This activity received funding from the Australian Government as part of the Community Energy Efficiency Program.

The views expressed herein are not necessarily the views of the Commonwealth of Australia, and the Commonwealth does not accept responsibility for any information or advice contained herein.
# Community Energy Efficiency Program – Final Report for 43 Davey Street, Frankston City Council

## TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Contents</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>EXECUTIVE SUMMARY</td>
<td>2</td>
</tr>
<tr>
<td>PROJECT OBJECTIVES</td>
<td>4</td>
</tr>
<tr>
<td>PROJECT ENERGY EFFICIENCY ACTIVITIES</td>
<td>4</td>
</tr>
<tr>
<td>Technology Summary</td>
<td>5</td>
</tr>
<tr>
<td>HVAC upgrade to economy cycle</td>
<td>6</td>
</tr>
<tr>
<td>Exit lights</td>
<td>7</td>
</tr>
<tr>
<td>Appliances</td>
<td>7</td>
</tr>
<tr>
<td>Solar Tube Skylights</td>
<td>8</td>
</tr>
<tr>
<td>Lighting</td>
<td>10</td>
</tr>
<tr>
<td>Organic Response Lighting</td>
<td>10</td>
</tr>
<tr>
<td>Thermal Window Film</td>
<td>12</td>
</tr>
<tr>
<td>Billi Eco Hot Water</td>
<td>14</td>
</tr>
<tr>
<td>Apricus Solar Hot Water</td>
<td>14</td>
</tr>
<tr>
<td>PROJECT DEMONSTRATION AND COMMUNICATIONS ACTIVITIES</td>
<td>19</td>
</tr>
<tr>
<td>Internal Stakeholders (Staff)</td>
<td>20</td>
</tr>
<tr>
<td>External Stakeholders (Community)</td>
<td>20</td>
</tr>
<tr>
<td>Thermal Comfort Guidelines</td>
<td>20</td>
</tr>
<tr>
<td>Real time energy display system</td>
<td>23</td>
</tr>
<tr>
<td>Meetings, emails and briefings</td>
<td>24</td>
</tr>
<tr>
<td>Energy Buster Workshops</td>
<td>27</td>
</tr>
<tr>
<td>Signs in staff kitchen and around the office</td>
<td>27</td>
</tr>
<tr>
<td>Educational Video about the project</td>
<td>30</td>
</tr>
<tr>
<td>OUTCOMES AND BENEFITS OF THE PROJECT</td>
<td>32</td>
</tr>
<tr>
<td>BUDGET</td>
<td>35</td>
</tr>
<tr>
<td>PROJECT OPERATION, MECHANISMS AND PROCESSES</td>
<td>36</td>
</tr>
<tr>
<td>CONCLUSION</td>
<td>37</td>
</tr>
</tbody>
</table>
EXECUTIVE SUMMARY

The project objectives were to reduce the running costs of the staff offices through reducing Council’s energy usage, and contribute towards our Carbon Neutral 2025 target and annual targets of 7,999 tonnes CO$_2$e in the next few years.

With the CEEP grant, Council retrofit the existing building to increase thermal capacity through insulation and reducing heat loss, increase natural light, replace inefficient lighting, heating, cooling and appliances with efficient retrofits. A comprehensive communications strategy engaged users as to the works being done, and how they can assist with improved behaviours.

Overall objectives are to:

- reduce energy consumption and GHG emissions of the building by 28.2 tonnes of CO$_2$e per annum, equivalent of 20,618 kWh reduction, 28.52% reduction in energy demand
- prepare for predicted increased use of the building from 2013 to keep emissions down
- contribute towards Council’s Carbon Neutral 2025 target and annual targets of 7,999 tonnes CO$_2$e
- increased thermal capacity/reduce heat loss and gain for the buildings, resulting in reduced heating and cooling demand
- optimise the existing HVAC system, significantly reducing electricity demand.

A range of technologies were used to achieve the project objectives including:

- HVAC
- Lighting, timers and sensors
- Skylights and windows – increasing natural light, fresh air intake (linked to HVAC) and address thermal efficiency
- Appliances – replace inefficient dishwasher and fridge with efficient
- Exit lights – replace fluoro with LED
- Water boiler replacement with instantaneous and timer
- Solar hot water to replace electric storage hot water
- Replacing double T8 light fittings with single T8s or T5s and/or LED where suitable
- Installing sensors and timers on lights in infrequently used rooms
- Sealing drafts and address insulation issues and thermal efficiency
- Modifying internal walls where possible to increase natural lighting and air movement to reduce lighting and HVAC demands
• Changing timers and settings on light timers, electric hot water, and HVAC system

A range of communication and education activities supported the project and its promotion including:

• Development and implementation of the Heating and Cooling Policy, known as the Thermal Comfort Guidelines

• Installation of a real time energy display system

• Educational Video about the project

• Meetings, emails and briefings; Signs in staff kitchen and around the office

• Councillor bulletins; Media Release about the project; Energy efficiency articles in local media/newsletters

• Sustainable Homes “Energy Busters” Workshops and handouts (general).

Energy efficiency outcome monitoring has commenced, with targets yet to be met. Increased occupancy and operating hours of the building have affected this. As at May 2014, a slight reduction of energy usage had been observed of 4,167 kWh per year, consisting of a 6,166kWh/year reduction on the upper level (office space) to 67,847 kWh per annum. This was primarily due to the Stage 1 Works of replacing the electric storage hot water service with solar hot water, and replacing inefficient appliances. Since this time however, increased occupancy of the building, and a combining of 2 separately metered areas into one, has made further energy reductions challenging as Council can no longer compare the original area.

A range of social benefits are already apparent with improved staff comfort and energy efficiency awareness, and positive feedback from workshops.

Council encountered issues with timing and budget due to additional scope being added to the project from Council. This caused several delays and required Council to contribute additional funding. A Deed of Variation and several milestone extensions were granted to assist with this.

The project was over-budget due to costs coming in higher than estimated at the time of applying for the CEEP grant, and with CPI increased from the grant being written to being awarded and delivered, this also impacted the budget.

The initial project budget was $257,103 with $126,290 being contributed by the Department of Industry. The total project cost was $322,522. Council has made up the shortfall with an initial $315,522. Once grant funds have been received, the budget breakdown will be:

Total Project: $322,522 = Department Contribution $126,290 + Council contribution $196,232
**PROJECT OBJECTIVES**

The project objectives were to reduce the running costs of the staff offices through reducing Council's energy usage, and contribute towards our Carbon Neutral 2025 target and annual targets of 7,999 tonnes CO2-e in the next few years.

With the CEEP grant, Council retrofit the existing building to increase thermal capacity through insulation and reducing heat loss, increase natural light, replace inefficient lighting, heating, cooling and appliances with efficient retrofits. A comprehensive communications strategy engaged users as to the works being done, and how they can assist with improved behaviours.

Overall objectives are to:

- reduce energy consumption and GHG emissions of the building by 28.2 tonnes of CO2-e per annum, equivalent of 20,618 kWh reduction, 28.52% reduction in energy demand
- prepare for predicted increased use of the building from 2013 to keep emissions down
- contribute towards Council's Carbon Neutral 2025 target and annual targets of 7,999 tonnes CO2-e
- increased thermal capacity/reduce heat loss and gain for the buildings, resulting in reduced heating and cooling demand
- optimise the existing HVAC system, significantly reducing electricity demand.
- Electricity cost savings

**PROJECT ENERGY EFFICIENCY ACTIVITIES**

Frankston City Council's proposed project aims to improve the energy efficiency of staff accommodation at "Annex43" (43 Davey Street Frankston) through a range of energy efficiency actions including lighting, HVAC optimisation, thermal capacity and appliances.

The building was selected due to its current high energy use, and to gain economies of scale by reducing project management costs, by tying the energy efficiency works into existing plans by pooling resources and preventing the need to re-visit completed works to then make them energy efficient in the future.

This will 'green' the existing plans for long term GHG emission reductions.

A range of technologies were used to achieve the project objectives including:

- HVAC
- Lighting, timers and sensors
- Skylights and windows – increasing natural light, fresh air intake (linked to HVAC) and address thermal efficiency
- Appliances – replace inefficient dishwasher and fridge with efficient
- Exit lights – replace fluoro with LED
- Water boiler replacement with instantaneous and timer
- Solar hot water to replace electric storage hot water
- Replacing double T8 light fittings with single T8s or T5s and/or LED where suitable
- Installing sensors and timers on lights in infrequently used rooms
- Sealing drafts and address insulation issues and thermal efficiency
- Modifying internal walls where possible to increase natural lighting and air movement to reduce lighting and HVAC demands
- Changing timers and settings on light timers, electric hot water, and HVAC system

More detailed information about some of the technologies follows.

**Technology Summary**

The technologies used were selected as they were the leading products on the market at the time of undertaking the project, offering great ‘bang for buck’ and long term energy savings without compromising on quality.

The technologies selected were complementary to one another for overall energy efficiency benefit. For example, Organic Response lighting has a built in light sensor, so it will dim down to save energy when there is adequate natural light from the windows and skylights.

The operable window is wired into the building management system so that the system controls when it opens and closes, using temperature, wind and rain sensors. This overcomes human intervention of opening windows when the system is actively heating and cooling.

Council is still tuning the HVAC system to run efficiently. It has had some initial ‘teething problems’ with the sensors picking up drafts in the walls and subsequently sending a signal to the Building Management System that the room is cooler than it actually is. The drafts have been addressed, and tuning of the HVAC system will continue until it is working efficiently and in harmony with the technologies in the building. Below is an image demonstrating how we monitored the teething problems using a FLIR infra-red camera.
HVAC upgrade to economy cycle

HVAC (Heating, Ventilation and Air Conditioning) units were modified to allow for an economy cycle – bringing in fresh air in times of ambient temperature thus reducing the need for artificial heating and cooling. A Building management system was put in place to allow the different package units on the roof to “talk” to one another – working in harmony rather than against each other. This was to overcome the situation where one unit is heating while the other is cooling, harmonising how the system works.

Part of the economy cycle of the HVAC included getting fresh air inside via the previously fixed window. An operable double glazed window linked to the Building Management System was installed to replace a fixed window to allow the HVAC system to bring in fresh air when the ambient air temperature requires no heating and cooling. Not only does this save energy, but also had social benefits in the comfort levels and air quality for building users.

Further ductwork was undertaken to improve the efficiency of air flow so that the units do not have to work as hard, saving energy.
**Exit lights**

Emergency Exit lights typically use a lot of energy as they are on 24 hours a day, every day of the year. We replaced all fluorescent Exit lights with LED exit lights, which represent approximately an 80% energy saving.

**Appliances**

Old inefficient appliances consisting of a fridge and a dishwasher were replaced with new, energy efficient alternatives. A Fisher and Paykel refrigerator was selected as it was the 2nd most efficient fridge available and there was a significant price difference (approximately $1000) to save an extra 30kWh per year. The fridge selected uses a mere 330kWh per year, replacing a fridge that was using over 500kWh per year. Significant research went into finding the most energy efficient dishwasher on the market. The selected unit, a Bosch, was the most efficient that could be sourced, using a mere 205kWh per year — around half that of other dishwashers and around a third of the one it replaced.
Energy Efficient appliances:

Solar Tube Skylights

Solar Tube skylights were selected as they are energy efficient (minimise heat loss and gain) and have excellent light rendition and distribution.

Solatube has long been an innovator in building daylighting. Through advanced technology, a Solatube Daylighting System provides more light than an ordinary skylight many times its size; thus eliminating many of the problems associated with large skylights.

The Raybender® 3000 Technology uses a series of lenses to capture more indirect light and less too-bright, too hot direct light. That means that the amount of light that’s captured stays fairly steady in cloudy or sunny weather, in summer, in winter, even in the morning, evening and midday. It is designed to bring in more light when it’s needed and less
light during times when the light is uncomfortably bright. It brings in light while excluding most heat, so it won’t contribute greatly to solar gain. The Lighttracker™ Reflector takes the light that’s been absorbed into the skylight and directs it straight down the skylight tube, minimising the number of times it will reflect off the walls and preserving as much of its intensity as possible. **Pictured below is one of the units installed during the project.**

Solatube skylight tubes are lined with the most highly reflective material available; Spectra Light Infinity. Every time the light bounces off the side of the tube, it retains 99.7% of its intensity and releases very little heat. However, that three tenths of a percent can add up. If the light bounces 100 times, it loses 30% of its intensity. That’s why there’s a limit to the length of the tubes and why it’s best to minimise the number of turns in the tubes. However, as you can imagine, light can travel quite some distance in these tubes before it loses a significant portion of its intensity. The extreme reflectivity of the transfer zone is another reason why these tubular skylights work so surprisingly well.

After the light has been absorbed, directed down the tube and bounced along to its destination, it will reach the delivery zone. That’s where it’s released into the interior of your home or building, probably into a fixture that looks a lot like an electric ceiling light. This is where the light can be dimmed or blocked if it isn’t wanted and this is where it can be boosted with LEDs or CFLs when the daylight is too dim to provide full illumination. This is where you can install a stylish Solatube fixture.

Solatube skylights may not be as simple and straightforward as a standard skylight or roof window, but the performance speaks for itself. They’re full of simple and innovative solutions in both materials and basic mechanics. The ingenuity is in how these elements are gathered together to greatly reduce or even eliminate the need for electrical lighting in interior spaces. Whether you’re an Architect, an Engineer, a property owner or a tradesperson, you are going to want to keep these skylights in mind for your upcoming projects!

The image below demonstrates the difference that a Solar Tube can make. For more information and videos visit [http://solatube.com.au/](http://solatube.com.au/)
**Lighting**

Lighting was replaced with LED lighting and Organic Response sensors as a technologically advanced solution to sensors and timers.

"Before" shots showing the 36watt T8 lighting, old vents and ducting, and Fluorescent Exit lights:

![Before shots](image)

**Organic Response Lighting**

Organic Response is a Revolutionary Lighting Control Technology. Organic Response uses Distributed Intelligence to deliver a highly responsive, flexible and energy efficient lighting.

Inspired by the idea of fish moving in a school yet acting independently, Organic Response® has developed a Distributed Intelligence lighting control system that allows each individual luminaire to make lighting decisions based on the presence of occupants in its immediate vicinity, ambient light levels, and information it receives from its neighbouring luminaires. It then contributes information back to the luminaire community, so other luminaires can also make more informed lighting decisions.
Although they make decisions individually, Distributed Intelligence means all the lights in a defined space act as a coordinated community.

The result is a highly flexible, energy efficient lighting control system that is incredibly simple and cost-effective to install.

At the heart of Distributed Intelligence is the Sensor Node, which is integrated into each luminaire during assembly.

Each Sensor Node contains a motion sensor, infrared transmitter, infrared receiver and ambient light sensor (with spectral response perfectly matched to the human eye).

How Organic Response Works

1. The moment a Sensor Node detects occupancy, it switches on its luminaire to a predetermined level. It simultaneously communicates with its immediate neighbours, using proximity limited wireless infrared, telling them it can see someone.

2. On receipt of this signal (and even though it may not itself detect anyone), the neighbouring Sensor Node switches its luminaire on to a specified level (e.g. 80% brightness), and simultaneously relays a signal to its own neighbours, telling them that one of its immediate neighbours can see someone.

3. This propagates rapidly throughout the floor with each Sensor Node receiving a signal indicating how close someone is to it, and emitting a pre-programmed light level based on that occupancy information, after adjusting for ambient light. Simultaneously, it increments the signal by one level and re-transmits it.
This results in comfortable lighting conditions around occupants, lower light levels in areas adjacent to them, but no wasted lighting of unoccupied or naturally lit areas.

A simple smartphone app allows individual luminaire brightness to be trimmed to optimal levels for specific tasks or the local environment. Alternatively, relay configuration, using the infrared communication described above, allows a whole floor to be configured with the press of a few buttons on the app.

Thermal Window Film

![Diagram of Thermal Window Film](image)

3mm Single Glazing/Aluminium Frame
U-Value w = 2.4 |
SHGC w = 0.77

3mm Single Glazing/Aluminium Frame + VEP 15 |
U-Value w = 5.1 |
SHGC w = 0.24

3mm Single Glazing/Aluminium Frame + VEP 70 |
U-Value w = 5.2 |
SHGC w = 0.47

3mm + 6mm + 3mm Double Glazing/Aluminium Frame |
U-Value w = 3.2 |
SHGC w = 0.68

Note: Glass and Framing data are taken from the Australian WERS website using generic aluminium framed glazing.
Ecolux 70 was installed on the windows to reduce heat loss in winter, and heat gain in summer. Ecolux was selected over Enerlogic due to supply issues at the time, and it offered the same benefits of Enerlogic for the same cost.

Ecolux 70 vs Enerlogic

<table>
<thead>
<tr>
<th>Solar Energy</th>
<th>Visible Light</th>
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<tbody>
<tr>
<td>T%</td>
<td>A%</td>
</tr>
<tr>
<td>Ecolux 70</td>
<td>43</td>
</tr>
<tr>
<td>Enerlogic</td>
<td>46</td>
</tr>
</tbody>
</table>

Performance results were generated from testing 1/8” (3mm) thick clear glass and have been measured, calculated and reported in accordance with ASTM, ASHRAE and AIMCAL standards. Performance results are subject to variations within industry standards.

Ecolux 70 is a super Low-E window film made by SolarGard. It is designed for heat retention and UV protection while at the same time stopping the least amount of visible light. Solar Gard have been working on this film for 2 years and the results rival double glazing.

"State-of-the-art Ecolux low-e window film helps temperatures stay comfortable day and night. It works to keep heat out in summer and reflect heat back into the room in winter. With an SPF rating of 700+ you can enjoy natural daylight with the benefits of maximum comfort and energy savings every day." - SolarGard

This film is ideal for

- Large unprotected glass areas
- Cold rooms that need as much light as possible

Pros & Cons:

- Highly transparent
- Low absorption
- Non-reflective
- No extra privacy
- Nearly no glare reduction
- Many reflective films stop more solar radiation from direct sun light.

Additional information on this product can be viewed on YouTube:

- Ecolux - Comfort Improvement, on YouTube
- Ecolux - Feel the Difference, on YouTube
- Ecolux - Winter Benefits, on YouTube
Billi Eco Hot Water

The hot water boiler unit, that boiled away day and night, was replaced with a Billi Eco undersink unit that has a learning function to power down at off peak times to save energy.

Smarter, safer and more convenient drinking water, the Billi Boiling and Chilled product category delivers invigorating filtered boiling and chilled drinking water. The Eco unit blends elegant style, futuristic design and cutting-edge technology, meeting green building requirements, disability access and ergonomic design imperatives. Our Australian designed and made products are quite simply the world’s premium drinking water systems.

Design benefits include a patented heat exchange system delivers substantial energy savings.

Lowest Energy Consumption: Superior insulation is critical to the sustainable performance of any integrated boiling system. The Billi Eco utilizes Billi’s unique high performance Thermostore™ technology and insulation materials which operate at a level of efficiency which exceeds 50 times that of a traditional hot water tank. In addition the Standby Mode will ensure after a set period of non-usage the unit will power down to prevent excess energy consumption.

Unique Eco-Intelligence™ Technology: The Billi Eco incorporates Eco-Intelligence technology which is a self-learning timer allowing the unit to only operate when required. The self-learning timer monitors daily usage patterns and even recognises evening and weekend changes in routine to effectively minimise energy consumption.

Apricus Solar Hot Water

Solar hot water was installed to replace the 2 electric storage hot water systems in the building.
Below: The completed solar hot water on the roof

The initial solar hot water design included water storage on the roof, but after measuring the purlins and undertaking a structural assessment, it was deemed that too much structural work would be required to accommodate this. The result was redesigning to run an Apricus collector down to an indoor storage tank, which included the need to drill through solid concrete.

Below – purlin spacing and dimensions inadequate to allow for water storage on the roof.

The Apricus system was selected due to quality parts, and the need for an evacuated tube assembly (pictured below) which is more suitable for colder climates due to passive sun tracking (explained below). Another benefit of this system is that the solar collector is placed on the roof but the holding tank can be placed at ground level, reducing structural work that would have had to be done to the roof to house a roof-mounted tank.

The Apricus solar hot water collector utilises our high quality, high performance evacuated tube technology to capture more solar energy for more hours in the day.
Passive Sun Tracking: The collector passively tracks the sun, reaching its peak output earlier in the morning and staying at peak until later in the afternoon than a traditional flat plate collector.

Excellent Cold Weather Performance:

The Apricus tubes have a vacuum between two glass layers and work similar to a thermos flask allowing it to retain up to 95% of the solar energy they capture! This means in colder climates and during the winter months, heat is retained and not lost into the atmosphere. The collectors are also rated to handle frost down to -15°C without the use of glycol which dramatically reduces maintenance of the system.

Light Weight, Easy to Install: A 30 tube collector weights approximately 110kg spread over a 2.2m x 2.0m roof space. Due to the difficulty of height access to the roof space, the unit was lifted by crane.

Quality Control: Apricus solar collectors and frames are manufactured in an Australian-managed facility. The facility is regularly audited by European, Australian and local
authorities to ensure adherence with product standards, labour laws, safety regulations and environmental requirements. We have obtained Australian Standards (AS2712:2002), SRCC (USA) and Solarkeymark (EU) certifications. The factory is also certified to ISO9001:2008 management and production standards.

The unit comes with a 15 Year Warranty on both Domestic and Commercial installations. That’s 15 years on the mounting frame, 15 years on the evacuated tubes & heat pipes, 15 years on the manifold.

**How The Apricus Solar Collector Works**

Sunlight (including UV) strikes the dark absorber coating inside the evacuated tube, the vacuum seal between the two layers of glass act like an insulator and prevent the heat energy that has been captured from escaping back into the atmosphere.

The heat pipe, located inside the evacuated tube carries a small amount of liquid (our secret herbs and spices) and is also evacuated, which means the liquid boils at a very low temperature (~30°C) turns to vapor and rises to the top of the heat pipe to the “bulb” which plugs in to the Apricus manifold.

The Apricus pump station moves water from the storage tank through the copper heat exchange located within the manifold. At this point, there is no water running through the tubes, the heat pipe bulb is simply transferring the heat retained inside the tube into the cooler water running through the manifold.

As this process happens, the vapor inside the heat pipe condenses and turns back into liquid returning to the bottom of the heat pipe; and the process begins again.

Due to the access issues with the roof, and being covered by seagull deterrent line, the unit had to be craned up in pieces which was quite a challenge to coordinate between access from a neighboring property and with the weather.
Below: Difficult Access

Below: Craning the solar hot water components onto the roof under the guidance of a working at heights auditor.
PROJECT DEMONSTRATION AND COMMUNICATIONS ACTIVITIES

The project’s activities were intended to demonstrate and communicate energy efficiency activities and their effectiveness.

Key stakeholders were internal staff in regards to the installations and day to day contact with the technologies. The broader community was seen as a stakeholder in demonstrating responsible spend of public funding, and the educational opportunities to inspire the community to think about their own energy efficiency opportunities.

This was done in a number of ways.
Internal Stakeholders (Staff)

The following tools were used for staff engagement and education:

- Development and implementation of the Heating and Cooling Policy, known as the Thermal Comfort Guidelines
- Installation of a real time energy display system
- Meetings, emails and briefings
- Signs in staff kitchen and around the office
- Educational Video about the project
- Councillor bulletins

External Stakeholders (Community)

The following tools were used for community engagement and education about energy efficiency in general, and about the project:

- Educational Video about the project, including a vox pop day roaming the streets taking to residents about what Council is doing
- Media Release about the project
- Energy efficiency articles in EnviroNews and Frankston City News (general)
- Sustainable Homes “Energy Busters” Workshops and handouts (general).

Further detail about the activities is below.

Thermal Comfort Guidelines

Thermal comfort guidelines were developed by Ironbark Sustainability in consultation with a wide range of stakeholders from building occupants, facilities maintenance teams and OH&S representatives.

The purpose of the guidelines was threefold:

To reduce energy consumption by agreeing on summer and winter set points for heating and cooling

To increase staff comfort and efficiency

To better manage complaints about the heating and cooling being too hot or cold through new procedures.

The Guidelines also include a logbook (pictured below), where complaints are no longer made directly to the Facilities team to adjust the temperature. Firstly, the OH&S representative visits the place of the complaint with a thermometer or Infra Red Camera, to assess whether the complaint is valid or if it falls within acceptable guidelines.
Only complaints where temperatures are outside of the acceptable guidelines for the weather are forwarded on to facilities to address the HVAC, and logged in the logbook.

**Below: Complaint logbook**

Thermal Comfort Guidelines highlights:

<table>
<thead>
<tr>
<th>Frankston City Council Thermal and Ventilation Comfort Parameters</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. warm season temperature ranges. Optimum: 23 - 25 0C. Acceptable: 20 - 26 0C.</td>
</tr>
<tr>
<td>2. cool season temperature ranges. Optimum: 19 -22 0C. Acceptable  18 - 24 0C</td>
</tr>
<tr>
<td>3. room temperature is to be measured &amp; controlled between 1.2 – 1.6 metres from floor level in accordance with industry guidelines</td>
</tr>
<tr>
<td>4. many areas of the building are to have simple room thermometers, while OH&amp;S staff are to have more accurate digital thermometers</td>
</tr>
<tr>
<td>5. optimum humidity range 40 - 60%</td>
</tr>
<tr>
<td>6. minimum recommended fresh air rate 10 litres per second (l/s) per person or 10 l/s per 10 m² for mechanical ventilation systems</td>
</tr>
<tr>
<td>7. optimum air movement 0.1 - 0.5 m/s (naturally ventilated), 0.1 - 0.2 m/s (air-conditioned)</td>
</tr>
<tr>
<td>8. HVAC vent covers – designed to divert vent air from blowing directly onto a staff member positioned directly below – are only to be installed under arrangement with management. A key step prior to deciding on installing a cover is to assess that installing it isn’t going to impact on the overall performance of the system, or impact adversely on people underneath</td>
</tr>
</tbody>
</table>
other vents.

9. Personal heaters and fans are to be used only under arrangement with management in extenuating circumstances. In no circumstances may staff bring in their own heaters, air conditioners or fans. After each case has been individually assessed, they need to be provided by Council, be regularly safety tested and tagged and be energy efficient. Floor model bar radiators & portable personal fan heaters are inefficient and carry a high risk of starting fires and are not to be used. Note also that overhead radiant heaters are generally not effective and can add to a feeling of discomfort when the head is hot, but the feet remain cold.

**NOTE:** Council has adopted an optimum warm season temperature range of 23 - 25°C and optimum cool season temperature range of 19 – 22°C as a balance of comfort and economy.

The warm season period is November through to March; cool season period is April through to October. Council acknowledge that the temperature can vary greatly throughout the year, and at times

**Below: Screen shots of some guidelines highlights.**
Below: An example of testing a complaint

Real time energy display system
A Real Time Energy Display System was installed, showing how much energy is being used at any given time in the building.

An Innotec ATOM system was selected as it would integrate well with the building management system. A brochure with technical information is included in the supporting documentation provided with this report.

To see how the system works, watch the video here:

A Photo of the system and some screen shots are below.
Meetings, emails and briefings

A sample of internal and external emails and a Councillor Briefing are provided in the folder “Supplementary Information” attached with this report. Example of an email to the community on saving energy:
May Energy Saving Workshop

Hi Ian & Virginia

I'm just writing to you to let you know that Frankston City Council is running an Energy Busters Workshop.

When: 7.30-9pm, Wednesday 22 May
Cost: $5, and receive a free resource book
Where: Lyrebird Community Centre (at Carrum Down’s Library)
BOOKINGS ESSENTIAL: Ph Lyrebird Centre on 9782 0133

Keeping Warm this Winter

Over half the average energy bill is due to heating and cooling. Even if you have gas heating, the fan still uses electricity, costing you and the planet.

There are lots of things we can do to reduce our heating bill, the main one being to keep the heat in the house, rather than lose it through the windows, doors, extraction fans and the chimney.

Here are some tips and costs for simple actions you can do at home to help keep warm this winter.

Read the May edition of EnviroNews here
1. **Build pelmets:** Cost – approx $12 per window if you use cheap or second hand timber. Then just paint to match your wall colour. Renters’ option: Use cardboard or coreflute and place along curtain tops coming out from the wall. Cost $0.

2. **Outdoor gap filler:** Using a gap filler (approx $10 per tube) and caulking gun ($2 to $15), **seal around all your window frames** and brickwork to stop cold air leaking into your wall cavity.

3. **Cold bathrooms, toilets and laundry:** Cut a piece of bubble wrap to the size of your window pane, spray a fine mist of water on the glass, and place on the bubble wrap. This provides instant insulation and zero cost, or $10 if you need to buy a roll – and also provides privacy while still letting in the light. This is great for renters too, as it’s fully removable and leaves no marks or residue.

4. **Chimney drafts?** Have a **chimney balloon** installed FREE through the state government **VEET program.** It inflates to block your chimney and stop all the warm air escaping from your house. Just remember to remove it before you have a fire and put it back in again later.

**People Power = Solar Power win!**

Thank you to everyone who pledged their support for solar power for Earth Hour. Your efforts put Frankston in the lead for our population category, winning a community group a 1.5kW solar power system from Sungevity.

The very lucky and “chuffed” recipient is the **Pines Community Men’s Shed!** The Men’s Shed do fantastic work in recycling and upcycling old items and timber, and can even teach you how to fix a bike!

*Pictured from left: Environment Manager Libby Anthony, Mayor Cr Sandra Mayer, Managing Director from Sungevity Nick Lake, and Rick Hodges from the Men’s Shed.*

**Forward this email to a friend**

**Update your preferences**

**Have a question about solar?** Click here.

**Have a warm and cosy winter!**
Energy Buster Workshops

Sustainable Homes “Energy Busters” Workshops to educate and empower the community to understand energy use in their own homes, and give them low cost projects to tackle to improve thermal efficiency (general). The following workshops were held:

<table>
<thead>
<tr>
<th>Date</th>
<th>Location</th>
<th>Presenter</th>
<th>Number of participants</th>
</tr>
</thead>
<tbody>
<tr>
<td>15 October 2013</td>
<td>Monash University</td>
<td>Ella Boyen</td>
<td>30+</td>
</tr>
<tr>
<td>25 October 2013</td>
<td>Langwarrin Community Centre</td>
<td>Ella Boyen</td>
<td>12</td>
</tr>
<tr>
<td>22 May 2013</td>
<td>Lyrebird Community Centre Carrum Downs</td>
<td>Ella Boyen</td>
<td>9</td>
</tr>
<tr>
<td>27 July 2013</td>
<td>Frankston South Community Centre</td>
<td>Ella Boyen</td>
<td>18</td>
</tr>
<tr>
<td>17 May 2014</td>
<td>Mahogany Neighbourhood Centre</td>
<td>Ella Boyen</td>
<td>17</td>
</tr>
</tbody>
</table>

All workshops are evaluated for effectiveness. Below is an example from one of the sessions.

Effectiveness of workshop: Your Energy Saving Knowledge...

Samples of workshop materials are included in the supplementarily information provided with this report.

Signs in staff kitchen and around the office

Signs were placed in the Kitchen and around the office to encourage positive behaviours and assist with the change management. The key teething problem was with the new fridge, that has strong suction and a tight seal. This resulted in some workers leaving the fridge door open. A sign was developed and placed on the fridge educating people how to open it, and advocates in the environment and community development teams reminded people in person how to use the fridge, and why the seal was strong.
A picture of this sign is below.

**The TRICK to the fridge**

Like a new tupperware seal, it is a bit tight as the suction is good – this keeps the cold air in and food fresh. It will lose suction over time.

**Do not leave the door open**

Just place one hand on the handle, and the other on the side of the fridge to open and hey presto!

Leaving the door open defeats the purpose of having an energy efficient fridge. Just bear with it. It will loosen over time.

**Some features of our Billi Eco**

- **Water Filter:**
  - Replaceable filter for clear and healthy water.

- **Self-latching Lever:**
  - The lever latches into the handle to keep the tap open.

- **3 Tap Options:**
  - Filtered water, hot water, and cold water.

- **Easy Operation:**
  - Simple lever operation for ease of use.

- **Eco-friendly Design:**
  - Made from sustainable materials.

Press down to fill a cup

Lift up to fill a jug
Open the blinds
Make the most of natural light

Turn off To save energy

Feeling cold?
Pop on a scarf

Know what you want
Before opening up
Keep the cool air in the fridge
And drinks icy cold

Dishwasher info

This is the most efficient, high end dishwasher on the market

- Place your items directly into the dishwasher – don’t leave them in the sink
- Do not start dishwasher unless full
- If you need an item that is in the dishwasher and the dishwasher is dirty, just retrieve the one item and wash it by hand as you would if it had been left in the sink
- Pop your name on the dishwasher roster – many hands make light work!
- Use the Eco Mode where possible – however please note it is eco because it doesn’t dry the dishes, so have a teatowel handy
- Can’t find the cutlery holder? It’s above the top shelf!

This activity received funding from the Department of Climate Change and Energy Efficiency as part of the Community Energy Efficiency Program.
Educational Video about the project

An educational video about the project was filmed both in the building and on the streets of Frankston. The aim of the video was to tell the community what Council is doing in the federally funded CEEP project, and also inspire them to undertake some energy efficiency initiatives in their own homes.

The video can be viewed here:

The video was published on Frankston TV, You Tube, Frankston City Council Website and Council's intranet “Grapevine” in 2014. It is hoped that it will also air on Channel 31 when Frankston TV returns to our television screens.

Below are some screen shots from the video.
Frankston City Council
and the
Community Energy Efficiency Program

Libby Anthony, Environment Manager

Frankston Resident
OUTCOMES AND BENEFITS OF THE PROJECT

Council is yet to receive interval data to differentiate baseline energy use and peak energy use. Evaluation below has been based on meter readings. Interval data will be available from November 2014 and will assist to evaluate areas that need to be fine-tuned to reach the original target.

Since the project commenced, the meters have been changed and the entire top level is now on the one meter. Previously, part of the top level was separately metered and managed by a third party, and occupancy and usage of the building has increased.

Further monitoring will be undertaken over the coming 12 months and into the future to assess the successes of the project and quantify savings.

Project Energy Efficiency Improvement Template

<table>
<thead>
<tr>
<th>Name of Building, Facility or Site 1</th>
<th>Annex 43 (43 Davey Street)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Location (address)</td>
<td>43 Davey Street, Frankston, VIC 3199</td>
</tr>
<tr>
<td>Type of building, facility or site</td>
<td>Council office administration building</td>
</tr>
<tr>
<td>Activity Type and Measure</td>
<td>Improve energy efficiency of HVAC system, lighting etc</td>
</tr>
<tr>
<td>Energy Efficiency Estimate Method</td>
<td>The simulation used to provide the estimates is based on the 2012 Building Code of Australia from JV3.</td>
</tr>
<tr>
<td>Date</td>
<td>28 Feb 2013</td>
</tr>
<tr>
<td>Baseline Energy Usage</td>
<td>74,013 kWh per annum (Upper Level); 8,350 kWh per annum (Basement Level) = Total 82,363 kWh per annum</td>
</tr>
<tr>
<td>Baseline Energy Efficiency</td>
<td>380.64 MJ/m² Upper Level 30.06 MJ/m² Lower Level 174.42 MJ/m² Overall</td>
</tr>
<tr>
<td>Energy Efficiency Improvement</td>
<td>Reduction 23,473.455 kWh x 3.6 /1,700 m² = 50 MJ per m² / annum 28.5% reduction in energy and emissions:</td>
</tr>
</tbody>
</table>
Greenhouse gas emission reductions: 28.2 tonnes per annum reducing energy intensity to 260 MJ/sq metre (upper level)

Greenhouse gas emission increase: 7.5 tonnes per annum, however changes in the building use and layout has reduced energy intensity to 273 MJ/sq metre (upper level) – a reduction of 28.3%

**Reporting Data (Measuring Energy Efficiency and Additional Data)**

- A total area of 1700 m² and 50-60 occupants
- 85% average operational occupancy level
- Daily hours of operation: 7am to 6pm

- A total area of 2000 m² and 70-80 occupants
- 95% average operational occupancy level
- Daily hours of operation: 6am to 7pm

**Cost of Activity**

- $257,103

**Estimated Cost Savings**

- Estimated annual cost savings: $6,232 per annum
- Estimated annual cost savings: 4.7kWh/m²/annum
- Overall $1,970 per annum

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**Energy Efficiency savings to date**

Although it is too early to assess a full year of data and realise the full energy savings, Council has seen some savings in the short term, considering the changes in the building use.

In February 2013 the baseline energy usage was 74,013 kWh per annum (Upper Level) and 8,350 kWh per annum (Basement Level), totalling 82,363 kWh per annum.

As at October 2014, the building has a higher occupancy and longer operating hours, the HVAC is still being tuned, and the meter now encompasses an additional area of 300m². Therefore whilst the total kWh has increased by 5,684kWh per annum, the energy intensity has decreased by 16.42MJ/m² as it is over a larger area.

The increase in the basement car park of 3,802 kWh/year could be attributed to the area being open and well lit for longer hours whilst it was a work site. It has also had increased usage whilst being used for storage for office relocations.

The overall energy efficiency improvement to date is 16.4 MJ per m² / annum, however this sees a 6.9% increase in energy and emissions, due to the additional area included on the bill, and increased occupancy. A ‘Business as Usual’ calculation would have seen an increase of 30% in the upper floor. Change of usage and metering was not factored in to the original savings projections.

Greenhouse gas emission increase: 7.5 tonnes per annum despite reducing energy intensity to 273 MJ/m² (upper level), and estimated annual cost savings: $1,940 per annum. Although this is lower than the estimated annual cost savings of $6,232 per annum, this can be attributed to both the lack of interval meter data to assess the performance of the HVAC system, the fine tuning of the HVAC system over the first 12 months, and the increased occupancy.
**Issues faced**

Council encountered issues with timing and budget due to additional scope being added to the project from Council. This caused several delays and required Council to contribute additional funding. A Deed of Variation and several milestone extensions were granted to assist with this.

The key learning from this situation is that Council has now implemented a procedure for any increases or changes in scope.

Tender costs also came in much higher than estimated at the time of submitting the grant. With Frankston City Council contributing extra funds, Council was still able to meet all the CEEP deliverables.

Changes in metering have added 300m² to the building’s energy bills, which were previously paid for by a tenant. This has made it hard to compare the results of the energy reductions. Lack of interval data has prevented Council identifying reductions and increases in baseline and peak energy use. With a new smart meter now installed, interval data will be available from November 2014.

**Targets**

Targets have not yet been met, as they were based on 12 month data averages, and Council is still scrutinising the impacts of changes in building use, and time of use. By May 2015 Council anticipates that the energy savings will be fully realised.

**Other Benefits**

Switching to LED lighting, is anticipated to save maintenance costs due to the lifespan of the lights. Again, this is difficult to quantify one month after project completion and will be fully realised in the coming few years.

Lighting quality in the building is significantly improved, with better colour rendition and a more natural light with the LEDs and skylights. Some staff have noticed feeling less eye strain as a result.

Staff comfort has been improved with the introduction of the Thermal Comfort Guidelines, setting out what is reasonable and unreasonable in temperature. The replacement of ducts and diffusers has improved the distribution of air from the HVAC. Cold drafts seem to have been eliminated.

Staff comfort has also been significantly increased with the introduction of fresh air to the building through both the operable window and economy cycle on the HVAC system.

**Community impact**

Whilst this project was conducted in staff accommodation, the community have been communicated with in terms of what they can to do achieve similar savings at home. This included a vox pop on the streets of Frankston, Energy Busters Workshops, and the Video. The Energy Busters workshops offered the best evaluation opportunity as they are conducted face to face and evaluation forms are handed out at every session. Feedback from the community on the workshops and Council’s activities has been extremely positive. Below is an excerpt from an email received from a participant at one of the workshops:
The other event I went to was a Winter Proof workshop on 17 May run by Ella. I learnt loads of really useful tips at the session. It was VERY worthwhile as so much practical information was packed into a short session. I was hugely impressed as there were SO MANY good tips and loads of useful resources. I left feeling very inspired!

So thank you to the council for running these sessions which are incredibly useful and informative, and importantly [sic] have a strong environmental focus (I also really like the Enviro newsletter which comes out periodically). Please continue to run environmental type events as they are always very informative, and well attended.

**BUDGET**

The initial project budget was:

<table>
<thead>
<tr>
<th></th>
<th>Department Funding</th>
<th>Frankston City Council Funding</th>
<th>Total Project</th>
</tr>
</thead>
<tbody>
<tr>
<td>CEEP Budget</td>
<td>$126,290</td>
<td>$130,813</td>
<td>$257,103</td>
</tr>
</tbody>
</table>

Frankston City Council has contributed an additional $184,709 to bring total Council contribution to $315,522 to compensate both for going over budget, and for bridging the gap of grant funds not yet being received.

One grant funds have been received in their entirety, the contributions will be:

<table>
<thead>
<tr>
<th></th>
<th>Department Funding</th>
<th>Frankston City Council Funding</th>
<th>Total Project</th>
</tr>
</thead>
<tbody>
<tr>
<td>CEEP Budget</td>
<td>$126,290</td>
<td>$196,232</td>
<td>$322,522</td>
</tr>
</tbody>
</table>

The project was over-budget due to costs coming in higher than estimated at the time of applying for the CEEP grant, and with CPI increased from the grant being written to being awarded and delivered, this also impacted the budget.

The nature of the technology itself did not create any budget issues, other than some of the items specified by consultants differed to what was budgeted for in the application.

The CEEP terms and conditions did not allow for in-kind contributions. The Project Management and Administration funds were used to outsource Project Management, and bring in a part time staff member for extra hours. The allocation for this was greatly underestimated, as the reporting requirements were cumbersome and time consuming.

Another challenge with the budget was the delay if invoicing until Milestone reports were accepted, which was a lengthy process.
PROJECT OPERATION, MECHANISMS AND PROCESSES

The Project management was outsourced to Tonber and CT Management. This proved a challenge in maintaining documentation in a central system and with multiple users having access to the Capital Works account, made reporting difficult. After these contracts expired, project management was brought in-house which improved the information flow and project progress considerably.

External organisations were involved in the construction phase in order to ensure qualified builders; electricians; plumbers etc. were used throughout the project.

Ideally the project should be delivered and reported on by the same individual that manages the budget, as Milestone reporting with no control over the budget was challenging. This is now happening for Round 2, and an internal project manager has been appointed for the remainder of Council’s remaining Round 1 project, who is working closely with the person undertaking the milestone reporting.

Resources were grossly underestimated at the time of submitting the grant application. Learnings from this project include:

- Increasing the lead time for approvals – both internal processes and CEEP
- Reporting time – inadequate time was allocated to manage the volume of reporting to the Department of Industry
- Increasing the overall project time frame – the tendering process is lengthy, and on this project, Council had to tender a second time as the first tenders were significantly above the available budget.
- Building in approval times – Council approval processes can take many weeks or months in competing for time on Council meeting agendas. This will be considered in future timelines for similar projects.
- External project management costs were not factored in during the scoping stage and had a significant impact on the overall budget. Bringing the project back in house dramatically improved this, as well as accountability and reporting lines.
- Future building use increases were not factored in at the time of making the application, therefore targets were set based on usage remaining the same.
- Lack of data for comparison – in hindsight, installation of a check meter to provide interval data on the HVAC system would have enhanced analysis of the data and results of the new technology.

Learnings from this project demonstrated that managing projects internally are more efficient and cost effective.
CONCLUSION

Frankston City Council is grateful for the assistance from the Department of Industry in providing the Community Energy Efficiency Project.

Whilst the full savings have not yet been fully realised, a reduction in energy intensity has been demonstrated despite higher usage of the building.

The project had a number of challenges, including lengthy approvals processes in Canberra, changes to requirements around milestones and invoicing, difficulties with external project management and underestimation of time and budget, it is positive to see the project now complete, and Council is enjoying the positive feedback from staff and the community.

Some highlights from the communications program are the Project Video, which may be aired on Frankston TV, Channel 31 in 2014/15, the development and implementation of the Thermal Comfort Guidelines, and the heightened awareness of energy efficiency in the office.
Declaration (See overleaf)

The Authorised Officer of the organisation makes the following declarations:

☒ I declare that I am authorised to submit this Final Report (including any attachments) on behalf of Frankston City Council

☒ I declare that the information provided in this Final Report is true and accurate.

☒ I understand, and acknowledge that giving false or misleading information in this Final Report is an offence under the *Criminal Code Act 1995*.

☒ I understand that final payment will only be made in accordance with the Funding Agreement including on satisfactory completion of Milestones.

Authorised Officer Signature: .................................................. Date: ....../........../............

Name: ..........................................................................

Position: ............................................................. Organisation: ..................................................

Witness Signature: ............................................................... Date: ....../........../............

Name: ..........................................................................

Position: ............................................................. Organisation: ..................................................

The use and disclosure of information provided in this Final Report is regulated by the relevant provisions and penalties of the *Public Service Act 1999*, the *Privacy Act 1988*, the *Freedom of Information Act 1982*, the *Crimes Act 1914* and the general laws of the Commonwealth of Australia.

Information contained in the Final Report may be disclosed by the Department for purposes such as promoting the program and reporting on its operation and policy development. This information may also be used in answering questions in Parliament and its committees. In addition, the selected project information will be made publicly available. Public announcements may include the name of the grant recipient and of any project partners; title and description of the project and its outcomes; and amount of funding awarded.
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Authorised Officer Signature: .......................................................... Date: 31/10/14

Name: CRAIG DINSLEY
Position: My Sustainable Assets Organisation: Frankston City Council

Witness Signature: .......................................................... Date: 31/10/14

Name: Ella Boyen
Position: Climate Change Officer Organisation: Frankston City Council

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