..." EDAs also provide support and collegiality for colleagues working on improving the sustainability of the built environment.

Cons: Cost of employing the EDA (note that there is the possibility to share an EDA between councils to offset costs). Reliance on the knowledge and communication skills of one person to deliver advice to the community.

Community Based Social Marketing: 5 Key Points to Designing an Effective Programme[75]

- Target behaviour
- Uncover barriers and benefits
- Design programme to overcome steps
- Pilot programme
- Implement and evaluate

Special events

Special events can lend profile to sustainability efforts. For example, Waitakere City and the Eco Matters Trust hold an annual Eco Day to showcase products and services and provide practical advice to the public. Kapiti Coast District Council runs an annual Sustainable Home and Garden Show. The 2009 weekend show offered lectures, eco design advice, and performances alongside stalls offering solar power, water tanks, greywater systems, insulation, heating systems, and more.

Publications

Information can be shared as brochures, in council communications to ratepayers, and online. Many council websites now include guidance for sustainable building. Other websites also offer comprehensive information. For example, there is the Smarter Homes website (**www.smarterhomes.org.nz**), a joint initiative by the Department of Building and Housing, the Ministry for the Environment, Consumer, Beacon Pathway Limited and URS. Websites such as Ecobob (**www.ecobob.co.nz**) provide users with an easy way of accessing information on environmentally friendly living such as profiles of eco houses, a listing of businesses providing eco living products and services, a range of information articles on eco living and an online community for people to share ideas and connect on eco living topics.

Pros: A simple, low-cost method for disseminating information. If produced by councils, they can tailor information to local issues and provide links to relevant council activities and regulations. Information produced by other agencies can also be useful — drawing on other sectors' expertise and resources.

Cons: A passive form of communication, relying on people to seek the information out. Needs to be linked into other initiatives if the information is going to be accessed and used.

Examples

- **Waitakere City Council's "Building Sustainably"** page (**http://www.waitakere.govt.nz/AbtCit/ec/bldsus/index.asp**) includes a range of resources for sustainable subdivision and sustainable homes. The Waitakere Sustainable Home Guidelines, first published in 1998, are much referred to by other organisations, although the website now points to Smarter Homes as more recent and regularly updated.
- **Hamilton City Council** maintains a Sustainable Urban Design Directory on its website (**www.hamilton.co.nz**).
- **Wellington City Council's Sustainable Building Guidelines** (**http://www.wellington.govt.nz/services/environment/practices/practices.html**) present an overview of issues and options for sustainable homes.

75 Christie et al. (2007)

Workshops and training

Councils with in-house capacity (such as Eco Design Advisors) can run workshops and training programmes for the community. For example, Hamilton City Council has offered workshops on:

- Eco design for new homes
- Solar, wind and photovoltaics
- Water efficiency
- Retrofitting existing homes
- Fine-tuning a new house for energy efficiency
- How to buy a better home
- Earthbuilding

Another option is to partner with community organisations. Waitakere City Council supports the EcoMatters Trust Sustainable Living Centre, which runs household sustainability programmes and workshops in a retrofitted 1950s house (**www.ecomatters.org.nz**). The Trust is now running a Sustainable Living Programme in Mandarin, including translating all course materials (working with the Chinese Conservation Education Trust with support from Waitakere, Auckland, North Shore and Manukau City Councils and the Chinese Settlers Trust).

Leading by example

Councils can play a key role in driving the construction industry towards more sustainable building practices. Where the public sector leads by example, a new standard of construction is set, upskilling of tradespeople and designers occurs at every level, and the community is able to experience first-hand that sustainable buildings are both pleasant to be in and functional, as well as being resource efficient. This also enables the council to engage with the community on issues to do with sustainability with a great deal of first-hand knowledge and provides confidence that the organisation is practising what it preaches.

Examples

- **Wellington City Council** has committed to a 20-year upgrade programme for its 2,354 social housing units. Upgrades include improvements to insulation and ventilation.
- **Waitakere City Council** is preparing to transform its run-down Wilsher Village complex (68 small units for older adults, owned and operated by the Council) into a flagship village, with more intensive and sustainable options for residential living. The units will be demolished and replaced with 205 larger units featuring solar hot water, rainwater harvesting, high thermal mass, good cross flow ventilation, and materials selected to have low volatile organic compounds. The units will be built to the LifeMark standard (ensuring accessibility for older adults), and will share amenities such as allotment gardens, fruit trees, and community rooms. By selling surplus units, the Council will substantially improve the levels of service offered at minimal cost to ratepayers.

8. Council administrative practices

This section focuses on how policies are expressed in everyday operations, and highlights a need for consistency across units and disciplines. The following possibilities are already used by councils to improve their handling of other issues, and they could potentially be adapted for sustainable building:

- **Reducing consent costs.** See section on fee waivers, above.
- **Simplifying building consent processes.** See section on building consent administration, above.
- **Fast-tracking consents.** A number of councils have looked at the opportunities to fast-track the consenting process for homeowners that are willing to install sustainable building innovations. Ensuring that the initiative will not place additional workload pressures on already stretched consenting staff is important as is being certain that the council can deliver on its promise of a sped up process.
- **One-stop shop.** During the course of its research, Beacon has heard frustrations from developers that have lamented the lack of a "one-stop shop" when dealing with the consenting process — particularly for larger projects. Nelson City Council's Solar Saver scheme is a one-stop shop approach, covering finance, consenting, and installation. It has met with a considerable positive response from the community.
- **Case managers.** Appointing a case manageroffers an opportunity to discuss sustainable design options with developers early and ensure that the consenting process is made as smooth (and consistent) as possible. Having a representative from various areas of council such as the building consents team, the landscape team, and water team brought into a meeting at the outset can be a way of ensuring that everybody who will be involved on the project has an opportunity to input into the development process, suggest sustainable building options or alternative approaches, and hear what the developer's needs, wishes and concerns may be.
- **Officer training** can help to ensure that officers on the building consent frontline are familiar with existing, new and emerging building technologies, and with how to apply council policy. This is particularly important where the technology may be different from mainstream building approaches. Running regular materials workshops, inviting various industry professionals to come and give seminars, and maintaining a commitment to upskilling officers can be an effective way of encouraging more sustainable building practices.

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Glossary and acronyms

CHP: Clean Heat Programme

EDA: Eco Design Advisor

EECA: Energy Efficiency and Conservation Authority

HEU: Household equivalent unit

HIRB: Height in relation to boundary

HSS : High Standard of Sustainability® - a set of benchmarks established by Beacon in relation to key performance areas of energy, water, indoor environmental quality, waste and materials which are measurable and used to define a sustainable home.

IEQ: Indoor Environment Quality - This encompasses the aspects of the indoor environment which impact on the health and well-being of house occupants, and on the sustainability of a home. It includes aspects such as temperature, relative and surface humidity, ventilation, lighting, noise and presence of pathogens and harmful chemicals in the air.

KCDC: Kapiti Coast District Council

LGA: Local Government Act 2002

lppd: litres per person per day

LTCCP: Long Term Council Community Plan – 10 year plan produced by local government outlining the community outcomes sought and expenditure proposed to meet these over a ten year period. These plans are reviewed every three years.

MFE: Ministry for the Environment

NES: National Environmental Standard established under the Resource Management Act.

NPS: National Policy Statement

Retrofit: interventions made on an existing home to improve its performance

RMA: Resource Management Act 1991

RPS: Regional Policy Statement

Takeback: The situation where energy savings made as a result of an intervention are not sustained due to an expansion of the service by a household. For example, energy savings from insulating uninsulated homes being “taken back” in the form of increased heating (and higher temperatures) in the home.

Thermal performance: The temperature qualities of a dwelling in terms of its ability to moderate external temperatures (heat and cold) and produce a comfortable and healthy environment for occupants.

TUSC: Tool for Urban Sustainability Code of Practice (Waitakere City Council)

WASSA: Water and Sanitary Services Assessment

Index of Key Performance Areas

About Beacon

Beacon Pathway Ltd is a research consortium that's working to find affordable, attractive ways to make New Zealand homes more sustainable: warmer, healthier, cheaper to run and kinder to the environment.

Beacon's shareholders are a unique mix of industry, local government and research organisations: BRANZ, Scion, New Zealand Steel, Waitakere City Council, and Fletcher Building. Their contributions are matched, dollar for dollar, by funding from the Foundation for Research, Science and Technology (FRST).

In addition, Beacon works closely with a number of stakeholders on specific areas of interest. Stakeholders include the Department of Building and Housing, EECA, Ministry for the Environment, Ministry for Economic Development, Consumer New Zealand, local and regional government, and Local Government New Zealand, district health boards, community energy efficiency organisations, industry organisations, Water NZ, New Zealand Business Council for Sustainable Development, New Zealand Green Building Council and the Sustainable Business Network.

Beacon takes a whole-of-house approach to renovating New Zealand homes. Our focus goes beyond energy to improving the sustainability of the whole house. Many retrofit programmes focus largely on energy efficiency, but we believe a home's total performance reflects an interdependent web of features and design. If one area only is addressed, it may compromise the performance of other aspects of the home. For example, high water use has energy implications - approximately 30% of typical New Zealand household energy consumption is spent heating water.

We believe the health and environmental benefits of improved indoor environment, reducing waste to landfill, and the cost savings of water conservation (directly to homeowners if it is metered, or through their rates if it isn't), are equally important.

For more information, please visit www.beaconpathway.co.nz

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