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## **Ecohousing Building Systems Capability Document**

In 2001 an International Patent application was filed by Tonny Bergqvist 's Patent Attorneys; Titled: '*BUILDING STRUCTURE AND MODULAR CONSTRUCTION METHOD*' The patent was granted with the Australian Patent No 2001261913. Tonny Bergqvist licensed Goldchill Pty Ltd T/A Ecohousing to market this patented Building System as:

### ***ECOHOUSING BUILDING SYSTEMS***

*Ecohousing Building Systems* located in Maroochydore, Queensland, Australia, is the manufacturers of Polyurethane Building Panels used in the innovative building construction solutions for Houses and Commercial Buildings. As well Ecohousing manufactures the Transportable Manufacturing Plants that produces the Ecohousing Building Panels.

*Ecohousing Building System* can provide building solutions for residential and commercial buildings for virtually any project. We can provide the solutions required under many projects – namely for housing, duplexes, 3 and 4 story apartment units and office complexes, dormitories and the likes.

*Ecohousing Building Systems* is committed to the development, manufacture and marketing of the environmentally friendly Polyurethane Building Panels and building methods. *Ecohousing Building Systems* are "*Building for the future*", satisfying the need for low cost, ecologically sound, totally insulated building solutions that combines the innate strength of Structural Polyurethane with the outstanding thermal qualities of Polyurethane Insulation.

*Ecohousing Building Systems* are classified as Structural Insulated Panels (SIPs). Their lightness, innate strength and load bearing capabilities make them ideal for "minimal framing" building methods, with consequent significant savings in construction time and costs. High thermal resistance ratings means *Ecohousing* homes easily meet the highest star energy efficiency requirements.



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**The Ecohousing Buildings** fulfill the four main principals:

***Developed Internationally for Ecological Sustainable Green Buildings***

- 1. Reduce energy usage**
- 2. Minimise external pollution**
- 3. Reduce embodied energy and resource depletion**
- 4. Minimise internal pollution & damage to health**

- 1.** It is proved that heating and cooling account for 39% of Australia's total domestic energy consumption and 15% of resident sector greenhouse gas emissions. The thermal qualities of the *Ecohousing Building Systems* provide for big reductions in energy requirements, and thus reducing the residential greenhouse gas emissions.
- 2.** The present *Stick frame building methods* predominantly in use, and over 90% of houses being built on concrete slabs, (Ecohousing builds 98% of their houses elevated) and with multiple trades travelling to job sites for months instead of weeks, leaving loads of builders waste to truck to landfills, instead of one wheelie bin on an *Ecohousing* building site. The combined pollution effect with present building methods is massive.
- 3.** The main component in the *Ecohousing* building panels, is *Polyurethane* injected between 6mm fibro cement sheets for walls, and 42mm profiled Spandek® sheets for roof and floor panels, the 2 component *Polyurethane* expands to 30 times it's volume once injected, creates a *Rigid Structural Polyurethane Foam* building panel, light weight with high thermal performance. Manufactured from the low end of oil, not needing extensive refining, it creates its own exothermal heat while expanding, therefor only needing minimal usage of electricity in manufacturing, with no resource depleting materials used in the buildings.



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4. Once the *Polyurethanes* expanding process is completed the Rigid polyurethane foam is chemically inert and cannot give off any gasses, with its high Insulation values heating and cooling is rarely required eliminating the need for heaters and unhealthy air-conditioners and heaters, requiring houses to have windows and doors shut, not allowing fresh air into the home.

### **Advantages of the *Ecohousing Building Systems***

Declining traditional building skills, more stringent energy rating requirements for new homes and inevitably rising prices, coupled with increased interest in and acceptance of a fresh approach to housing, particularly in the area of building materials.

The *Ecohousing Building Systems* is a building system that provides many advantages including:

- Suitable for all high wind areas
- Structural insulated floor panels, wall panels and roof panels
- Durable using fiber cement (Waterblock) sheeting
- Ease and speed of assembly
- Ease/economy of shipment
- Maximum strength, durability and style
- Sound absorbing walls
- Cyclone resistance
- Fire resistance in accordance with ASTM6092
- Green Environmental focus
- Maximum insulation benefits
- Stability of foundations
- Simplicity of connections

### ***Ecological:***

- CO<sup>2</sup> Production emission savings
- Low embodied energy
- Reduced building material waste
- Energy usage savings (cooling / heating)
- Reduce the usage of resource depleting materials



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## **Types of Construction**

*Ecohousing Building Systems* are suitable in the following areas:

- Affordable housing
- Residential housing
- Luxury housing
- Remote area housing
- Commercial offices
- Resort/hotel/motel accommodation
- Schools and Classrooms
- Mining camps with onsite assembly

## ***Ecohousing Building Systems* specification**

### **General:**

The *Ecohousing Building Systems* consists of interlocking sections of Polyurethane Building Panels for floors, walls and roofs.

Each building design is delivered to site flat packed after plans have been approved by the local regulatory authority. All three systems can be used independently with conventionally built houses.

### **Footings and Stumps:**

Square hollow section (SHS) stumps in 'Duragal' finish are placed in concrete pads when pouring cement, hole size generally 350mm diameter, the design of the footing is dependent on soil classification and loading.

### **Floor Panels:**

The elevated and two storey houses *Ecohousing Building Systems* uses galvanized steel 30024 "C" bearers and joists the Spandek© profiled Zincalume clad floor panels are 104mm thick, in lengths up to 10.4 meter with up to 3.6 meter span.

Floor finish is usually Yellow Tongue or Magnesium Oxide (MGO) screwed and glued with Polyurethane glue to the insulated floor panel.

The weight of the panels, in concert with their structural rigidity, allows for a reduction in total stumps required for elevated houses and very little use of concrete.



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### ***R value:***

The insulation value for the insulated floor panel is R4.65 bare for the 104mm panel increasing to R5.20 with different coverings.

### ***Features:***

- Ease and speed of erection
- Suitable for all sub-frames
- Weather resistant
- Fire safe

### **Wall Panels:**

*Ecohousing Building Systems* wall panels comprise of a high pressure injection bonding of **structural polyurethane (PUR)** between sheets of Waterblock© CSR fibrecement, resulting in high strength and light weight wall panels. Wall panels come in 104mm & 128mm thickness and 900mm wide. Available in 2400mm, 2700mm, 3000mm and 3600mm in heights.

### ***Features:***

- High R rating; 104mm **R5.37**
- Absolute true straightness
- Totally reliable thermal and acoustic continuity and performance
- No cavities, no gaps, no cold bridges and no thermal leaks
- Light weight
- Vermin (rodent), ant and termite safe without any chemical treatments
- Fire safe
- Indoor and outdoor application

### **Roof Panels:**

*Ecohousing Building Systems* unique lightweight roof panels are available in lengths up to 10.4 meter, in 104mm thickness. The panel comprise of a high pressure injection bonding off structural polyurethane between sheets of Spandek© profiled Colorbond© or Zinalume. The 104mm roof panel system offers a thermal value of 4.65 bare and has achieved a permissible stress design load of 3.7kPa from James Cook University's Structural Cyclone Testing Centre. They are complimented by standard capping and guttering systems. The roofing panels have been designed for an applied ultimate maximum wind load based on Region "D" Terrain category 3.



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### **Features:**

- Generous span capacity of up to 7 meter for the 104mm panel.
- Absolute structural consistency
- Simple click in joining installation
- Combination of lightness and construction method means speedier project completion
- Fire safe

### **Weather and Climatic Suitability**

The *Ecohousing Building Systems* is designed and tested to withstand extreme climate regimes in Queensland and Australia. The *Ecohousing Building Systems* can also resist all Australian Cyclone regions, Earthquakes, Tornados and other extreme conditions. It is fire resistant, impervious to water penetration, resistant to mould, rotting, and resistant to termites and other pests.

**High Winds** –In wind speed testing, the Ecohousing solution easily met the requirement of the BCA. All buildings are independently certified by a RPEQ (or as applicable for each state) to meet the BCA and local codes.

**Fire resistant** – The *Ecohousing Building Systems* floor, wall and roof panels are injected with fire retardant self-extinguishing polyurethane foam. (PUR) is a self-extinguishing foam according to ASTM6092. Steel used in the system is also noncombustible, so therefore significantly reduces the amount of flammable material in a home.

**Termite resistant** - The *Ecohousing Building Systems* floor and roof panels are clad in Spandek© profiled Colorbond© or Zinalume, wall panels clad with Waterblock CSR fibrecement sheets. Because of this, floor, walls and roof panels does not require additional chemical treatments to protect them from Termites or pests.



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## Maintenance

**Product materials** – The materials used in *Ecohousing Building Systems* require very low maintenance. The use of polyurethane as insulation together with various finishes, makes the internal and external walls virtually indestructible. In the case of a repair being required, these can easily be repaired with normal plaster products which are readily available from local hardware.

**Windows and Doors** – The windows are fitted in weather proof galvanized portal frames, the galvanized steel frame doors are supplied with stainless steel hinges to prevent any corrosion and these are easily replaced as needed.

## Quality Assurance

Quality Assurance is in place to **AS/NZS ISO 9001:2008 in respect to:**

**Design, Manufacture and Supply of pressure injected polyurethane structural insulating/acoustic panels.**

**Design and Manufacture of equipment to produce the panels.**

## Manufacturing Plants

The *Ecohousing Manufacturing Plants* are designed to be shipped in containers to any place in Australia where a large Housing Project is taking place, saving on freight by only having to ship in the 3 components needed to start manufacturing Roof- Wall and Floor Panels:- *Liquid Polyurethane – CSR Cement Sheeting - .42mm Profiled Roof Sheeting*. on completion of the project the manufacturing plant can quickly be moved to a new location to be installed in a suitable building.

We can ship complete Manufacturing Plants in containers to any country in the world where they can be set up ready to manufacture Roof, Wall and Floor panels within 24 Hours of arriving at factory site building, all that is required is 3 phase power and the 3 raw materials required to start manufacturing panels.



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### **Export**

**Ecohousing Building Systems** have been exporting buildings for a number of years now for use in Housing – Schools - Medical Centers – Administration Buildings, shipped in containers to New Caledonia and local Islands and to Papua New Guinea, where a complete Panel Manufacturing Plant has been set up in Lae, with huge savings in freight and import duties, as well as giving work to the local indigenous people.

### **Patents**

Worldwide Patents in place for Building System and Manufacturing Plant.





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