

Facing

Newsletter of Beacon Pathway

December 2005



Merry Christmas



Thank you for your interest and support for Beacon Pathway Ltd in 2005. We wish you a happy holiday season, and a safe and sustainable 2006.

Shanghai Research Institute for Building Science

Beacon's General Manager, Nick Collins, recently joined Chris Kane (BRANZ Ltd) in a visit to the Green Buildings of the Shanghai Research Institute for Building Science (SRIBS). He reports:

The Green Buildings project grew out of the Shanghai Government's push for more sustainable buildings. It includes an office building and two residential buildings. Much research went into determining what sustainable building technologies were currently available internationally as part of the design and construction of the buildings, and SRIBS staff continue to review their choices.

The Office Building

The Office Building, which is one year old, accommodates research offices and clean labs. It aims to:

- Protect the environment
- Be energy efficient
- Conserve materials and general resources
- Create a comfortable and productive work environment.

It was designed to achieve a energy savings of 75% compared to a comparable office building in Shanghai, with solar sources (direct water heating, and photovoltaic cells (PV)) providing 20% of the energy used. The building is constructed from 60% recycled material.



Ten key technologies have been used to meet these goals:

1. **Natural Ventilation** – The building uses a roof chimney (stack ventilation) to reduce dependence on air conditioning. Subsequently it was found that this was not moving enough air to create a comfortable environment, so the design was further refined using wind tunnel testing. As a result, a second vent stack was created, using the interstitial space between the skillion roof and a false ceiling installed below. Additionally, computer-controlled windows open automatically as the indoor temperature rises.
2. **Energy efficiency** – Four different external wall structures contribute to energy efficiency by insulating the building from the heat outside:
 - EPS in an EIFS system,
 - XPS/concrete sandwich panels,
 - Low-conductivity concrete blocks, and
 - Sections incorporating phase change material.

The windows are double glazed with low emissivity film on the outer side of the internal pane to reflect back heat from the sun.

3. **Natural lighting** – Computer controlled sets of louvres on the roof and walls control sunlight entering the building – no use is made of deciduous plants for summer shading. On the upper floors, the louvres are installed horizontally above the windows to maintain the view whilst still offering some shading.
4. **Solar energy** – Roof-mounted PV cells are connected to the Shanghai mains via a net metering arrangement. The solar water heater uses evacuated tubes on the roof – in summer, a heat exchanger drives an evaporative air conditioner and, in winter, it drives in-slab floor heating. Liquid desiccant is used to dehumidify inbound air to the air conditioning system reducing the likelihood of Legionnaires' disease which is caused by infection of a condensed layer of water on the chiller.
5. **Air conditioning** – Driven by solar energy, as above.
6. **Green materials** – 60% of materials in the building are from recycled sources – although it is unclear whether this is by weight, volume, or value. Low VoC materials have been used wherever possible.
7. **Intelligent controls** – The building is extensively (and visibly) monitored. Feedback-driven controls include the thermal ventilation and light shading systems. Sensors automatically open venting windows if the CO₂ concentration gets too high. The complex external walls contain temperature and relative humidity monitoring sensors enabling a better understanding of thermal mass effects.
8. **Eco landscaping, lake and roof garden** – High surface permeability allows stormwater to go to ground (or into the lake). The latter cools the surrounding air by evaporation, as does the indoor water pool in the central atrium – this functions as part of the stack ventilation system. The flat roofs also have roof gardens to minimise what stormwater run-off does occur.
9. **Water recycling** – Grey water is collected, purified and recycled for gardens and toilets.
10. **Comfortable indoor environment** – This is achieved by balancing temperature, lighting and acoustics.



Residential housing

Two housing units have been constructed: one single dwelling (a villa) of 238m²; and an apartment building with two units of 402m² each. They were in the finishing stages during our visit.

The double storey villa design aims for zero energy consumption. It is of masonry construction and is extremely well cooled via a ground sourced heat pump and low exergy radiant system in the lower room ceilings, combined with a central atrium for good air movement. The indoor temperature of the villa was comfortable despite daytime outdoor temperatures of 32 °C during our visit.

The apartment mixes masonry construction with an upper floor of light timber framing (supported by the Canadian Timber Association). Although it was still not finished at the time of our visit, the upper levels appeared complete, and were not a good advertisement for light timber frame construction as it is extremely poorly ventilated. However this composite construction confirmed the ease with which timber frame can be used in multi-storey residences, and in conjunction with concrete.

Features of the houses include:

- High efficiency exterior walls (Roof R4, walls R3.2, windows .2)
- Vacuum IGUS - Double glazing with low-E coatings
- Roof garden
- Roof and wall computer-controlled shading systems.
- Ground source heat pump - saves 70% of energy compared to electricity
- Radiant cooling roof (in conjunction with above)
- Photo-voltaic cells
- Solar hot water
- Wind power (very neat scroll-type Japanese generator (vertical axis) which is reputed to be very efficient and very quiet).
- Gas-powered air conditioning and automatic rubbish separation in the apartment



Sustainable Residential Building Manual contract

In September the Ministry for the Environment called for tenders to develop a web-based sustainable residential information resource, a New Zealand equivalent of the successful Australian Your Home resource. Although the environmental, social, economic and health benefits of improving housing quality and performance have been widely researched, knowledge about the advantages of more sustainable homes is not mainstream. Without consumer demand, industry is unlikely to change to more sustainable methods, materials and practices. And without reliable, credible technical information industry will not be able to meet consumer demand for sustainable residential design and construction. In light of this, the objective of the Sustainable Residential Building Manual is to create and stimulate consumer demand for more sustainable housing (new build and retrofit), and to provide industry with necessary information to meet that demand.

Beacon joined with BRANZ Ltd, Presence (Marketing Communications) and the Consumers' Institute to submit a proposal which has been accepted by the Ministry. Negotiations are now underway to finalise the contract and plan for delivering the project. The project will be managed by Marta Karlik-Neale of URS NZ Ltd and has a tight time-frame for completion.

MfE seeks a number of value-added inputs to the project to ensure the information resource remains up-to-date and well-used once developed. These inputs are not being funded by MfE but are seen as part of the overall project delivery. Value added benefits include: access to additional research; ability to secure funding for research which may be required to fill gaps in the Australian *Your Home* and current NZ sources; industry and sector group engagement and support for the information resource; ability to fund and continue to develop the resource after MfE project funding ceases.

Check out the Australian Your Home resource on:
www.greenhouse.gov.au/yourhome/

What does a 65% response rate from a survey of 20,000 households look like?

Beacon's Market Transformation team, led by Ann Smith of Landcare Research - Manaaki Whenua in collaboration with the Consumers' Institute, has been investigating what consumers have done to make their homes more sustainable, what problems they have had in doing that, what they would like to do in the future and why. 20,000 questionnaires were sent out to Consumers' Institute members. Very nearly 13,000 completed forms were returned of which only 17 were unusable. The hard work of crunching and interpreting the data has begun. The amount of data and the number ways of interrogating it is mind-boggling. It's been an incredibly successful exercise and we look forward to continuing collaboration with the Consumers' Institute.

Data from the survey is expected to feed into all of Beacon's research streams. It will help develop a picture of market segmentation and help us to better understand problems householders may have with available sustainable technology, and what they would like in the future. Indicators will be developed from the survey results to enable Beacon to monitor the level of uptake of sustainable technologies by householders.



Ann Smith with all 13,000 survey forms

NOW Home Open Day

The next NOW Home Open Day will be held on 3 April, to tie in with Waitakere City's Eco Day. Eco Day is held at Olympic Park and show-cases green technologies and projects. Details of the Open Day will be on the website www.nowhome.co.nz or available from Waitakere City Council: Ph 836 8000 closer to the time.