



CERES EcoHouse

A zero emissions, retrofitted Australian home at CERES Community Environment Park.



Welcome to the CERES zero emissions EcoHouse

The EcoHouse was transported to CERES in 1982 and was retrofitted to demonstrate energy efficient design and early solar technology. In its time at CERES it has undergone a series of renovations and alterations to continually improve energy efficiency.

In 2017, in response to the challenges of a warming climate, CERES decided to push for a zero emissions residence. It was time for the EcoHouse to become all electric with no dependency on fossil fuels. We took a number of steps, all of which can be replicated in your own home to work towards your own zero emissions goals.

To keep track of our progress, a Delta Smart Monitor power meter was installed in the entry of the house, to measure our solar generation and electricity use. The data display lets us easily keep track of the system in order to maximise our solar energy use.

5 steps to zero emissions

1 | Remove appliances that use non renewable energy

The gas supplied to Melbourne homes is natural gas, a non-renewable fossil fuel. By replacing gas appliances with electric ones, we can power the appliances with renewable solar electricity. Energy efficient electric appliances are usually less expensive to run than gas appliances.

2 | Reduce energy demand

I) Appliances

The refrigerator and washing machines were selected as the most efficient at the date of purchase.

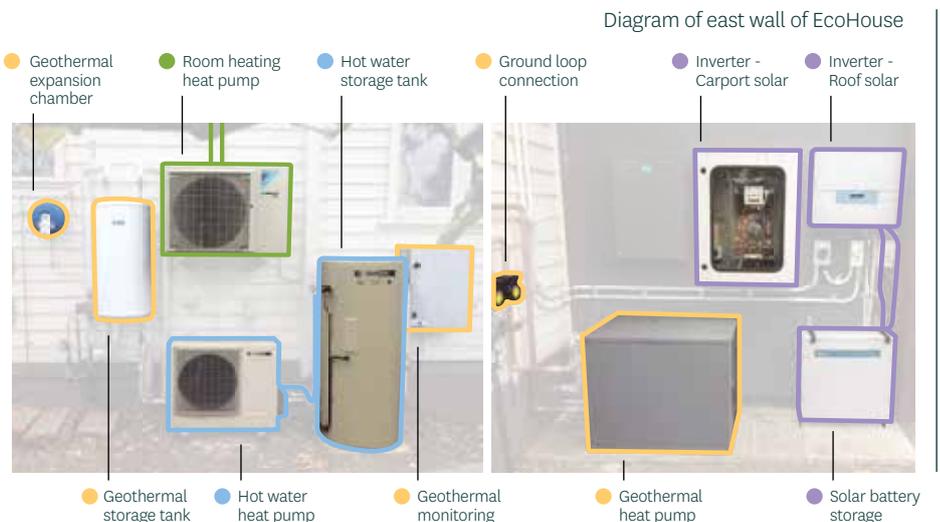
II) Heating and cooling

Heating, cooling and hot water are now provided by heat pumps. Heat pumps move heat from one place to another,

instead of burning fuel to produce heat. This means they are on average four times more efficient than conventional heaters.

- Two heat pump AC/heating units were provided by Daikin and installed Air Fusion. ●
- A hot water heat pump by Sanden was installed by NewGen Solar. ●

- A Water Furnace heat pump was connected to the ground-sourced heat exchange hydronic heating system. The heat pump was provided by University of Melbourne, Department of Civil and Environmental Engineering. ●
- Ceiling fans in the north facing rooms provide very efficient cooling.





Top: Efficient electric induction hotplate
Bottom: Delta AC EV charger

3 | Generate more solar energy

We installed a new 3.71kW solar array, to replace a non-operational solar hot water unit and poorly performing old photovoltaic panels. ●

4 | Install solar electricity storage

We use a hybrid inverter and 6kWh battery for solar electricity storage. This Delta system allows us to capture and store solar energy. The electricity is released when the demand at the time is greater than the amount of solar electricity being generated. The system has several modes that can be programmed to accommodate different time of use charges. ●

5 | Consider the carbon emissions from transport

Transport is a major contributor to greenhouse gas emissions. By using public transport, riding bikes and walking, emissions can be greatly reduced, however sometimes a vehicle is necessary.

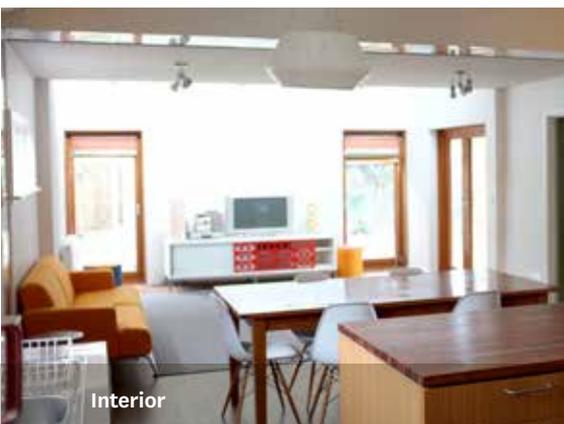
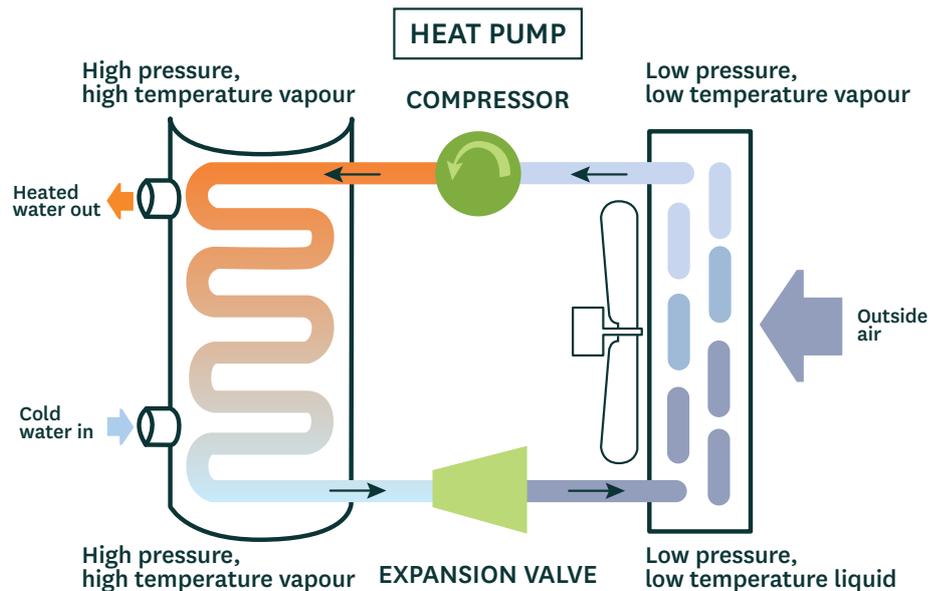
The EcoHouse has a Delta electric vehicle (EV) charge system located in the carport which allows charging of an EV with solar energy.

The electric car normally seen parked at the charge station is a 2014 Renault Kangoo Z.E..

III) Improve lighting efficiency

The EcoHouse has energy efficient light globes throughout – a mix of Compact Fluorescent Light (CFL) bulbs and Light Emitting Diodes (LED).

CFLs use around 70% less electricity than traditional incandescent lightglobes and LEDs use even less. Halogen downlights are extremely inefficient and leave gaps in your ceiling insulation as it cannot be placed over the transformers.



Interior



Front garden



Smart Monitor

What have we learnt along the way?

- **The Victorian residential sector uses 32 times more energy for heating than cooling.** The EcoHouse has been fitted with two heat pump heating systems to demonstrate different efficient space heating options powered by renewable energy.
- **Furnishing and fitting accreditation can be confusing as there are many different forms.** Those used in decision making for the EcoHouse were GECA, ISO14001 and the EU Ecolabel.
- **Real-time tracking of energy use needs to be easy.** A real-time performance information panel or smart monitor linked to the inverter is a great way to track how your house is performing and keep to your zero emissions target.

What other sustainability actions are we taking?

Water saving

A 23,000 litre concrete tank is located at the back of the EcoHouse and is plumbed to the bathroom, toilets and laundry with simple changeover system to mains water.

Hot water taps are connected to a change-over system, which diverts cold water to a storage tank allowing water through only when the correct temperature is reached.

Passive heating and cooling features to control the exchange of heat and light between the EcoHouse and the external environment

- Existing north facing clerestory windows in the back room louvered for summer shading
- Automatic Reflex Shades blinds on the north facing bay windows
- Skylights double glazed with aircell diffuser material

- The airlock at the entrance is an intermediate zone providing thermal insulation to the rest of the house
- Underfloor - R 1.5 aircell reflective insulation
- Wall cavities - R 1.5 polyester insulation
- Roof - R 3.5 polyester insulation
- Parhammer double glazed doors and windows
- Older windows have secondary double glazing by ecoMaster, or Clear Comfort DIY plastic film

Building Materials

- E zero board used in kitchen
- Plywood used for underflooring rather than particle board
- Carpet cut to minimize waste
- Use of recycled building materials

Paints, Fabrics, Floor Coverings and Window furnishing

Environmental impact was the key principle used for furniture selection. Considerations include durability, recyclability, distance travelled, re-use of material, third party accreditation

and carbon footprint and water quality impact e.g. Low VOC paints.

Furniture is GECA-accredited or similar, and/or carbon offset, supplied by LivingEdge, an ISO 14001 accredited company.

Can you take some of these same steps?

Yes! Any home can be converted to reduce carbon emissions. Need help? Positive Charge is a free service that can provide expert advice on the actions for your home. They can also link you up to tried and tested products and services to help you on your journey. www.positivecharge.com.au

Across Victoria, government-accredited Scorecard assessors can visit your home and provide personalised advice on reducing your home's energy use. You will also get a Scorecard certificate, showing your home's energy efficiency star rating. www.victorianenergysaver.vic.gov.au/scorecard



www.positivecharge.com.au



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