ZERO ENERGY HOUSE

ONE YEAR ON, WE CATCH UP WITH THE OWNERS OF THE AUCKLAND ZERO ENERGY HOUSE TO FIND OUT HOW THEIR PILOT PROJECT IS PERFORMING AGAINST DESIGN PREDICTIONS.

TEXT **MATT FORDHAM** PHOTOGRAPHY (EXTERIOR) **CHRISTOPH HOSSLEY** (INTERIOR) **TODD EYRE**

Thermal engineer Jo Woods and solar engineer Shay Brazier have lived in their Auckland case study house for one year now. They have released the first set of performance data tracked by built-in sensors — the all-important comfort measures.

Their project seeks to prove that the environmental, health and financial benefits offered by Zero Energy housing are achievable in the New Zealand context. To advance this, they have shared details of the house design, construction, performance and costs so other people can build their own.

TEMPERATURE

The project has many goals including Zero Energy, water efficiency and waste minimisation. But the core requirement for any home is that it is comfortable to live in.

This house achieves comfortable temperature and humidity levels without a heating system. Instead, heat is captured passively using a large area of glazing on the northern side of the house and retained via a concrete slab and extremely efficient building envelope.

Jo and Shay's cost analysis indicates that in the long-run, investing in high-performing windows and extra insulation will save them $12,000 compared with the cost of constructing the house to the building code and installing, running and maintaining heating systems.

Data from the winter months showed an average internal temperature of 19.6°, with the temperature difference between living areas and bedrooms less than half a degree on average. Internal temperatures also remained relatively stable compared with overnight fluctuations outside. A 10° drop outside typically resulted in only 2–3 degrees inside the house.

PERFORMANCE – COMFORT

The winter results are in:

- The house has been warm and dry, with an average temperature of 19.6°
- Avoiding the need for heating has helped to achieve winter power bills of $1.80 a month
- In the long-run, building a home that doesn't require heating will save $12,000

WINTER ENERGY BILLS

Avoiding the need to heat the home has cut their energy demand by 30%, which is the proportion spent on heating by a typical Auckland household. Combined with other energy efficiency measures in the house, they estimate they have used a quarter of the energy of the average Auckland household.

Their roof-mounted solar photovoltaic system generated 30% more energy than they consumed. Because they don't store energy on-site, surplus electricity that couldn't be used in the house was sold to an electricity retailer and they relied upon the grid to purchase energy — typically at night when the photovoltaics were not generating. Because of the price differential between energy bought and sold they ended up with a small winter power bill of $1.78 a month.

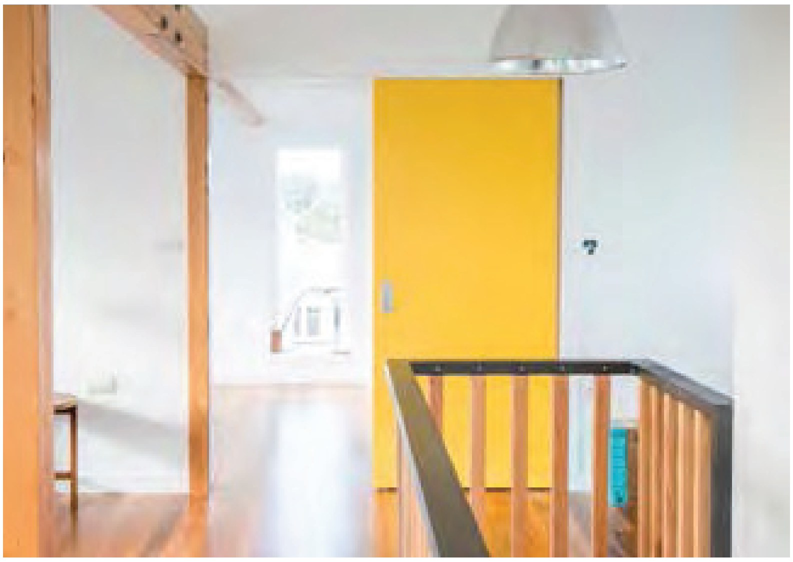
LIGHT

While it's not a driver of thermal comfort, using less lighting further reduces costs. The large area of glazing on the north side of the house brings in a lot of light, but also the choice of paint makes a noticeable difference. Studies have found a third of energy use from lighting can be impacted by factors such as the colour and reflectivity of paints. The interior off-white colour reflects light well and the use of lights over the winter has been minimal. Even the rooms of the south side of the house that don't get direct sunlight feel light as a result of this. ■

Read the full story at **www.zeroenergyhouse.co.nz**

PROJECT DETAILS

Architects **www.astudioarchitects.com**
Energy consultants **www.e3bw.co.nz**
Glazing **www.metroglasstech.co.nz**
Insulation **www.greenstuf.co.nz**
Solar Systems **www.solarcity.co.nz**



TOP & CENTRE The service rooms — kitchen, bathrooms and laundry — are on the south side of the house, with the bedrooms and living areas placed on the north to make the most of natural light and heat. BOTTOM Generous north-facing windows, light colours and reflective paints can greatly reduce the need for artificial lighting. OPPOSITE The east wall gets full sun and has a large opening to bring morning sun into the kitchen.