Climate Safe Rooms

Protecting people with health vulnerabilities from weather extremes

By Tim Adams, Building Designer, F2 Design

Implementation granted

I was always more than happy to talk to anyone who would listen about the idea. It was only in 2018 when a serious opportunity presented itself to implement the Climate Safe Room model.

The Virtual Centre for Climate Change Innovation[2] announced a grants program for innovative projects. As a representative of Geelong Sustainability, I floated the concept at a grants program workshop and received a very enthusiastic reception.

This positivity raised a level of confidence sufficient for Geelong Sustainability to commit to the substantial amount of work required to make a pitch for the funding of a pilot program, which would confirm the proof of concept of Climate Safe Rooms.[3]

The City of Greater Geelong (pictured) was the project partner responsible to assist in identifying the candidates for the Climate Safe Room project.

Climate Safe Rooms provide a safe haven in the homes of people most at risk of serious illness or death from climate extremes. A Climate Safe Room is an energy-efficient room that remains comfortable in both summer and winter extremes, fully insulated and draught-proofed with high efficiency air-conditioning and small solar system to offset running costs.

In 2020, before COVID-19 struck and delayed installation of climate safe rooms, 16 houses in Victoria were assessed for energy inefficiency. With the Victorian lockdown now behind us, the project's back on, very valuable lessons have been learnt, and there's more to come as health monitoring continues.

Extreme beginnings

The goal of the Climate Safe Room project is to ensure community members with health vulnerabilities are safe in their houses during the more extreme weather events we expect will become more frequent.

The project's genesis was in a Barwon South West region climate change adaptation workshop in early 2016. A discussion at the workshop, around building community resilience to climate change, morphed in my mind into a need to make buildings more resilient.

An article I wrote about the concept was published in Design Matters National News[1] in March of that year. It was then presented to the Liveable Cities Conference in June 2016.

The project became a reality when an application to the Virtual Centre for Climate Change Innovation grant scheme was successful, and it was awarded $300k for implementation and measuring results.

The lead organisation of the Climate Safe Rooms project is Geelong Sustainability, with assistance from partners CSIRO, City of Greater Geelong, EcoMaster and Uniting.

Whole-of-house ratings

Critical to the solution is the understanding that all our major tools for assessing energy efficiency, like NatHERS and Residential Efficiency Scorecard, deliver headline star-rating scores for the whole house performance.

This is useful and important for benchmarking but can deliver scores that are daunting and overwhelming, especially where building fabric thermal performance of the dwelling was not given a high priority when the building was designed and constructed.

A refuge in their own home

In practice, it is not necessary to heat and cool the whole house for every hour of the year to very tight thermostat settings. Very importantly, however, it is essential for occupants, especially those with health issues, to have a refuge that maintains acceptable comfort levels throughout the year.

It is also completely unacceptable, as we learned through the process, that people find it necessary to go to bed and retreat under blankets at sundown in winter because heating is unaffordable, where the unaffordability is due to poor quality building fabric and inefficient heating appliances.

Retrofits balanced with renewables

The project outline was to deliver climate-safe portions of houses occupied by low-income members of the community with health vulnerabilities. Energy efficiency retrofit tasks to improve building fabric and appliance performance were balanced with sufficient photovoltaic renewable energy generation to power the necessary heating and cooling loads.

By all accounts, the idea was viewed with a level of enthusiasm sufficient for the maximum grant amount of $300k to be allocated. This sum, combined with in-kind contributions from partners and a small injection of money from Geelong Sustainability, rounded up to a project budget of approximately $380k.

City of Greater Geelong was the project partner responsible to assist in identifying the candidates. A little surprisingly, participant uptake was slower than anticipated. This in part appears to be due to the response that it seemed too good to be true to be offered up to around $15k worth of upgrades at no cost to the household.

Targeting the most beneficial interventions

Both FirstRate5 [House Energy Rating Software] and Residential Efficiency Scorecard were used to assess the dwellings and identify the best improvements to achieve our goals.

Some of the results were surprising. The biggest revelation, in one house, was when adding R3.5 bulk insulation on top of existing R1.5 improved winter performance by eight per cent; whereas, adding R1.5 floor insulation, where none was existing, improved winter performance by 30 per cent.

Some of these findings provide the understanding that generic/rule of thumb upgrade activities may not deliver the most cost-effective results. Careful use of a NatHERS assessment has proved to be an extremely powerful aid to target the most beneficial interventions. Heating and Cooling energy allowances have also assisted the sizing of reverse-cycle appliances and Photovoltaic array capacity.

The works were defined and costed just prior to the COVID-19 lockdown. Installations, accordingly, were halted but are now proceeding.

Driving maximum benefit

CSIRO is the project partner for monitoring and data collection of indoor conditions and occupation profiles. One advantage of the delay in installation is that we have collected much more 'before' data than would have been possible otherwise.

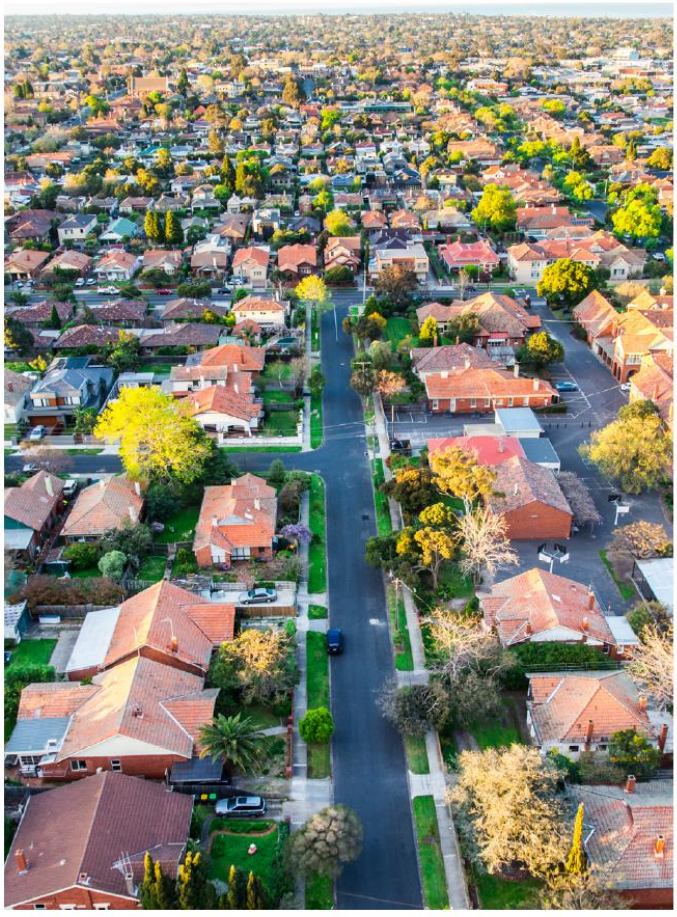
Uniting have used their experience to assist with ensuring the candidates are well informed about the intended effective operation of the houses after remedial works are completed. This is so that occupants do not fail to drive systems to maximum benefit. In some circumstances, this involves incremental behaviour change.

It was anticipated that EcoMaster would install insulation, draft sealing and secondary glazing. Due to COVID-19 and other circumstances, EcoMaster had to withdraw, and those tasks will now be undertaken by local Geelong contractors, as will curtains, blinds, PV and AC systems.

What is a Climate Safe Room?

A Climate Safe Room is a room in the house that has been retrofitted to ensure that it does not become uncomfortably hot in summer or too cold in winter. Initially, the room is made more energy efficient and then a high efficiency reverse cycle air-conditioner (for heating and cooling) is fitted, together with a small roof-top solar system to generate the electricity needed to operate the air-conditioner and offset its running costs.

The program is funded by the Victorian Government and will create the Climate Safe Room at no cost to the eligible participant. The program will also measure health and wellbeing as well as energy bill savings that result from making the home more comfortable during summer and winter weather.



Tackling morbidity

After the project is completed, it is envisaged that the results will inform a broader roll-out of similar enterprises to ensure hospital emergency rooms are not inundated during heat waves, and that our morbidity statistics due to cold in winter do not remain around twice the number experienced in Sweden.[4]

Sources:

1 https://news.bdav.org.au/safe-rooms/
2 https://www.climatechange.vic.gov.au/virtual-centre-for-climate-change-innovation/virtual-centre-for-climate-change-innovation
3 https://www.geelongsustainability.org.au/climatesaferooms/
4 https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(14)62114-0/fulltext