HIGH PERFORMANCE HOUSES

Wanaka architects have devised an innovative adaptable building design system that ensures sustainable performance and energy efficiency for a wider market sector.

By Anne Salmond, Salmond Architecture, Wanaka

The High Performance House® is an adaptable building design system that uses combinations of prefabricated pavilions and links to create customised and affordable site-specific homes. The concept was created by architects at Salmond Architecture. They believe that energy-efficient, healthy, architect-designed homes can be made available to a wider range of homeowners by standardising some elements and linking them differently to best suit each situation. Such houses fit a gap in the market between standard plans and one-off architecturally designed homes.

Modular, energy-efficient design

High Performance Houses® provide energy-efficient, modular design that is customised for each site and client. These houses provide good environmental performance, siting and design flexibility, and a choice of roof form and cladding. Each house is unique, but by using standard pavilions as the design base, there are cost-saving advantages.

Flexibility to grow over time

Each house is designed and sited to maximise passive solar performance, views and privacy, and minimise siteworks. Clients' needs drive the internal planning of the pavilions. Typically, there are two or more linked pavilions, which come in two standard sizes (65 and 58 m²). Additional rooms are 22 m², and links are approximately 14 m². The links are oriented to suit the sites and can accommodate level changes on sloping sites.

Linked pavilions allow the houses to start small and 'grow' with a family. Growth can be planned from a first home with one or two bedrooms to a family home. Generally, there are between one and four pavilions.

The first pavilion typically has living areas with one or two bedrooms and a bathroom and laundry. Future additions can be planned from the start. Pavilions added during the life of the house may include bedrooms and bathrooms or a garage pavilion with storage and additional space for guest bedroom, bunkroom, office or workshop. Links minimise disruption to the existing house and provide sheltered entry or transition spaces that separate the pavilions for privacy and environmental and acoustic control.

Different sizes for different budgets

The size and cost of a High Performance House® varies from simple 2-bedroom pavilions clad in inexpensive materials and lined with plasterboard to large family homes using timber, stone cladding and high-quality interior finishes.

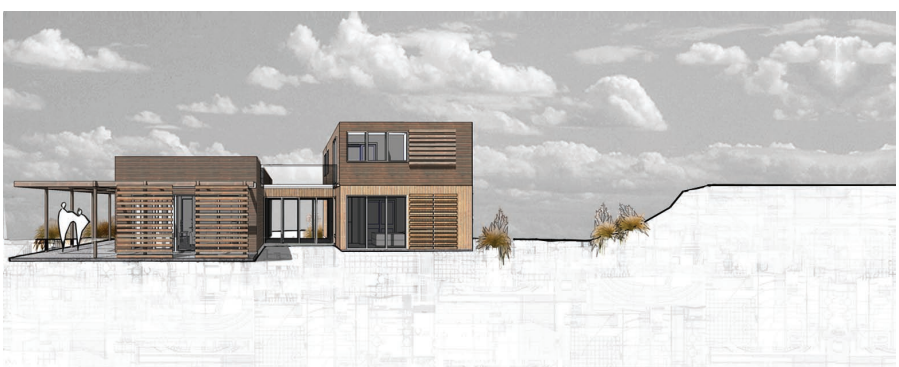
Sizes are based on standard pavilion areas. This makes the houses affordable for couples who may not yet need additional bedrooms, or for people who no longer need a family-sized house.

What all the houses have in common is simple clean forms, sheltered outdoor spaces and a HERS (home energy rating) of 7+, making them comfortable and energy-efficient.

Standardised construction

Structure is located predominantly in the exterior walls for space flexibility over the life of the building and adaptability around different site conditions and uses. Materials are selected for their energy and environmental performance over their life. Pavilions are oriented, glazed and insulated to achieve excellent passive solar performance. Services are designed to minimise energy use and water use.

Standardised construction details are used. Construction methods optimise material use and reduce waste. Alternative methods include offsite assembly of wall panels and windows or conventional simple construction, depending on project specifics.



Foundations are reinforced concrete, engineered for each site. Exterior timber framing is 150 × 50 mm to allow for additional insulation and external load-bearing walls for interior flexibility. Insulation in the roof is R5.2 and R3.8 in the walls. The floor slab is insulated with 50 mm XPS under the whole slab.

Conventional or prefab

Both conventional and prefabricated construction options are being investigated. One alternative construction method is for an engineered timber structure and a prefabricated wall panel system. This allows for off-site construction and cost savings due to subsequent building efficiencies. Structurally insulated panels and modular construction are also being explored for cost comparisons.

Overall, these architecturally advised, client-specific designs with predefined detailing ensure a measured level of sustainable performance and energy efficiency. Cost savings come from using prefabricated building elements, detailed design documentation efficiencies and on-going energy savings.

For more information, go to www.highperformancehouses.co.nz.

Other key features of a High Performance House®.	
Planning	Flexible interior planning.
	Efficient storage including concealed rubbish separation for recycling/composting.
	Deck/pergola along north and westerly façades for outdoor living.
	Minimum circulation space.
Energy efficiency	North-facing living areas for optimum solar gain.
	Minimisation of windows on south side to prevent extensive heat loss.
	Solar panels for water heating (optional).
	Thermostats, timers and submain switch.
	Natural cross-ventilation.
Materials	Environmentally friendly and durable interior materials.
	Benign and low VOC finishes.
	Argon-filled double glazing with low-e coating.
	Minimisation of construction waste.
Water conservation	Water-efficient toilets and low-flow showerheads.
	Greywater reuse for irrigation (optional).
	Rainwater harvesting (optional).
Appliances/lighting	Low-energy light fittings and efficient appliances
	Timers and thermostats to control usage.
Landscape	Permeable ground surfaces.
	Planting for shade, insulation and privacy.
	Fruit trees and vegetable garden to encourage sustainable living.
Measurement	Theoretical performance predicted using ALF and HERS; measured on site after construction.
	Independent measurement of energy performance.
Use	Increased user comfort and health.
	Users' orientation and manual to support effective management of systems, fittings and appliances.
	Maintenance schedule.
	Visible energy monitoring.