

Facing

Newsletter of Beacon Pathway April 2009



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New look for Beacon website

We've revamped the Beacon site to present our learning clearly and improve access to our research and reports.

What's changed?

- The three main sections reflect our three areas of priority:
 - new homes** (case studies of the Waitakere and Rotorua NOW Homes)
 - existing homes** (case study on the Papakowhai Renovation project and information about the HomeSmart Renovation project.
 - neighbourhoods** (development of the Neighbourhood Sustainability Framework, including case studies of neighbourhoods measured)

- The Further Research covers all our **supporting research** including energy, water, indoor environment, systems, policy and regulation.
- The separate NOW Home site has been incorporated into the new site.
- Each area of research has its own reports and presentations page. This will list all publicly available reports related to that subject. Find those pages quickly by typing "reports" into the **Search** facility at top right.
- New additions to the website will also be flagged via the News section. Use the **RSS feed** to alert you to new reports.

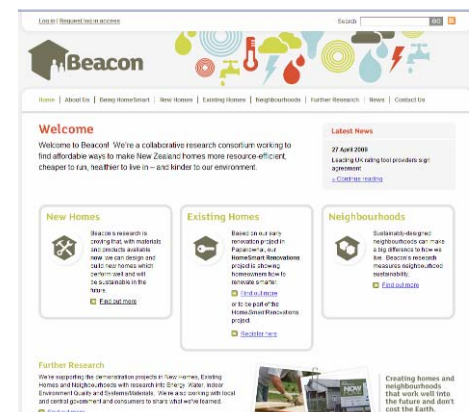
Shareholder? Get access to Beacon's full database

If you work for one of Beacon's shareholders (NZ Steel, Fletcher Building, BRANZ, Waitakere City Council or Scion) you can apply to access Beacon's Knowledge Base.

Click *Request Log In Access* at the top left to request a username and password

The Knowledge Base is the full collection of Beacon's reports including shareholder only and confidential reports. Once logged in as a shareholder, you can either search the Knowledge Base or browse the extended lists of reports on the Reports and Presentation pages.

www.beaconpathway.co.nz



Large-scale renovation is big on job creation

Beacon's briefing to the Job Summit maintains that the building industry is in a strong position to protect and create jobs in these tough economic times – with Government support.

Prudent investment by the Government in New Zealand's residential infrastructure, in partnership with local government and industry, will maintain employment and critical mass in the building, building product manufacturing and building retail industries.

National's focus on upgrading state housing is an excellent leadership position which can be built on by encouraging and incentivising other home-owning New Zealanders to do the same.

Renovation means jobs

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 8% of the workforce (Briefing for the Minister for Building and Construction, November 2008). There is significant economic and social benefit in redirecting this resource to improving the current housing stock in recessionary times.

One of the largest groups of houses represented in this country is the 1940 - 1960 mass housing style. Research undertaken by BRANZ indicates

that there are a total of 479,000 of these houses throughout New Zealand.

A standard 1940-1960 home renovated with a standard renovation package 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 would be required to provide the products and services involved in the renovation activity.

Benefits of undertaking wide scale renovation in relation to jobs:

1. Renovation activity involves a broad spectrum of skills and trades from unskilled labour through to qualified electricians, plumbers and builders, and hence provides a diversity of employment opportunities.
2. The jobs and skills required by renovation activity are easily transferred into and out of new build activity - providing a flexible workforce.
3. Specific regional targeting of renovation activity based on housing stock is possible - assisting communities who are in greater need of securing jobs and retaining skilled workers.
4. Renovation activity can utilise and target New Zealand-made products and services helping to support the wider local economy.
5. The need for an element of low skilled labour in renovation installation provides employment for many who need it most.

What is a standard renovation package?

To bring these homes to a much higher standard of warmth, health, comfort, energy and water use, a standard renovation package would include:

- 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

Read the full briefing paper at:

http://www.beaconpathway.co.nz/further-research/article/large_scale_renovation_creates_jobs

House types and prevalence

To improve the energy performance of so many houses, we've broken them down into basic house types.

Even though New Zealand's climate varies from the top to the bottom of the country, the same basic housing types in each period of history were used throughout the country for mass housing.

In the main these were timber framed houses with metal roofs and little or no insulation. As shifts in society and culture occurred, including updates to the building regulations, changes appear in house typology.

These ten house types cover 80% of New Zealand's housing stock. By understanding how each type of house was built, we can identify the issues and challenges that energy renovation will have to address.

Once the ten house types were identified, further research quantified the numbers in each group, breaking the number of houses down by climate zone and territorial authority.

The largest group is the 1940s to 1960s mass housing group and their characteristics lend themselves to a common set of retrofits.

Each typology was assessed for ease of retrofit based on a number of physical parameters, e.g. roof and sub-floor access and likely replacement of components. They were scored across a number of measures including existing insulation levels, roof and sub-floor access, chimneys, window and wall condition (for insulation retrofitting during replacement), and hot water cylinder age (for a solar water replacement).

The best scoring in terms of retrofit favourability were the villas, 1920s bungalows and the 1940s to 1960s mass housing group.



Relevant reports available on the website are:

Verney Ryan, G Burgess, Lois Easton

[New Zealand House Typologies to Inform Energy Retrofits](#) (Report EN6570/9)

This report outlines the methodology and work undertaken to develop a series of housing typologies to inform Beacon in relation to energy retrofit interventions. It outlines the findings from a workshop examining house typology and a process of engagement with key experts to develop a framework for definition of house typologies applicable to the New Zealand housing stock.

Ian Page, J Fung

[Housing Typologies: Current Stock Prevalence](#) (Report EN6570/8)

This report analyses the characteristics of the housing stock (such as roof space and sub-floor space access, existing insulation levels, window and wall cladding condition, etc) that affect the ability, opportunity and need to retrofit sustainability features. The report confirms the typologies developed in earlier work are generally useful and numbers in each group are provided.

Typology summary												
Numbers as at March 2006												
Number of dwelling units (000)												
	Art Bungalow	Deco	Mass housing	Multi units	Multi units	Mass housing	Housing	Multi units	Housing	Housing	Multi units	Total
Villas	1920-36	1925-40	40s-60s	Pre-1960	1960-70s	1970-78	1978-80s	1980-90s	1990-96	post 96	2000s	
86	113	18	479	34	133	151	182	68	112	201	28	1606

Sample of the data available

Read more at:

http://www.beaconpathway.co.nz/further-research/article/how_house_type_affects_energy_retrofits

Neighbourhood data available

A survey may offer useful data for territorial authorities and other stakeholders in sustainable settlements.

Designed to provide a baseline for Beacon's Neighbourhood Sustainability Resident Self-Report Tool, the survey of 1,613 people investigates their behaviours, perceptions and experiences in relation to their neighbourhoods.

The survey provides, for the first time, direct evidence as to the impact of built environment densities and use profiles on aspects of neighbourhood sustainability.

Debates on the merits or otherwise of the intensification of

urban settlements and the trend to mixed use neighbourhoods have, to date, been largely uninformed by empirical evidence.

Those debates continue as territorial authorities throughout the country attempt to optimise the social and economic as well as environmental performance of New Zealand's cities and towns.

This survey provides territorial authorities, and any others interested in the built environment a unique database.

Learn more about the survey

To facilitate access to the data, we've prepared a report on the survey,

A National Survey of Neighbourhood Experiences and Characteristics: Opportunities for Data Use.

The report

- sets out the survey method
- profiles the socio-demographic and neighbourhood characteristics of participants
- sets out the structure of the database.

Request the data

Customised tables can be requested via Beacon. Email:

office@beaconpathway.co.nz

Not all data is currently available. No unit data will be made available and all data will be provided at the discretion of Beacon.

A cost of extraction charge will apply.

Read the report at:

http://beaconpathway.co.nz/neighbourhoods/article/neighbourhood_survey_data_available

SB10 Sustainable Building: Innovation and transformation

26-28 May 2010. Te Papa, Wellington

Join other industry stakeholders to focus on sustainable building in the New Zealand environment.

Following on from the successful SB07 held in Auckland 2007, the 2010 conference will bring

together local and international speakers to share their knowledge and insights on innovative, high performance and low impact approaches to developing, maintaining and retrofitting the built environment for sustainability.

Call for papers

SB10 organisers are calling for scientific and industry oriented papers. They are keen to include a wide range of papers on sustainable building and sustainable communities in the conference.

You can submit an abstract online at www.sb10.org.nz



Call for sponsors

The SB10 NZ conference will be widely attended by people across the building sector and will offer an opportunity for your organisation to be associated with a key event aimed at transforming the New Zealand built environment.

Sponsorship packages are aimed at providing sponsors with a worthwhile return on investment.

Exhibition space will be available for organisations to showcase products and services of interest to conference participants.

A flyer is attached with this newsletter.

Find out more at

www.sb10.org.nz

Sharing our research - local government workshops

Beacon has recently completed a range of research either targeted at, or supporting, local government encouragement of sustainable building and renovation.

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

From our discussions with council officers, we know that councils are interested in promoting more sustainable housing choices, but that they are working with limited resources and some uncertainty as to what they can do.

Recent research of particular use to councils includes:

- Energy research into various house types, their prevalence around New Zealand and the best retrofit options to improve their performance
- Energy research into the best renewable energy options around New Zealand
- Research into water demand management and a framework to support councils to decide on the best water policies for them
- A resource manual to support local government in encouraging sustainable building and renovation

What the workshop will cover

As part of this workshop, we will:

- Introduce the contents of Beacon's new publication *Building Sustainable Homes: a Resource Manual for Local Government*.
- Share critical findings from Beacon's retrofit and new-build research programmes.
- Equip officers with information about how homes can be better designed for energy, water, indoor environment quality and waste.
- Outline the range of regulatory and non-regulatory policy tools available to councils to promote more sustainable building in their districts.
- Identify some simple priority actions that could be undertaken across New Zealand, and in locally-specific contexts.

Who will be interested?

The workshop is designed for a broad range of council officers, and we would like to invite you to assemble a small team to attend from across different council units. We would particularly recommend it for:

- Staff involved in assessing resource and building consent applications, including planners, engineers, building compliance officers
- Forward planners (e.g. those involved in writing District Plan provisions)
- Asset managers with responsibility for council housing stock
- Sustainability advisors

Building Sustainable Homes: What Local Government Can Do

Dates:

- Christchurch, 11 June
- Wellington, 19 June
- Rotorua, July (tbc)
- Auckland, August (tbc)

Where to book

Spaces are limited. Please contact Kim Hinton to register your interest:

kimh@beaconpathway.co.nz

tel: 09 522 5170



Temperature

Winter temperatures within the home were able to be maintained above benchmarks (16°C in bedrooms and 18°C in living spaces) with minimal heating

Summer temperatures particularly in the evening were often very warm

A solar powered stack fan was installed to address this issue

Did you know? **13.2°C** the average winter living room temperature in a pre-1979 New Zealand house



HomeSmart Renovations

Over 530 homeowners are now signed up to the HomeSmart Renovations. Most of these have had their home assessed and have received their renovation plans.

We have our full quota in Christchurch and are recruiting well in Auckland, Wellington, Rotorua/Taupo, and Dunedin.

However we still need more homeowners participating from the Nelson and Marlborough areas.

Additional research #1: Solar and heat pump hot water systems

A water heating project, jointly funded with EECA, aims to understand the difference in performance between heat pump hot water systems and solar hot water systems. Both types of technologies are very efficient but there are different circumstances and locations where one will perform better than the other. For example, solar hot water systems generally require good year-round sun on a northerly oriented roof to perform at their best.

We're looking for homeowners in

- Rotorua/Taupo
- Wellington
- Nelson/Marlborough
- Auckland

who are planning to install either heat pump or solar hot water system within the next 3-4 months, but haven't as yet decided on the system.

The bonus for participants in the project is a \$500 discount Beacon has negotiated with suppliers (Azzuro Solar, Parex Industries and Right House) of two different

solar hot water and three different heat pump hot water systems for installations over the next three months. The existing EECA solar hot water system subsidies (interest free loan to \$1000 or a \$1000 grant) are available on top of these discounted rates.

If you participate in the project, the choice of which system and which partner supplier to use is up to you. We will provide you with the information on the systems and you can choose.

Additional research #2: Forced air and heat recovery systems

In conjunction with the University of Otago and BRANZ, our Indoor Environment team is exploring how forced air and heat recovery ventilation systems can be optimised for New Zealand houses and conditions, and where these systems are most appropriate.

We are looking for households in Dunedin with existing forced-air or heat recovery systems. These are systems such as DVS, HRV and Moisture Master.

We would install equipment in the roof space to measure how much air flow there is through the system. A temperature sensor would be placed in the room of the outlet of the system as well as temperature and moisture sensors in the coldest room in the house. We would also undertake a 'blower door' test which is a simple ventilation test.

Homeowners would receive results from the performance of your ventilation system and your house in addition to the HomeSmart Renovation Plan.

Find out more at

http://www.beaconpathway.co.nz/existing-homes/article/hot_water_and_ventilation_sub-projects

HomeSmarts website shows value for consumers

All that we've learned about the best ways to renovate and most cost effective options to recommend for good home performance, is used in generating renovation plans for HomeSmart Renovation homeowners.

However it is also available in simpler form to all homeowners via the HomeSmarts website www.homesmarts.org.nz

www.homesmarts.org.nz has been set up to help New Zealanders check how their homes are performing and only takes a few minutes.

It gives you a tour of a sustainable home, a health check, advice and, if you want to make changes to your home, a renovation plan.

The benefits of understanding how well our homes perform environmentally do not end with lower power bills and a healthier home - as important as these are.

Increasingly people want to know about the environmental characteristics of a home - in particular how well insulated it is - before they purchase or rent it.

While steps to making your house more sustainable may not have the "wow" factor of, say, installing a new spa pool, the benefits in energy reduction and better health are having an increasing flow-on effect to house values.

We encourage you to visit www.homesmarts.org.nz - and see how you might improve all of these!

Papakowhai renovations offer important learning

Now complete, the Papakowhai Renovation Project offers some invaluable insights into sustainable renovations.

Funded by Beacon Pathway, researchers from BRANZ explored the most cost-effective and easy-to-implement combinations of retrofit options, and developed a cost-benefit analysis for a range of sustainable technologies in the areas of energy, water, indoor environment quality and waste.

Nine homes were selected to take part in the study. Papakowhai was chosen due to a predominance of 1960's and 1970's housing, built in the pre-insulation era and considered difficult to energy retrofit.

The suburb's hilly setting encouraged split-level homes, many of which are oriented to the view, not the sun.

Prior to work commencing, the homes were monitored for temperature, humidity, and energy use. Results indicated that most homes were cold, damp, or high energy consumers.

Three different levels of thermal intervention were applied:

- basic,- topping up insulation in the ceiling and installing underfloor
- standard-fitting heavy ceiling and underfloor insulation
- high- addressed the entire thermal envelope – ceiling, floors, walls and windows –

and introduced efficient space heating.

Apart from one house which was renovated to subsidised insulation levels of the day, even the 'basic' renovations exceeded standard practice for the time. Driving this were studies that found achieving the minimum doesn't result in long-term energy savings or sufficient improvements in indoor temperatures to ensure homes are healthy and comfortable.

Thermal performance

While heavy ceiling and underfloor insulation certainly showed some improvement to the thermal performance, houses where a full thermal envelope and efficient heating were installed gave the best outcomes in terms of both reticulated energy savings and temperature improvements.

Two homes, for example, received the full treatment: the ceiling, walls and floors were fully insulated, double glazing was fitted, a layer of polythene spread on the ground beneath the house to inhibit rising damp, and an energy efficient heating source was installed. Pre- versus post-monitoring revealed that homeowners enjoyed substantial savings on their energy bills as a result of the retrofits – between 23% (2480kWh) and 33% (930kWh).

As well as cost savings, there was a dramatic shift in the mean winter temperatures in both the family areas and bedrooms, in one case rising 3.3°C and 5.5°C respectively, in the other rising 2.5°C and 2.9°C.

Other homes received a more modest thermal makeover, with efforts centred largely on ceiling and underfloor insulation. While these upgrades did result in energy savings and temperature improvements, not one of these

homes had a healthy mean minimum temperature in the depths of winter.



Key findings from Papakowhai

While some aspects of the research are still being interpreted, several conclusions were immediately obvious:

- It's important to insulate the full thermal envelope, including the walls
- Efficient heating must accompany a thermal retrofit
- Hot water cylinder wraps are a great energy efficiency measure and should be widely applied
- Solar hot water systems can perform well, even in winter
- Low-flow showerheads should accompany hot water conversions



The study highlighted the need for wall insulation to achieve good reticulated energy savings and healthy indoor temperatures.

Wall insulation needs to be promoted as a 'must have' retrofit solution, rather than its current perception as a 'nice to do'.

Double glazing should also be considered, particularly with glass-only retrofits or if windows need replacing.

Efficient heating

Results from the Papakowhai study confirm findings from earlier research: improvements to insulation must be complemented by an efficient heating source.

Four of the nine homes were fitted with an efficient heat pump, low-emission pellet or wood burner. When coupled with good levels of insulation the potential exists to experience good temperature and energy efficiency gains. But, as with many things, to enjoy the full benefits the technology must be used properly. Success often comes down to education.

Homeowners in the Papakowhai Renovation project were given no special training in how to maximise the benefits of their sustainable renovations. This lack of knowledge was reflected by several homeowners' decisions not to increase their heating. As a result, while they did notice some energy savings it was at the expense of temperature, which in these homes fell below that generally recommended to maintain good health.

Hot Water Heating

In terms of value for money, hot water cylinder wraps and pipe lagging remain a fantastic investment. While cylinders ranged in age from 1970s to 2005, wrapping proved worthwhile in all cases, boosting efficiency between 11% and 30%. In fact, the cylinder wraps appear to be worthwhile even on modern A-grade cylinders, particularly if only low volumes of hot water are used thanks to the high proportion of standing losses.



The study also established that solar hot water systems can provide the majority of water heating needs and optimum installations will clearly deliver the best results. The sun's free energy provided an impressive 55-70% of the hot water needs to the three homes with solar water installations – in winter! Summer performance would naturally drive that figure closer to 100%.

And, for a moderate increase in cost, a wetback is very effective if combined with solar hot water.

Interestingly, the study confirms that low-flow shower heads and flow restrictors should be included alongside solar/instant gas hot water systems. With the seemingly endless supply of hot water that these systems promise, householders began taking longer showers. Low-flow water devices combat this effect.

Beacon Pathway and BRANZ acknowledge the following supporters to the project:

Azzuro Solar

Donated three solar water heating systems and installation

Energy Smart

Project management of actual retrofits

Fisher Windows

Discounted double glazing window frames

Fletcher Aluminium

Donated aluminium extrusions for window frames

Hutt Mana Charitable Trust

Donated funding towards insulation installations

Metro GlassTech

Donated double glazing systems

Porirua City Council

Waived building consent fees and provided help and advice

Rinnai New Zealand

Donated two instant gas water heaters

Tasman Insulation

Discounted insulation products

Winstone Wallboards

Donated Gib® plasterboard