



Reference: AF12/377 SM

28 July 2015

## MEMBERS

**NOTICE** is hereby given that the Environmental Sustainability Sub-Committee will meet in the following Meeting Room on the day, date and time as follows:

**Environmental Sustainability Sub-Committee**  
(Conference Room - Level 1):

Tuesday, 4<sup>th</sup> August 2015 at 7:30 a.m.

An agenda for the meeting is enclosed herewith.

**Mark McSHANE**  
CHIEF EXECUTIVE OFFICER

ENVIRONMENTAL SUSTAINABILITY SUB-COMMITTEE  
Meeting to be held on Tuesday, 4<sup>th</sup> August 2015 at 7.30 a.m.

AGENDA

1. ENVIRONMENTAL MANAGEMENT - Project Management - Efficient Homes Project  
- Ref. AF11/407
2. ENVIRONMENTAL MANAGEMENT - Environmental Sustainability Sub-Committee -  
Reports for Information - Ref. AF12/377

ENVIRONMENTAL SUSTAINABILITY SUB-COMMITTEE

Meeting to be held in the Conference Room, Operational Services Area, Level One of Civic Centre,  
10 Watson Terrace, Mount Gambier, on Tuesday 4<sup>th</sup> August 2015 at 7:30 a.m.

AGENDA

PRESENT: Cr P Richardson (Presiding Member)  
Crs D Mutton, I Von Stanke and S Mezinec

COUNCIL OFFICERS: Aaron Izzard, Environmental Sustainability Officer  
Carmel Ron, Environmental Sustainability Officer  
Sarah Moretti, Administration Officer - Operational Services

APOLOGIES: moved the apology received from be accepted.  
seconded

COUNCIL MEMBERS  
AS OBSERVERS:

**WE ACKNOWLEDGE THE BOANDIK PEOPLES AS THE TRADITIONAL CUSTODIANS OF THE LAND WHERE WE MEET TODAY. WE RESPECT THEIR SPIRITUAL RELATIONSHIP WITH THE LAND AND RECOGNISE THE DEEP FEELINGS OF ATTACHMENT OUR INDIGENOUS PEOPLES HAVE WITH THIS LAND.**

MINUTES: moved that the minutes of the previous meeting held on Tuesday, 7<sup>th</sup> July 2015 be taken as read and confirmed.  
seconded

QUESTIONS: (a) With Notice - nil submitted.  
(b) Without Notice -

**1. ENVIRONMENTAL MANAGEMENT - Project Management - Efficient Homes Project - Ref. AF11/407**

*Goal: Environment*

*Strategic Objective: (i) Systematically build Council as an environmentally sustainable organisation*

The Environmental Sustainability Officer reported:

- (a) The aims of this project are to assist the community in knowing cost effective and efficient methods of heating and cooling their home, and also assist people who are thinking of building a new house or renovating in knowing how they can design their house to be comfortable, efficient and cheap to heat and cool. This project involves installing temperature loggers in houses constructed of a variety of materials – limestone, modern brick veneer, rammed earth, and mixed materials – and leaving them in situ for 12 months. All loggers were removed from the houses at the end of July 2015 so the data could be downloaded and the batteries replaced if necessary. A Final Report has been prepared and attached to this agenda.

moved it be recommended:

- (a) The report be received;
- (b) Council approve publishing of the Efficient Homes Project 2014-2015 Final Report to the City of Mount Gambier website;

Environmental Sustainability Sub-Committee Agenda for 4<sup>th</sup> August 2015 Cont'd...

- (c) Council approve undertaking a third round of the project in 2015/16.

seconded

**2. ENVIRONMENTAL MANAGEMENT - Environmental Sustainability Sub-Committee - Reports for Information - Ref. AF12/377**

The Environmental Sustainability Officer reported:

- (a) Environmental Sustainability Program 2015 - Project Progress

The current table outlining projects for 2015 is attached to the agenda for Members information.

moved it be recommended:

- (a) The report be received;  
(b) item (a) as above be received and noted for information.

seconded

**MOTIONS WITHOUT NOTICE**

The meeting closed at \_\_\_\_\_ a.m.

28 July 2015  
AF12/377  
SM

# Efficient Homes Project 2014-2015: Final Report

August 2015

Aaron Izzard, Environmental Sustainability Officer, City of Mount Gambier

## 1. Project Aims

The aims of this project are to assist the community in knowing cost effective and efficient methods of heating and cooling their home, and also assist people who are thinking of building a new house or renovating in knowing how they can design their house to be comfortable, efficient and cheap to heat and cool. This project involves installing temperature loggers in houses constructed of a variety of materials – limestone, brick veneer, timber, and mixed materials – and leaving them in situ for 12 months. Heating and cooling actions will ideally be recorded by residents. The project is focused on the climate of Mount Gambier.

## 2. Intended Outcomes

- Assist people who are thinking of building a new house or renovating in knowing how they can design their house to be comfortable, efficient, and cheap to heat and cool.
- Highlight the amounts of energy (and hence cost) required to heat or cool homes constructed of various materials in Mount Gambier.
- Assist the community in knowing the most cost effective, efficient and environmentally friendly methods of heating and cooling their home.

## 3. Exclusions & Clarifications

- Room temperatures are not only affected by the building envelope materials, but can also be affected by their position in the house – e.g. north vs south facing, microclimate, position and geography of the house, level of insulation etc.
- No fan pressurisation testing was undertaken to measure air leakage rates and identify draughts.
- Outside temperatures are all correlated, but likely to be affected by their placement at their particular location and micro climates.

## 4. Method

All temperature loggers were tested in an office environment prior to their use in the project. All loggers recorded temperatures within 0.2 of a degree when placed at the same location within a building.

In May & June 2014 HOBO temperature loggers were placed in three different types of house: Modern Brick Veneer, Rammed Earth and Mixed Materials (referred to in this report as “Modern Eclectic”). A set of Geosignal XT100 temperature loggers were placed in an old Limestone house. The purpose of using the two different types of temperature loggers was to compare performance and price.

All loggers were removed from the houses in July 2015 so the data could be downloaded and the batteries replaced if necessary.

## 5. Temperature Loggers



HOBO UX100 Temperature Data Logger

Geosignal XT100 Temperature Logger

The HOBO temperature loggers are the more expensive variety (\$102 vs \$24 for a Geosignal logger), but they are much better quality. It is expected that the HOBO loggers will last much longer, and so be able to be reused more times than the Geosignal loggers. The HOBO loggers can be attached to surfaces by a magnet or Velcro strap, the Geosignal loggers do not come with any attachment features.

The HOBO loggers come with their own software which makes downloading the data and exporting it very user friendly. The Geosignal loggers do not come with any software and changing the settings and downloading data is not as straight forward.

As with the majority of products, you get what you pay for. The Geosignal loggers are cheaper, but they are significantly lower quality and nowhere near as user friendly. The other main advantage of the HOBO loggers is that they have a temperature display, so residents can see the temperature in the room at any time, hence they can play a role in behaviour change through knowledge provision. Finally, the battery does not last as long in the Geosignal loggers, these batteries only lasted just over 6 months, whereas the batteries in the HOBO loggers are expected to last over 12 months.

If more temperature loggers are purchased for future stages of the Efficient Homes Project then it is recommended to purchase HOBO temperature loggers.

## 6. Results

The period from April to October is generally a heating period in Mount Gambier, with residents using heating appliances on most days during this time. The first round of this study found that Mount Gambier residents commonly actively heat their homes between 100-150 days per year. December to February is the period of the year when active cooling is more likely to be used. The first round of this study found that Mount Gambier residents actively cool their homes with an air conditioner between 0-15 days per year. Less intensive methods such as ceiling fans, pedestal fans and opening windows of an evening are used more often – but still much less often than heaters are used.

Overall, Mount Gambier residents use active heating much more often than active cooling throughout the year.

A number of graphs have been produced from the data downloaded from all of the temperature loggers.

More graphs are located in [Appendix A – House Temperature Graphs](#).

### a. *Unheated Rooms*

The efficiency of a home, or more specifically a room within a home, can be ascertained by looking at the temperature change over a 24 hour period and comparing that with the outside temperature change. In order to assess this characteristic without the interference of artificial heating, temperature loggers were placed in unheated rooms that are isolated from the rest of the house by a closed door.

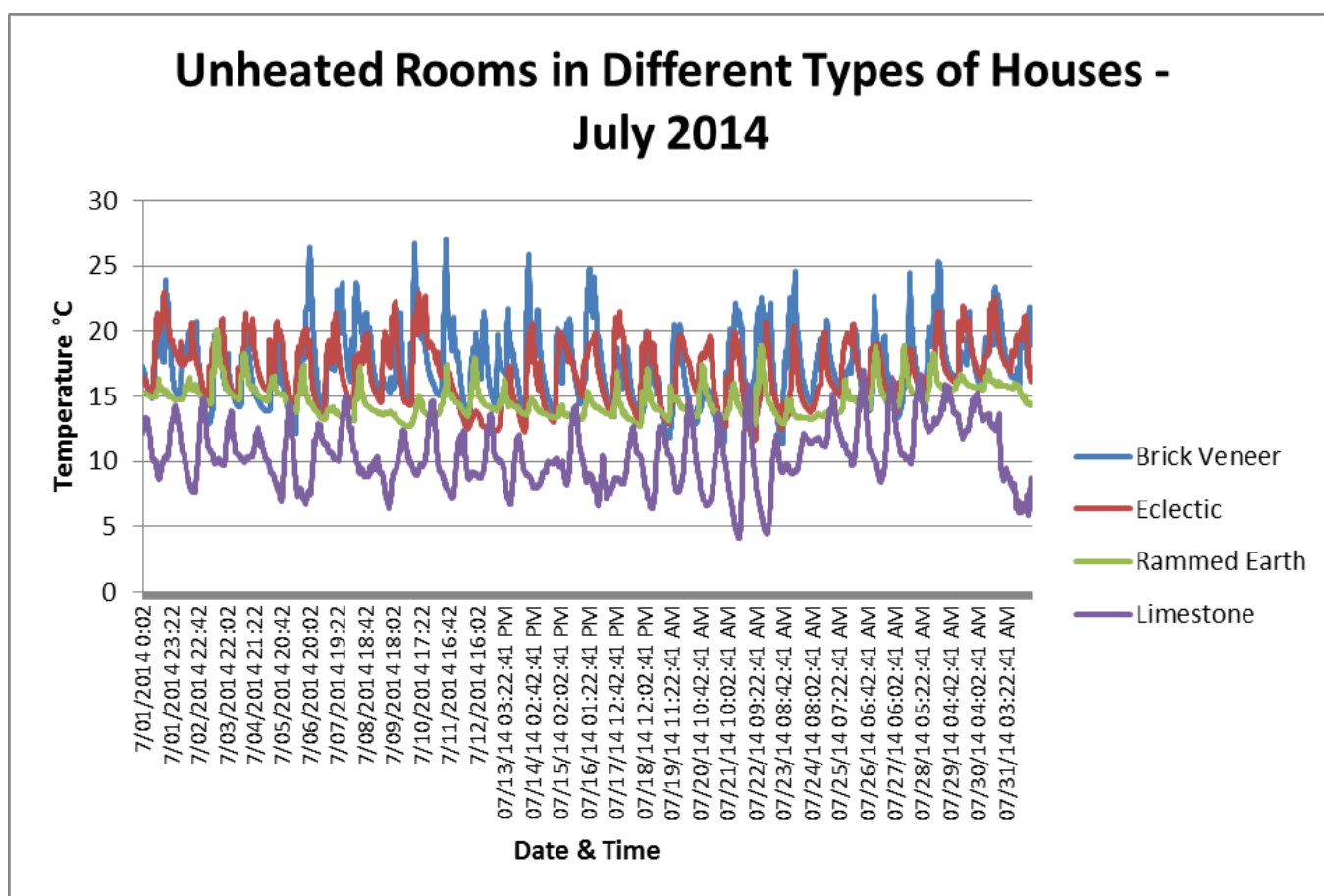
The room that changed the least was the Rammed Earth. Ordinarily one would expect the Limestone house to also have less change, but the unheated/conditioned room was an external laundry that has been added on, and does not form part of the original envelope of the building.

The unheated rooms with the greatest temperature change was in the Modern Brick Veneer house, and also the Limestone house for the reason cited above.

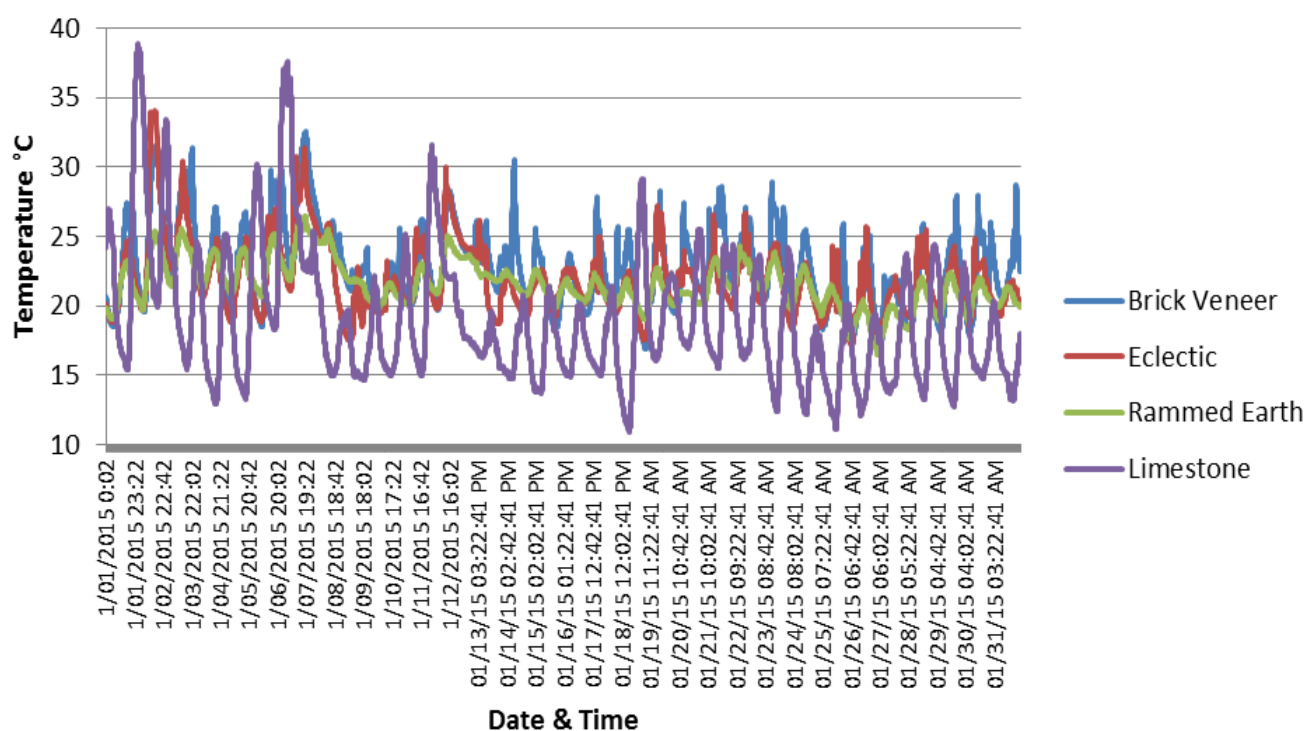
It is expected that the Rammed Earth house would have a smaller temperature range than the Brick Veneer as it has a much higher thermal mass, and hence a lot more energy is required to change its temperature than a building with less thermal mass such as Brick Veneer.

The Rammed Earth had the least susceptibility to the external weather.

In both the Modern Brick Veneer and Modern Eclectic the only unheated room was a laundry. This is not ideal as both laundries had a dryer, and if the door was left open they are connected to the rest of their house which is heated. These factors would have affected the results for these two houses to some degree.



## Unheated Rooms in Different Types of Houses - Januray 2015



### b. Heated (& Cooled) Rooms

The performance of heated and cooled rooms is largely influenced by the behaviour of the residents. Some residents use heaters, air conditioners, fans etc. more often than others, and also like to have the temperature at a higher or lower set point than others.

During the cooler months the Brick Veneer heated room had the greatest daily temperature change, due to the fact that this room was heated to a higher temperature than the heated rooms in the other houses. It also seemed to drop to the lowest temperature overnight.

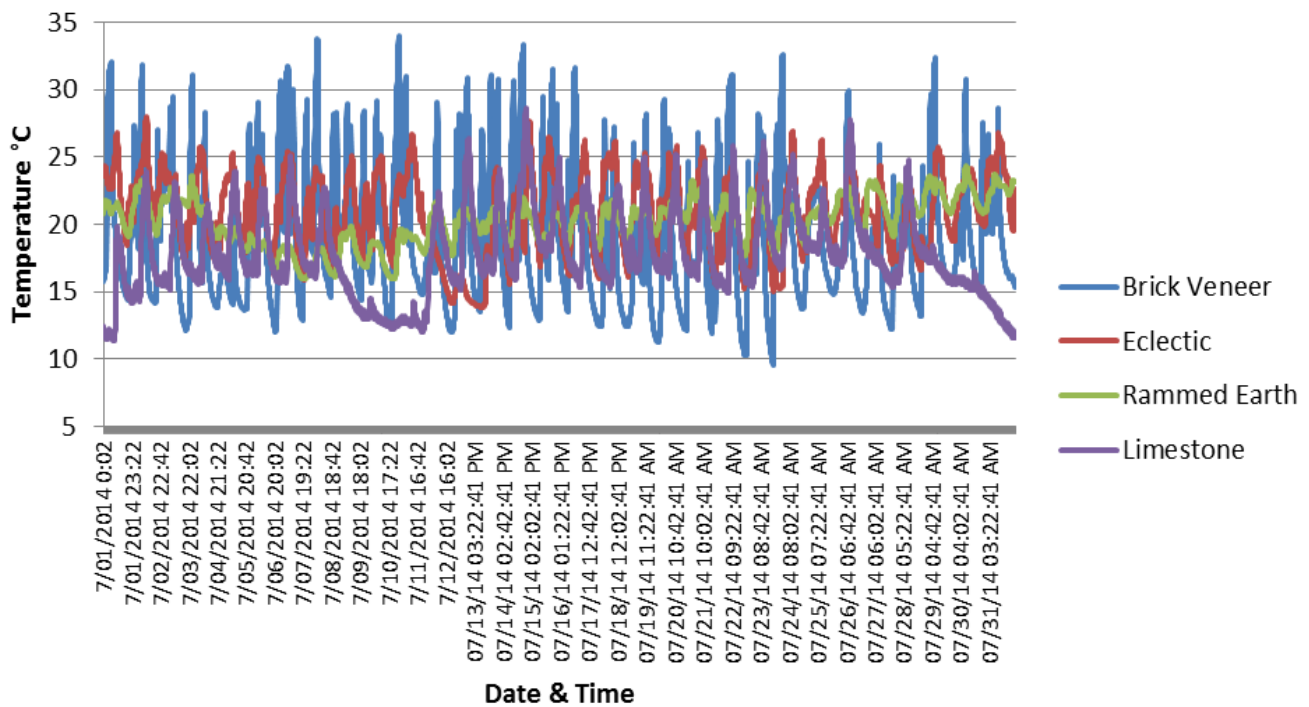
The Rammed Earth heated room experienced the smallest daily temperature change, due to it not being heated as highly as the other houses. It also held its temperature well overnight.

During the hotter months the Brick Veneer room got more consistently hotter, and generally had the greatest temperature variance. This indicates the susceptibility of Brick Veneer homes to the external temperature.

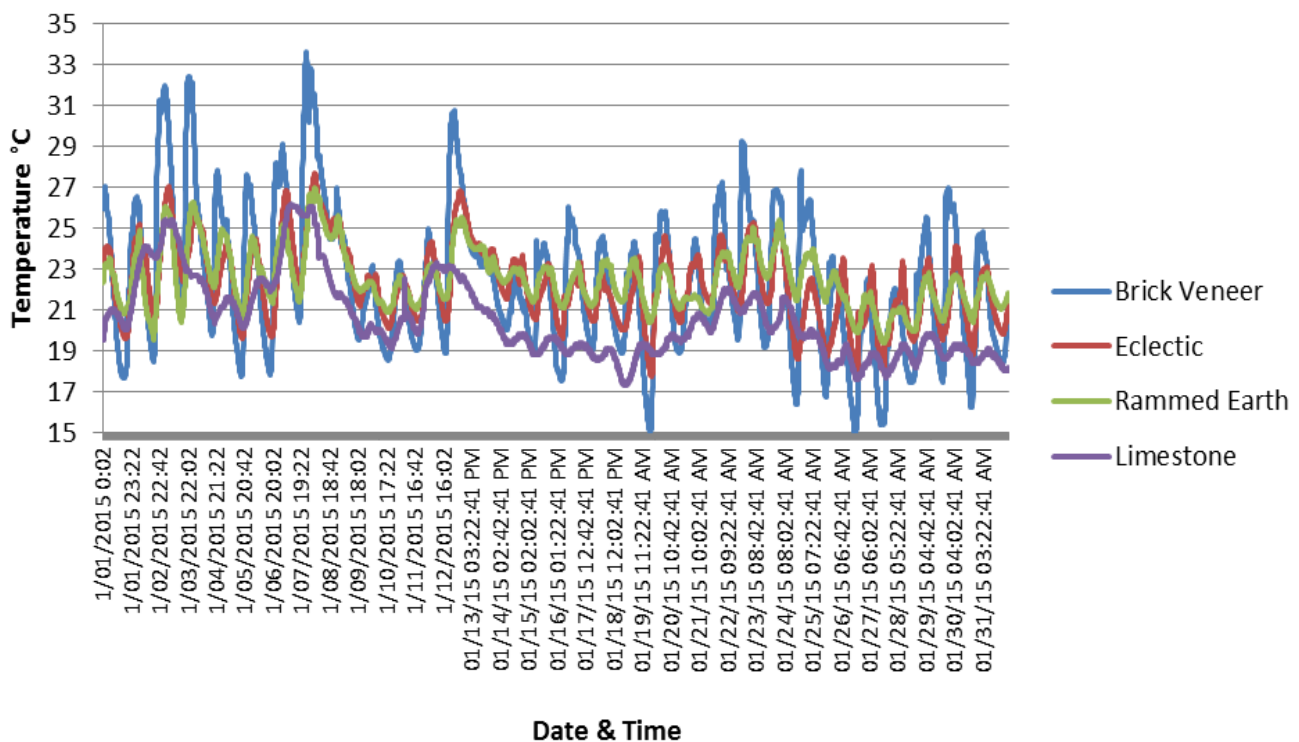
The Rammed Earth and Limestone had the least variance over summer, due to their high thermal mass – much higher amounts of energy are required to change their temperature.



## Heated Rooms in Different Types of Houses - July 2014



## Conditioned Rooms in Different Types of Houses - January 2015



### c. Overall

These results seem to indicate that two factors are important in determining a house's ability to be isolated from outside temperature changes, and retain heat – those being thermal mass and placement of the room within the building (though these are certainly not the only factors – especially the level of insulation).

Going one step further, isolated thermal mass within an insulated building envelope would regulate the internal temperature even more. For example, this may be an internal stone or brick wall or feature which is not directly connected to an exterior wall, but fully contained within the insulating layer.

The Rammed Earth house keeps a very stable temperature, which would make it more pleasant for the occupants. Overall this appears to be a good design for this southern climate.

The results also clearly demonstrate the variation within houses. Building designs must take into account not only the materials, but also the site location, in order to design a building that will take a minimal amount of active energy to heat or cool.

The ideal is a house that is completely passively heated and cooled, with no requirement for extra energy for this purpose. This may be difficult in Mount Gambier's predominantly heating climate, but a building that only requires minimal active heating (and cooling) could surely be achieved.

High thermal mass seems to make a significant contribution to this end. If a house contained isolated thermal mass that could be relatively passively activated, this would mean an even more stable temperature for the occupants.

### Heating

Heating every room regardless of whether someone is using them or not is very inefficient. Many modern homes have central heating (and cooling), but they heat every room on the system regardless of whether they are occupied or not. Energy (and money) is being used to heat rooms that are not being used.

Home owners thinking of installing central heating should make sure that it can be zoned. This may involve having vents that can be closed when the room is not being used.

Home owners should also seriously consider if they really need (central) heating in the bedrooms. In Mount Gambier's climate, heating should generally only be required in bedrooms for people with special needs e.g. infants, elderly, those who are sick etc. Generally, healthy adults in a reasonably constructed home should not need heating in their bedroom in this climate.

## 7. Future Recommendations

As far as possible, install the temperature loggers in similar locations within (and outside) each house e.g. unheated room on the south side of the house. This will not always be possible, but some consideration should be given to this when selecting houses for subsequent rounds of the project.

## 8. Next Steps

Given that all the temperature loggers are still working, place them in another set of houses for 12 months. Preferably place the loggers in homes made of different materials to those tested in the 2014-2015 round.

## 9. Enquiries

Enquiries about this project can be made to:

Aaron Izzard

Environmental Sustainability Officer

City of Mount Gambier

E: [aizzard@mountgambier.sa.gov.au](mailto:aizzard@mountgambier.sa.gov.au)

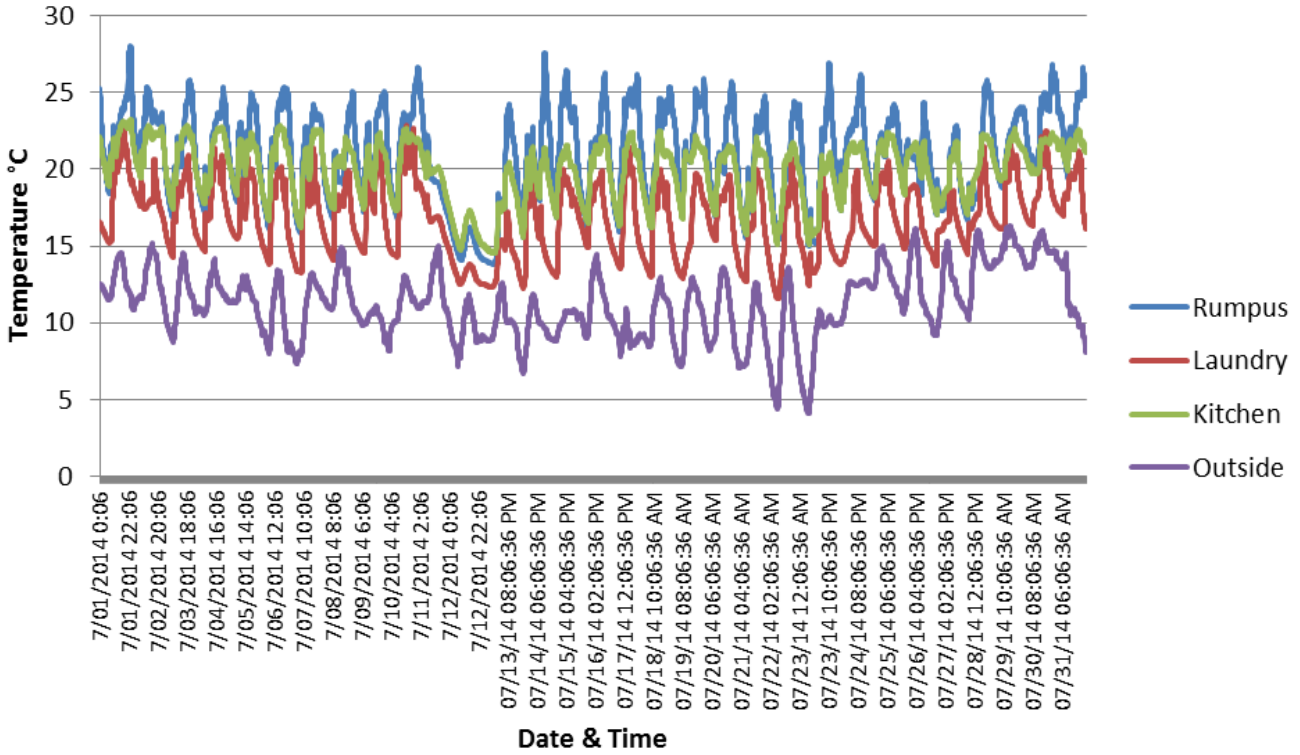
T: 08 8721 2528

## 10. Further Information on Home Energy Efficiency

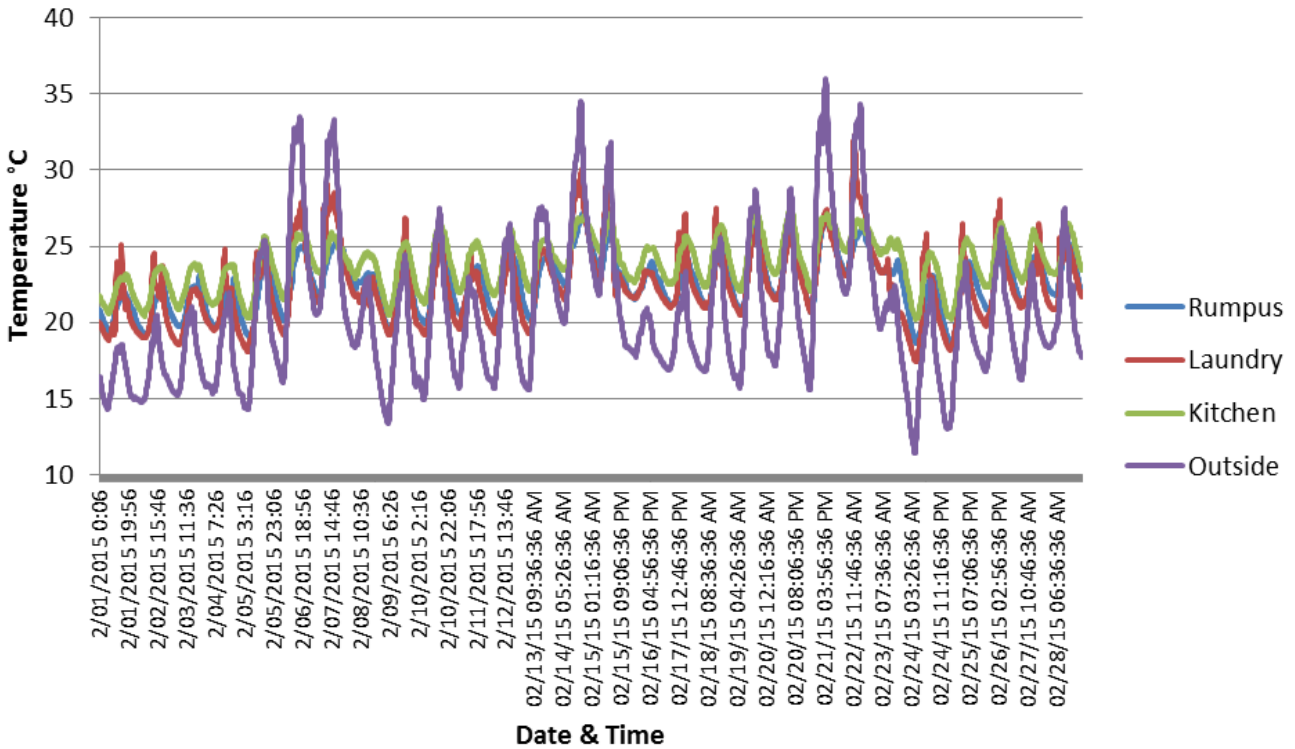
For a more detailed discussion on the energy efficiency of a variety of existing homes see this report commissioned by Sustainability Victoria: [On-Ground Assessment of the Energy Efficiency Potential of Victorian Homes](#)



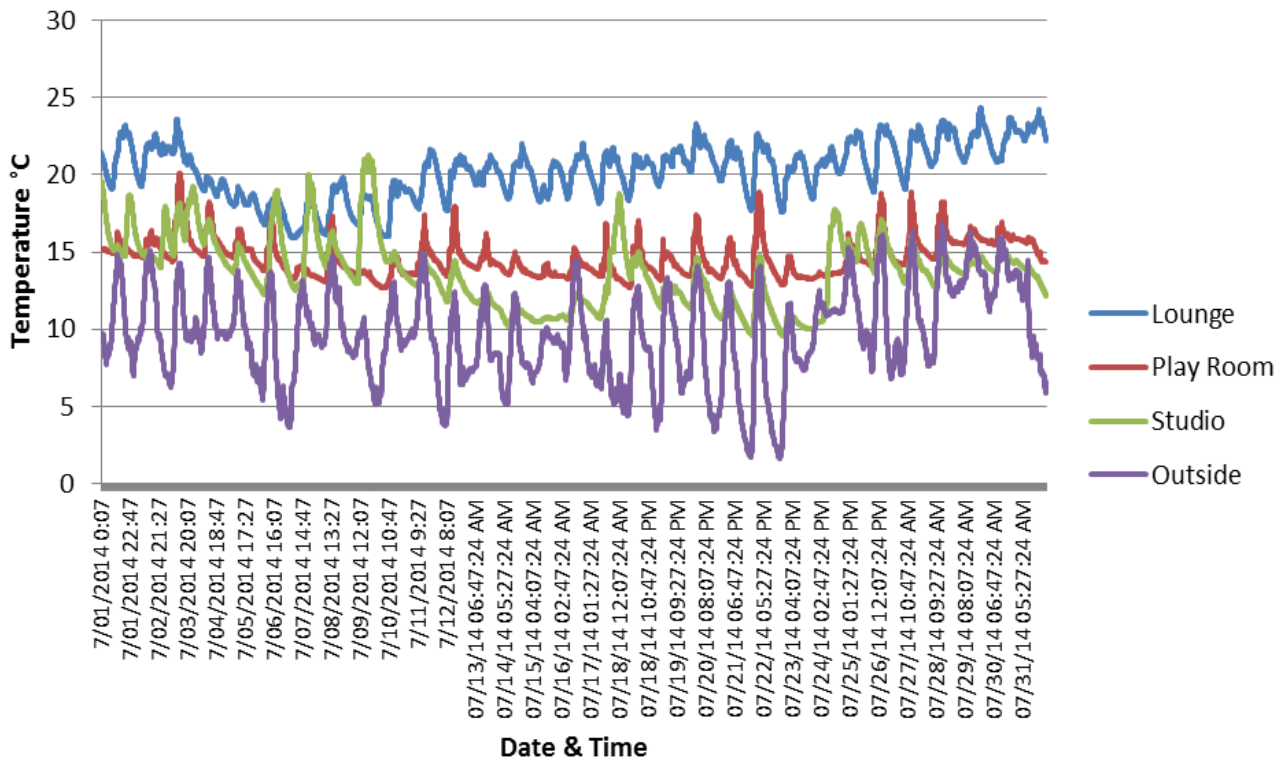
## Modern Eclectic All Loggers - July 2014



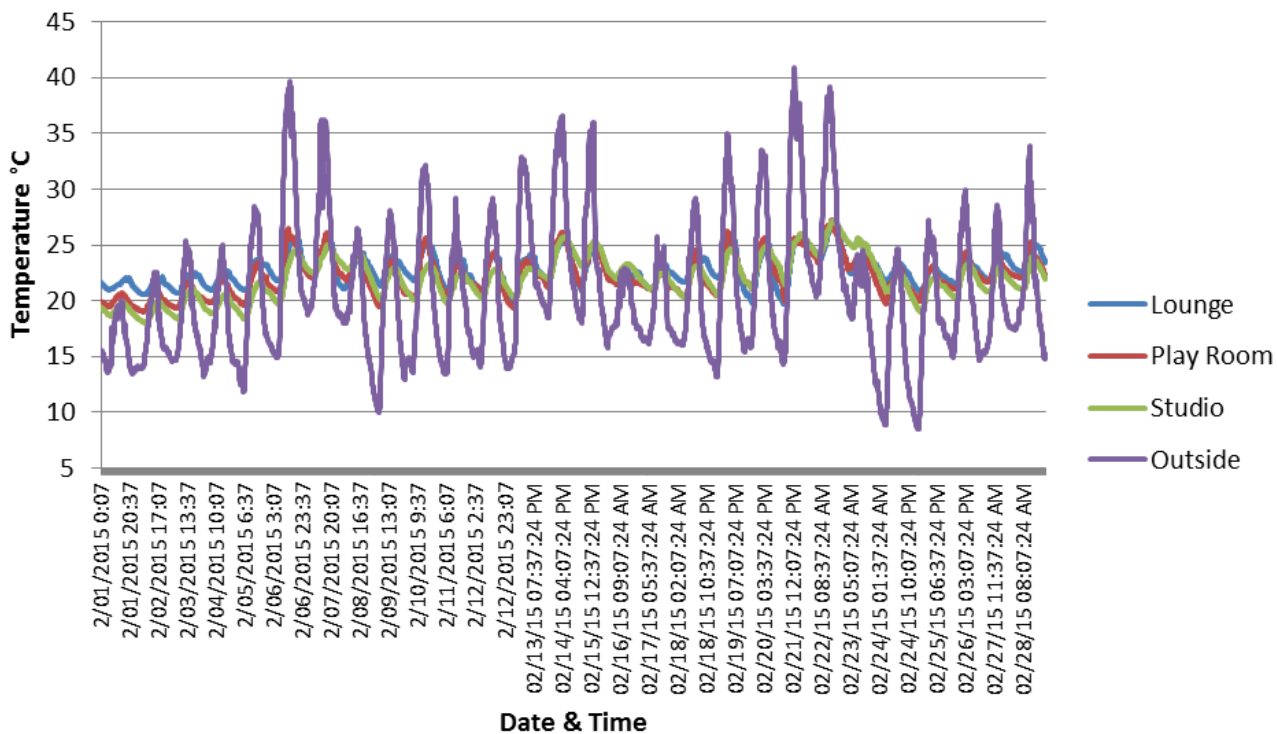
## Modern Eclectic All Loggers - February 2015



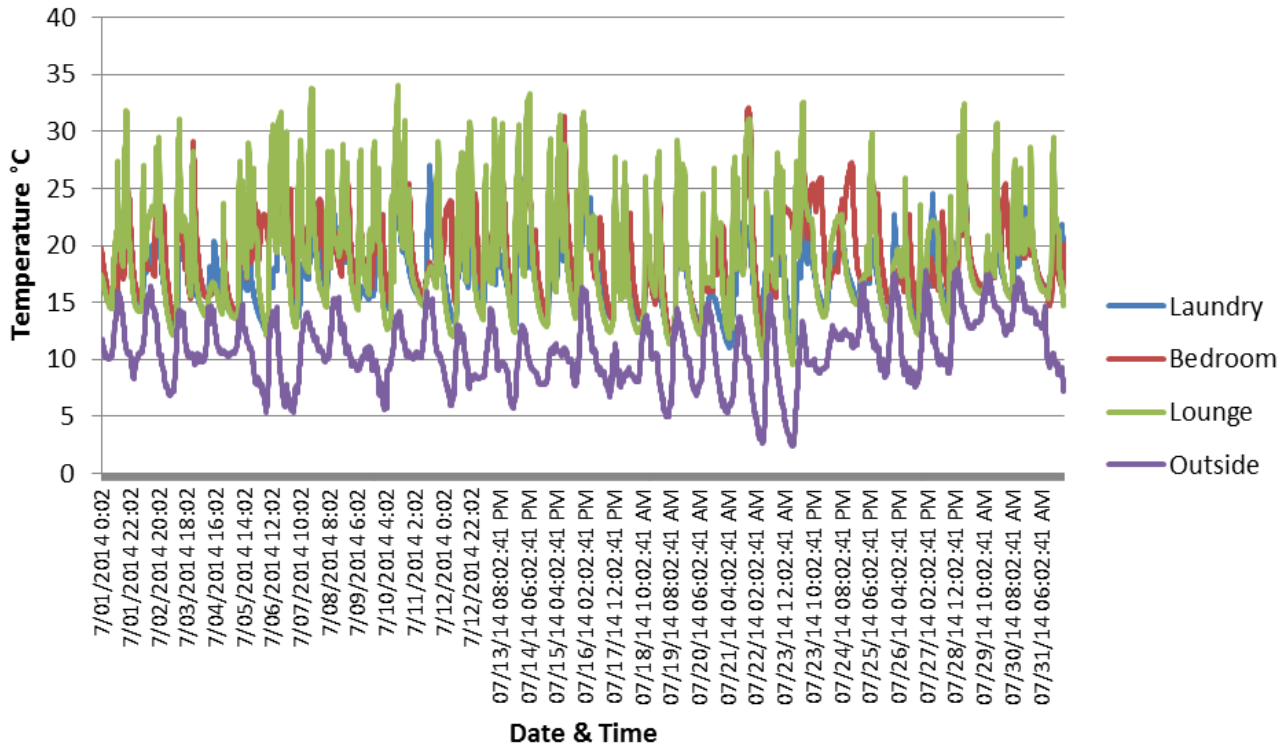
## Rammed Earth All Loggers - July 2014



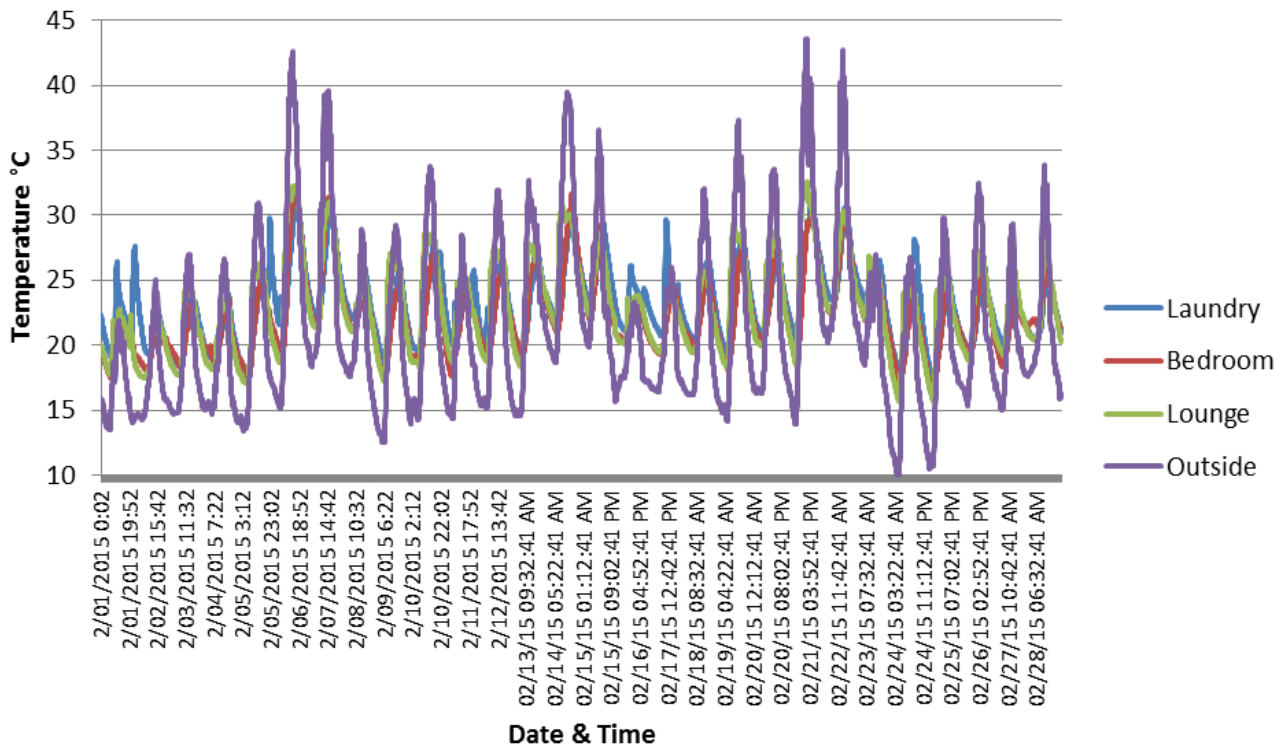
## Rammed Earth All Loggers - February 2015



## Modern Brick Veneer All Loggers - July 2014



## Modern Brick Veneer All Loggers - February 2015



## Environmental Sustainability Program 2015 – Project Progress

**Updated: 4<sup>th</sup> August 2015**

<b>Project</b>	<b>Summary</b>	<b>Progress Notes</b>
Salvage Yard	Investigate opportunities for re-establishing a salvage yard in Eucalypt Drive.	Staff are working on an updated EOI with an external organisation with a view to re-releasing it.
Caroline Landfill Audit	Audit the trucks depositing waste to the landfill to identify opportunities to reduce the amount of recyclables and organics that are being deposited.	Contractors have been contacted to let them know the results of the audit and to find a way forward to reduce contamination.
Organics Next Steps	Investigate opportunities for reducing the amount of organic waste being put in Council's kerbside rubbish bins.	At the March 2015 Council meeting Council approved the release of 2,000 kitchen caddies with bio-bags to organics bin subscribers in the 2015-2016 financial year. Bulk buy opportunities for compost bins and worm farms are also being investigated.
Library Solar Power System	Installation of a 57kW solar system on the roof of the Library, to supply 25-30% of the Library's electricity needs.	The system is now switched on and fully functional. The display inside the library will be switched on in the near future.
Blue Lake Solar Lighting	Involves the installation of solar lights around the footpath around the Blue Lake.	Installation of the lights is now complete. Leadsun are testing a few lights that have been switching off a little early, to be complete in the next two weeks.
Park & Stride Mount Gambier	The aim of this 12 month project is to encourage community members who come to central Mount Gambier to shop, to park in an off-street car park and walk to shop, rather than drive from shop to shop.	The program has been launched. So far there have been over 500 Facebook page likes, 150 Surveys completed, over 150 people make the public commitment, and thousands of Facebook 'Post Reach'. A variety of prizes have been given including shop vouchers and P&S eftpos cards.
Bin Tagging	This involves checking the contents of waste and recycling bins from 150 properties, and give specific feedback about what goes in which bins.	All four runs completed. Recycling bin contamination reduced 41%, and waste bins by 47%. The program will be undertaken again in Spring 2015.
Efficient Homes Project	This project involves installing temperature loggers in houses constructed of a variety of materials – rammed earth, modern eclectic, modern brick veneer and limestone – and leaving them in situ for 12 months.	Loggers have been now been collected. Data is being analysed and a final report being prepared.
Aquatic Centre Energy Audit	An audit of the electricity use of the Mount Gambier Aquatic Centre. It is anticipated that the auditors will make recommendations for improving the efficiency of the facility, leading to long term reductions in electricity costs.	Follow up investigations are currently being undertaken.
2015 KESAB Awards	Nominate City of Mount Gambier for numerous categories within the KESAB awards.	2015 submission has been submitted. Judging will take place later in the year.
Resource Efficiency Review	Review of Council operations to identify what level of resources are currently being used, and identify opportunities for increased efficiency.	Some initial data received from Finance and suppliers. Analysis of data will commence in the near future as the ESO work program allows.
Fruit Tree EOI	Involved working with residents to put a small number of fruit trees in their local reserve.	In conjunction with local residents 6 fruit trees were planted in the Limestone Court reserve on Thursday 2 July 2015.
Carbon Reporting	Measure and report on Council's carbon emissions for the	Reporting will commence when final 2014-2015 utility bills are received in



	2014-2015 financial year. Assess if Council triggers any carbon and/or climate change legislation.	August.
Mount Gambier: Edible City	Run a series of workshops on home food production, from beginner to more advanced topics.	Program was launched on Sunday 21 June 2015 at John Powell Reserve. Webpage is live. Workshops are being organised. First workshop will take place at the Mount Gambier Farmers Market on Saturday 15 <sup>th</sup> of August.
Smaller Projects	<ul style="list-style-type: none"> <li>- Smart Living profiles.</li> <li>- Talks at schools and community groups on environment and sustainability topics.</li> </ul>	<ul style="list-style-type: none"> <li>- Five Smart Living profiles have been completed.</li> <li>- Talks undertaken on an ongoing basis upon request. Two radio interviews were undertaken regarding the Mount Gambier: Edible City project. A talk will be delivered at Mulga St primary later today on the topic of groundwater.</li> </ul>
Environmental Events	<ul style="list-style-type: none"> <li>- Clean Up Australia Day</li> <li>- Earth Hour</li> <li>- Ride to Work Day</li> <li>- Walk to Work Day</li> </ul>	<ul style="list-style-type: none"> <li>- Completed.</li> <li>- Completed.</li> <li>- Wednesday 14th October.</li> <li>- Friday 8 November.</li> </ul>