

# Facing

Newsletter of Beacon Pathway August 2009



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## First HomeSmart Home

Open to the public this week

The New Zealand Housing Foundation has built a HomeSmart Home as a pilot project to see how energy, water and waste efficiencies can be made, to create a comfortable and healthy home, and to test the use of such features in future Foundation housing projects.

See more on Page 2



Beacon's HomeSmart Home procedures were used to guide the design and construction of the home which is expected to meet the benchmarks of the HSS High Standard of Sustainability®.

As well as incorporating our learning into the house design, Beacon will be monitoring the home's performance and the experience of the homeowners.

Beacon worked with the Housing Foundation to change the specifications on their standard type 4a design in line with the guidelines of the HomeSmart Homes procedures. The Tindall Foundation is funding the cost of the additional interventions for this house which are estimated at \$43,500, including a \$20,000 photovoltaic grid.

## 8 star HERS rating

The house was assessed under EECA's Home Energy Rating Scheme. With comparatively modest changes, the rating increased from 4.5 stars in a standard Foundation home to a very commendable 8.0 stars.

For more information about the house and its features [www.beaconpathway.co.nz/new-homes/](http://www.beaconpathway.co.nz/new-homes/)

## Open Week

New Zealand Housing Foundation is holding an 'Open Week' before the family moves in. Come and look around this wonderful new home in their West Coast Road development.

**27 August - 2 September 2009**

**10.30am - 2.30pm daily**

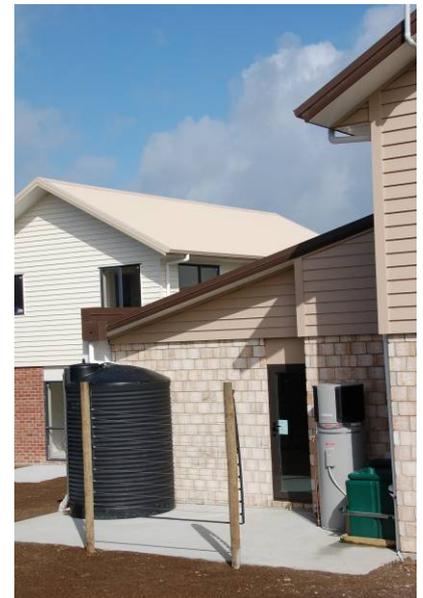
**16 Foundation Place, Glen Eden (cnr Titch Place and Foundation Place)**



*Heat pump hot water system*



*The EcoPlus greywater system*



*Back of the house facilities including a rainwater tank*

## SB10 Sustainable Building New Zealand

### Innovation and Transformation for Building Performance

#### What to look forward to

Coming up in May next year, SB10 New Zealand will provide an opportunity for those with an interest in sustainable building to hear the latest thinking and research on sustainable building in New Zealand.

118 abstracts have been received for the conference. Topics covered include:

- the challenge of improving building performance beyond what is currently standard today
- the options available for both new and existing buildings
- new and innovative materials and building methodologies
- the role of building in communities and the built form in creating sustainable neighbourhoods and settlements
- case studies and industry papers, including case studies of recent GreenStar-rated commercial buildings.
- post-occupancy evaluation of the ongoing performance of sustainable buildings.
- building and renovating affordable social housing.

The experience of major New Zealand initiatives – the GreenStar Rating Schemes, the new Residential Housing Rating Scheme and the Sustainable Habitat Challenge (SHAC) programme – are also profiled.

Overseas interest in the conference is also evidenced with papers submitted from Thailand, Korea, Malaysia, United Arab Emirates, Hong Kong and Japan. These have been attracted by the global promotion of the conference to members of CIB (the International Council for Building) and iiSBE (the International Initiative for Sustainable Building).

A preliminary programme for the conference will be available early September.

#### Opportunities for exhibitors and sponsors

NZ Steel, Resene, EECA and CRESA are all sponsors for aspects of the conference. Other sponsorship opportunities are still available,

A trade exhibition will be run alongside the conference, showing New Zealand's growth in sustainable procurement practice. This opportunity is of interest to organisations selling Environmental Choice certified products, Government agencies and NGOs promoting sustainable practice, and organisations providing advice on sustainable practice or sustainability services / products



Visit:  
[www.sb10.org.nz](http://www.sb10.org.nz)

or

contact Lois Easton  
[Loise@beaconpathway.co.nz](mailto:Loise@beaconpathway.co.nz)

## Rating tool progress

A Joint Venture has been formed between Beacon, BRANZ and NZ Green Building Council to develop a rating scheme for both new and existing homes.

A performance standard of this nature would allow homeowners to assess their home's operation and, importantly, reflect the value of improvements; more than a "nice to have", it is the key to help address New Zealand's poorly performing houses.

Put simply, if you can't measure you can't manage.

Home rating schemes are gaining popularity in other nations such as Australia, the USA, Japan and Britain. Many of these countries are operating multiple rating systems which focus purely on new builds.

This New Zealand industry-led proposal, however, is unique: a single residential rating scheme for both new and existing homes.

A user-friendly web-based model will allow homeowners to complete a basic self-assessment of their existing home so that they can prioritise home improvements. This will enable homeowners to earn a 'star rating', based on things like energy and water use, and levels of health and comfort.

A certified rating will be possible via an independent, third party evaluation of the home. Assessors will consider other important aspects of home performance and environmental impacts such as waste, site ecology and materials selection. The result will be a rating that you can use with confidence at the time of sale or rental.

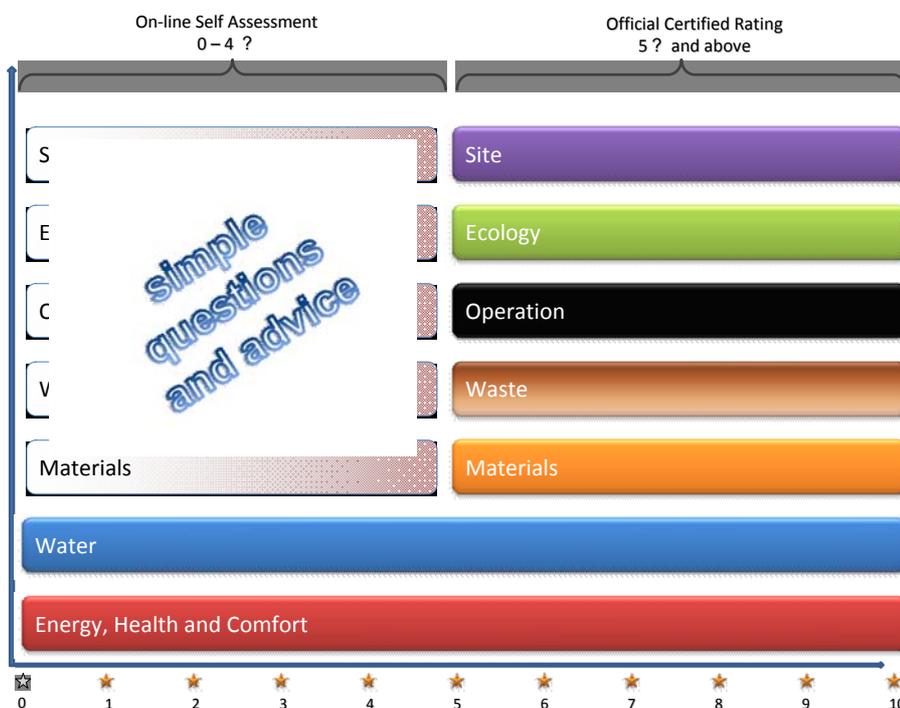
The intention is to go beyond a simple rating scheme. A 'star rating', coupled with a scheme that delivers credible and independent advice about what needs to be done to a house to improve its rating, will assist homeowners in prioritising those interventions that improve the quality and performance of their homes.

The Joint Venture group has prepared a scoping report, laying out what is needed for a successful rating scheme, and what scientific basis exists to rate homes. Download this here:

### [Development of a Single Residential Rating Tool for New Zealand](#)

The group is now working on the detail of the rating scheme, and will shortly be presenting a prototype to the Technical Working Group of experts and interested parties from industry and government.

*The proposed structure of the new rating scheme*



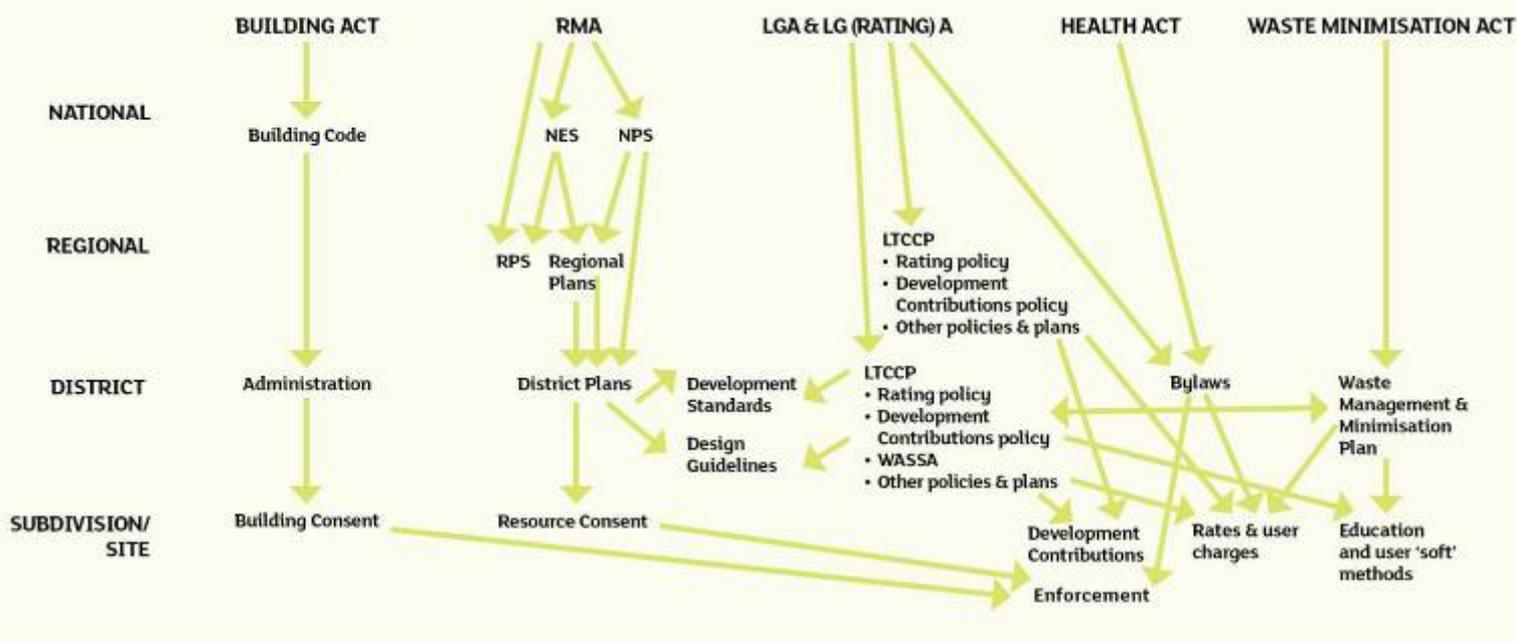
## Resource Manual for councils

Beacon's Resource Manual for Local Government lays out the value for councils in encouraging sustainable building and renovation in their plans and processes.

Using Beacon's research it defines what makes a sustainable home and shows why New Zealand and New Zealanders need sustainable homes. Further research and council case studies have helped to establish the legislative basis for councils to justify action, and to 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.

The Resource Manual has been presented to council staff in Christchurch, Wellington, Rotorua and Auckland in a series of well-attended workshops. A final workshop is planned for the lower South Island if there is enough interest. Contact [kimh@beaconpathway.co.nz](mailto:kimh@beaconpathway.co.nz) if you would like to attend.

Following the feedback and discussion at these workshops, Beacon researchers will be updating and publishing the Resource Manual.



## Legislative and policy mechanisms that affect houses

Download the draft Resource Manual from:

[Building Sustainable Homes: A Resource Manual for Local Government \(Publication HR2420/6\)](#)

## Papakowhai Renovation case study

House 3 is one of the Papakowhai success stories.

Built in the 1970s, it is typical of the split level homes in the hilly suburb, oriented to the view rather than the sun and lacking insulation.

To improve its performance, House 3 underwent a major renovation, including:

- insulation in the walls (R2.4 batts) and under the floor (R2 foil backed batts and polythene vapour barrier)
- lowering the skillion ceiling and insulating with R3.6 batts; re-laying remaining ceiling insulation and overtopping with R2.6 blanket
- double glazing
- an NES-compliant wood burner and a ducted heat pump system
- a solar hot water system and a newly wrapped 300L cylinder
- flow restrictors on the shower heads and dual-flush toilets
- a kitchen rangehood to replace a broken extraction fan.

The results speak for themselves. This family of five reduced their winter power bills by 33%. They saved 62% on space heating costs, despite increasing their heating to bring their house to comfortable and healthy temperatures. The impact of the extra heating was absorbed by the improvement in thermal performance of the dwelling and increased efficiency of heat source.

The solar water heater provided 55% of the family's hot water – in winter! In summer it would be close to 100%. Again, this is despite the family enjoying longer showers and using 21% more hot water in winter. The low-flow shower heads also helped to offset greater costs for the family.

Inside the house, the family enjoyed much warmer, healthier living. The average winter temperatures in the family room and bedrooms rose significantly and rarely dipped below the minimum temperatures recommended by the World Health Organisation for healthy living.

The family loved the new warmth of the house, especially being able to use the whole house rather than huddling round the fire. Problems with condensation and mould were eliminated and they noticed improved family health with fewer colds and flu since the renovations. What's more, an asthmatic child needed to use an inhaler less frequently. With their water costing less to heat, they no longer worried about the hot water running out.

Read more about the Papakowhai Renovation project at:

<http://www.beaconpathway.co.nz/existing-homes/>



## New on the website

Lois Easton

### Papakowhai Renovations: Project Summary and Case Studies (Report TE106/18)

The Papakowhai Renovation project renovated nine homes with a range of sustainable interventions and monitored them to see the effects of the retrofits on dwelling performance. During the course of the project, nine reports on different aspects of the project were prepared. This report summarises these reports and presents the overall findings.

Each house is presented as a case study, compiling:

- Pre-renovation status
- Renovations undertaken
- Key improvements in energy, indoor environment, water and waste
- Householder experience



### Key findings

Full thermal envelope insulation is likely to be needed for reticulated energy savings and temperature improvements to HSS®-2008 standards.

Efficient heating must accompany insulation improvements.

Hot water cylinder wraps are an excellent investment across all hot water cylinders.

Optimally-sized and -installed solar hot water systems can deliver high efficiency even in winter.

A number of retrofit measures are relatively straightforward and can easily be included in a wider renovation by competent tradespeople.

Some measures are uncommon or tricky (rainwater plumbed for internal uses, greywater reuse, retrofitting double glazing) and need specialist installers with a high degree of competence and familiarity with good installation practices.

Careful planning and project management are required to ensure an optimal renovation.

Good management of consenting issues is critical to implementing large scale renovations.

Ian Page

### Cost Benefits of Sustainable Housing Retrofits (Report TE106/19)

One of the outputs of the Papakowhai Renovation project, this report considers the cost benefits of a variety of sustainable retrofits for the existing housing stock.

The retrofits interventions costed are mainly energy and water related, and values are calculated for the four main centres and eleven house/multi-unit typologies. Health and comfort benefits are considered and the costs include initial costs of the measures and their replacements. Future operating costs are discounted and the results are expressed as net present values and benefit cost ratios. Typologies and locations are scaled up to derive national benefits.

Three packages were identified: Basic, Standard and Enhanced.

Most of the measures were found to have net benefits in all four centres, i.e. Auckland, Wellington, Christchurch and Invercargill. All the measures in the Basic and Standard packages were cost-effective. In the Enhanced package, wall insulation retrofit was cost-effective but the other measures were either not cost-effective (rainwater tanks, hot water heat pump), or were cost-effective only in the cooler parts of the country (curtains, secondary glazing).

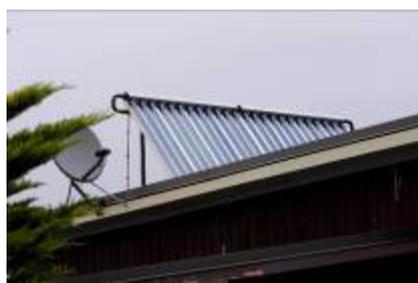
## Andrew Pollard

### Solar Water Heating in the Waitakere and Rotorua NOW Homes and in three Papakowhai Renovation homes (Report HR2420/8)

This report examines the performance of the solar water heating systems used in Beacon's live research homes; the Waitakere NOW Home®, the Rotorua NOW Home® and three of the Papakowhai Renovation houses. A variety of systems were used in these houses and performance varied from 75% of the water heating being provided by solar in one of the Papakowhai Renovation houses to 36% of the water heating needs being met by solar in the Rotorua NOW Home®.

The results confirm findings of other research and highlight the need to ensure that:

- Immediate reheating of cylinders is prevented with the use of timers.
- Information on how the system is operating is available to the occupants such as display units or controls
- The angle of the collector is near the site latitude angle to ensure good year round performance
- Sufficient collector area and storage volume is provided
- Heat losses of cylinders are minimised and pipes well insulated



## Mandy Armstrong and Verney Ryan

### Matching Renewable Technology to Local Resources at the Household and Neighbourhood Level (Report EN6590/4)

This report explores the range of renewable technology options available to household based on their local resources. These technologies can be used for the provision of low-grade heating (solar hot water, biomass burners etc) or for electricity generation for high-grade energy requirements.

Understanding the site where a house is located is important to select the most appropriate renewable technology with the best chance of performing. In addition to the site-specific factors the general location in terms of climate, seasonal variations and geography can impact the availability of local resources (such as wood, pellets, other biomass, consistent wind and sunshine hours).

The report also offers a way to assess household needs for energy. Energy demand is a factor of the number of people in the house, their age and comfort requirements, whether they are at home during the day, their activities, health needs etc. There are two crucial variables that determine how much energy a house uses - the behaviour of the people in the house; and the performance of the house itself.

**Ben Kneppers, Damon Birchfield, and Maggie Lawton**

### Energy-Water Relationships in Reticulated Water Infrastructure Systems (Report WA7090/2)

This report considers the relationship between the reticulated urban water cycle and the energy used in those processes. The operational energy component of urban water systems should be given more weight in the design of reticulated water systems as energy costs rise. The study was undertaken to provide one aspect of why and how the urban water infrastructure could be modified to be more resource efficient and resilient, now and in the future, and to signal the fact that a water demand management approach has benefits in a reduction of both water and energy costs.

Energy data from the councils at Nelson, Waitakere, Kapiti Coast and Palmerston North was considered based on the four sectors of the reticulated water system: water supply pumping, water supply treatment, wastewater pumping and wastewater treatment. Initial results showed some variations in energy efficiency between the systems used by each council. For example, the degree of water supply treatment required and the degree to which gravity fed systems were available were key factors in the energy operating cost of the systems.

Infrastructure managers and designers could consider different approaches to reduce energy requirements.

These include:

- Minimising energy use when designing new water/wastewater infrastructure.
- Reviewing the maintenance features of existing plants to improve energy efficiency.
- Making best use of natural local advantages that might allow gravity feeding or good quality water which requires less treatment.
- Capturing co-generated energy sources such as methane from wastewater treatment to reduce cost and carbon emissions.
- Providing on-site renewable energy to power the operations.
- Considering the provision of services which are fit for purpose e.g., not treating all water sources to a potable standard.
- Considering local small scale water systems for smaller communities which can be tailored to site specific conditions, rather than a scaled down model of major infrastructure.



**David Kettle**

### Integrated Water Management Design Criteria Report (Report WA7090/3)

A set of product design criteria was developed to assess water saving products and systems on their relative efficiency and effectiveness at the home and neighbourhood scale. It included existing water assessment criteria as well as a holistic integrated water management approach with relatively new criteria such as resilience, how well all three waters (stormwater, water supply and wastewater) are integrated, the degree of water treatment appropriate for its end use, climate change and energy uncertainty. The criteria were also grouped under the New Zealand Government's four well-beings of culture, social, economic and environmental.

Different products scored differently against different criteria, with the best overall 'score' coming from a combined 'system', comprising a low flow shower head, a water efficient washing machine, a 9,000 litre rain water tank and greywater reuse.

Two potential commercial opportunities were identified; the installation of a relatively small 200 litre rainwater tank attached to the side of the house to supply toilet water only; and a 'modular' tank system where small storage blocks of 200 to 300 litres each could be connected up in irregular shapes to fit under decks, etc.