East Gippsland Shire Council

Final Report: CEEP 2243 Bright Futures East Gippsland

Lakes Entrance Aquadome pool heating and lighting upgrade

www.eastgippsland.vic.gov.au

This activity received funding from the Australian Government
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1. EXECUTIVE SUMMARY

The Lakes Entrance Aquadome is an East Gippsland Shire Recreation centre servicing the local community. The centre comprises a 6 lane 25m lap pool, a smaller learn-to-swim and a toddler pool. Other facilities include a spa pool, change rooms, sauna, gym and weights rooms, crèche and associated offices, store rooms and plant rooms.

The main heating system prior to the project was based on atmospheric LPG (Liquid Petroleum Gas) boilers, supplied by onsite storage tanks (as mains natural gas is unavailable). The project aimed to reduce energy consumption and operating costs at the centre by

- Upgrading the heating system
  - Air sourced heat pumps were chosen as the main heat source to replace LPG energy
  - LPG boilers were retained as part of the energy mix to provide auxiliary heat to pool water and air heating, heating to the spa pool and heating to the change rooms
  - A control system formed an important part of the project allowing remote control and performance monitoring
- Retrofitting the centre lights with LED replacements
- Pool blankets - a peer review of the project plan recommended the inclusion of pool blankets as an integral part of the project

There were a number of technical and site issues that delayed the completion of the project. The most important of these was the requirement to upgrade the electrical supply to the site to enable the use of air sourced heat pumps.

As a result of delays the heat pumps were only operational for 3 months of the 2014-15 financial year. Despite this the energy consumption in the 2014-15 financial year was 15% lower and the cost savings show a 30% reduction compared to the previous base year. Given the heat pumps were only operating for 3 months of the financial year and the pool blankets for seven months greater reductions can be expected in 2015-16.

Interval data for gas and electricity for June 2015 showed a 40% energy reduction compared to June 2012. It is anticipated the project will reach its overall energy reduction target of 60% in the next full financial year and might exceed its financial target given the current level of LPG and electricity pricing.

Pool blankets proved to be a straightforward and effective means to reduce energy consumption. A conservative estimate of the contribution of pool blankets alone would be around a 17% reduction in LPG compared to no blankets at all.

The lighting retrofit included more lights that originally proposed but the calculated savings rose from $3,300 to approximately $7,000 per annum.

The project was widely promoted under the Bright Futures communication package. East Gippsland Shire Council was successful with three CEEP applications and the communications activities of each project were bundled together under the banner of Bright Futures East Gippsland. A broad ranging campaign has been implemented through many media. These activities help ensure the project meets the wider aims of the Community Energy Efficiency Program and acknowledge the major contribution of the Australian Government. Communications activities will continue beyond the end date of this particular project.
East Gippsland Shire Council was able to deliver the Lakes Entrance Aquadome Project using existing Council procedures and processes in a cost effective manner. The project was delivered just less than 1% under budget.

The project has set East Gippsland Shire Council as an example in leading in energy efficiency; it has demonstrated smart energy use and the communications activities encourage the better use of energy and energy efficiency within the community.

The project has increased the capacity of the community, Council staff and local contractors to implement further energy efficiency measures. The project has contributed to the national effort to reduce greenhouse gas emissions.
2. **ENERGY EFFICIENCY OBJECTIVES**

The key objectives of the project were to:
- reduce the amount of energy used for pool and space heating;
- and reduce the operating costs for the facility.

The broader outcomes anticipated were:
- reduced energy usage,
- greater flexibility in the control of energy use to minimise costs,
- reduced financial burden on the local community,
- and a reduction in the need to increase user fees due to escalating LPG costs.

There were specific CEEP program objectives and associated communication objectives.

### 2.1 CEEP program objectives

The overall objectives of the program are to improve the energy efficiency of non-residential council and community buildings, facilities and lighting; particularly where this would benefit low socio-economic and other disadvantaged communities or support energy efficiency in regional and rural councils.

The program aimed to:
- demonstrate and encourage smarter energy use;
- encourage better use of energy and energy savings;
- build the capacity of the energy services sector and support competitive Australian manufacturers.

The program will also contribute to the national effort to reduce greenhouse gas emissions.

### 2.2 Communications objectives

The following communication objectives were set:
- To launch the Brighter Futures East Gippsland energy efficiency program;
- To communicate the benefits of the energy efficiency project at the community facilities;
- To promote the benefits of energy efficient more widely – i.e. across the Community;
- To promote widespread adoption of energy efficiency;
- To share lessons from this project;
- To demonstrated leadership around energy efficiency in the community (“leading by example”)
- Ensure that staff and the community are well informed of the purpose and the scope of this project; and
- Educate staff, use groups and the wider community including other councils and relevant local suppliers of the benefits of improved energy management practices.

### 2.3 Alignment of project and program objectives

The projects energy efficiency and communication objectives closely aligned with the CEEP program objectives so that successful project delivery would ensure progress toward the outcomes and objectives of the overall program.
The project demonstrates and encourages smarter energy use with the examples of pool blankets; air sourced heat pumps and LED lighting.

The project encourages better use of energy and energy savings by clearly linking better energy use with financial savings and reductions in emissions.

The specific works at Lakes Entrance Aquadome have helped build the capacity of local sub-contractors in the area of low energy lighting and building management and heating control systems.
3. PROJECT ENERGY EFFICIENCY ACTIVITIES

The Lakes Entrance Aquadome Recreation Centre has been upgraded. The pool and spa water heating systems, the air heating / heat recovery systems have been upgraded whilst the internal/external lighting systems have been retrofitted with energy efficient LED lights.

3.1 Energy efficiency technologies

The following range of technologies was used at the Lakes Entrance Aquadome:

3.1.1 Air sourced heat pumps

The main pool and the learn to swim/toddler pools now use air source heat pumps as their main heat source with auxiliary heat from the existing solar system and backup and further auxiliary heating from new condensing boilers. Air sourced heat pumps might be considered the core technology for the heating system at the Aquadome.

![Photo to show new heat pumps prior to the shed wall and fencing works](image)

The air heating and heat recovery system has been changed from an LPG heated air handler to an air sourced heat pump based heat recovery system with gas auxiliary heating.

The heating demand in the original system was met using LPG fired non-modulating atmospheric boilers. LPG is an expensive fuel source and the old atmospheric boilers were efficient. A study was undertaken to determine the most energy efficient and cost effective alternative. Air sourced heat pumps proved to be the favoured technology due to a combination of moderate capital costs and high efficiencies. Specifically, the recent improvements in coefficient of performance (COP) has improved efficacy of this technology.
3.1.2 Pool blankets

Each of the pools including the spa have had automated pool blanket systems installed to reduce heat demand.

The pool blankets were perhaps the simplest technology used at the Aquadome. Their savings are significant – a very conservative estimate being 17% of the heat energy requirement of the pool. They complement the air sourced heat pumps and gas boilers in that they reduce heat demand. An interesting note is that pool blankets are not a new technology. - The Lakes Entrance Aquadome used to have pool blankets but their use was discontinued due to manual handling issues. The new blankets overcame this OH&S (Occupational Health and Safety) barrier through automation and elimination of manual handling risks.

Pool blankets were used to reduce the overall heat demand of the site which influenced the sizing of the new heating equipment. Pool blankets were chosen as they are a proven technology, simple to implement and very cost effective.

3.1.3 Condensing/cascading boilers

The original pool heating boilers were decommissioned and replaced with modern condensing modulating boilers. Whilst there was potential to completely eliminate the need for the main gas boilers at the Lakes Entrance Aquadome the new and efficient gas boiler were incorporated into the technology mix in order to:

- Provide auxiliary heat to the heat pumps in colder conditions;
- Reduce the sizing and electrical demand of the heat pumps;
- Provide flexibility in the source of heat energy to respond to changing circumstances – such as the possibility of natural gas becoming available at Lakes Entrance; and
- Provide redundancy options should the heat pumps fail.
A separate spa pool boiler was changed from an older atmospheric boiler to a modern condensing boiler.
3.1.4 Building management system

The heating equipment is monitored and controlled using a computer control system. Seventy nine separate channels of data are processed by the controller and are available for control and monitoring. Further channels can be added at a later date to broaden the monitoring and control. The data is available remotely via a data hosting service to help with remote diagnosis of faults and analysis of equipment performance. The heating equipment can be controlled remotely using supervisory control and data acquisition (SCADA). See screenshot below.

Whilst control and fault diagnosis are very important the ability of the control system to monitor performance allows further improvements in efficiency.

Data can be manipulated to help identify areas were improvements and savings can be made.
3.1.5 LED lighting

LED lighting technology was used in the retrofit of the Aquadome lighting systems because of its high energy efficiency, performance standards and low maintenance requirements.
The 14 pool hall high bay lights were the most prominent lights replaced but there was a significant number of fluorescent tubes within the rest of the centre retrofitted with LED’s in addition to five exterior floodlights.

3.2 Implementation

Implementation was undertaken making extensive use of the project plan with specific reference to the project milestone requirements. It would be difficult to overstate the value of the final approved project plan and the work that went into its development. Significant delays were encountered during the project but the project plan remained the basis for implementation.

The project implementation schedule and budget combined with the timeframe and phasing sections of the project plan were overlain with EGSC’s procurement policy to timetable development of specifications and procurement processes. On ground implementation followed the procurement.

On ground implementation was supervised by the project manager and the project supervisor with regular on site meetings with contractors and Aquadome staff and management.

Air and Water Heating Tender

On completion of project plans the first major item attended to was the development of specifications and a tender for the supply of the main heating equipment at the Lakes Entrance Aquadome.

Contracts for the works were signed in December 2014 after delays caused by incorrect documentation.

Pool Blankets

Pool Blankets were installed in October and training for all staff completed in November 2014.

Electrical Upgrades

EGSC’s electrical contractor completed upgrades to the main switchboard and underground supply in December 2014 with Ausnet Services completing the transformer upgrade in January 2015.

Heat Pumps

The principal contractor delayed commencement of works on the air and water heating until February 2014 and as a result required variations to extend the contract. The water heating heat pumps proved to be a straightforward installation but the air handling and system control presented some technical issues resulting in delays. An initial commissioning report was completed by 7 May 2015 but with was not until 14 August that all outstanding issues had been addressed.

Spa Boiler

The spa pool boiler was replaced with a condensing boiler in June 2015.

Decommission/Replacement Old Pool Boilers

The old Hurlcon pool water heating boilers were removed and replaced with smaller cascading, condensing boilers in July 2015.

Plant Room/Storage Fit Out, Fencing and Protective Enclosure

All fit out, fencing and protective enclosure works were completed in July and August 2015.
3.3 Site and technology implementation Issues

3.3.1 Electrical Upgrades

There was a combination of a site constraint and a technology issue which impacted the implementation of the project. The main site related problem or constraint was electrical supply and the requirement for upgrade. The existing electrical usage at the site was close to the capacity of the supply to the site. The technology related issue was the additional load imposed by the heat pump equipment. This combination required an upgrade of the supply from the network (Ausnet Services) and this in turn required an upgrade of the underground supply from the Ausnet supply point to a new main switchboard.

Photo to show new transformer provided by Ausnet Services

From an initial supply request to Ausnet Services on the 9 April 2014 it took until 12 January 2015 for the upgrade to be completed.

Whilst Ausnet processed the initial supply request the project team could not proceed with the upgrades to the underground supply and switchboard. Once the Ausnet offer of upgrade was processed a specification could be developed for the EGSC electrical upgrade and these works had to be completed prior to the Ausnet supply upgrade.
These electrical supply enabling works substantially delayed the commencement of works by the principal contractor.

The delays caused were serious but the enabling works could have taken much longer and been out of the control of EGSC.

3.3.2 GSM Networks and IT Issues

The control and monitoring system as installed used the 3G GSM network to transmit data. In the initial stage of the project this worked reasonably well. However, as commissioning approached the network connection became unreliable and rendered both the SCADA system and the Bitpool system inoperable. A hard link though EGSC’s computer network had to be arranged with resultant delays as firewall and IP address issues were resolved.

A further IT issue occurred with the gas metering data collection. The consultant engineering company-Energy Made Clean provided a remote data hosting service for the output of the gas meter. Unfortunately this suffered from reliability issues resulting in data gaps. In July 2015 the remote date hosting server malfunctioned. The data hosting was then transferred to the heating control system.

3.3.3 Control and Monitoring System

The control and monitoring system proved to be a technical issue and ongoing problem to the project. Delays were encountered during the installation related to the principal contractor’s management of their supplier and electrical sub-contractor. The installation suffered from some faulty componentry (CT clamps for energy monitoring of the heat pumps). This caused delays to the commissioning of the heating equipment and problems monitoring electrical consumption of the heat pumps and lighting.
4. PROJECT DEMONSTRATION AND COMMUNICATIONS ACTIVITIES

The East Gippsland Shire Council’s Bright Futures communications package comprised activities aimed at promoting the objectives of the CEEP program. EGSC was successful with three CEEP applications (CEEP 2204 - Energy Efficient Street Lights and Main Corporate Centre, CEEP 2205 Bairnsdale Aquatic and Recreation Centre (BARC) pool heating and lighting upgrade and CEEP 2243 Lakes Entrance Aquadome pool heating and lighting upgrade) and the communications activities treated the three projects as a whole package with the costs of the activities being attributed across the three projects. The Bright Futures communications activities will continue to at least May 2016 with the conclusion of the CEEP 2205 Bairnsdale Aquatic and Recreation Centre (BARC) pool heating and lighting upgrade project. Promotion of the energy efficiency activities at the Lakes Entrance Aquadome will continue well after the conclusion of this project.

The communication activities were phased according to the following project timeframes:

- Pre-Launch;
- Bright Futures Launch;
- During Installation; and
- Post Installation / Ongoing.

4.1 Pre-Launch

Funding Announcement (August 2013)

A press release appeared in the local newspaper (The News, edition 28/08/2013 on page 7) and on the shire website announcing the successful attainment of CEEP funding.

See Attachment 1 – Funding announcement media release.

Communication Plan Development

A communication plan was developed as part of the overall project plan, submitted with the second milestone. The Communications plan identified stakeholders and the methods by which key messages would be delivered.

Branding Development

Prior to the launch, branding was developed around the Bright Futures concept. It resulted in the following logos and branding designs:
4.2 Bright Futures Launch Event (activity 3.1.3.1)

The Bright Futures project was launched at the Shire site of the East Gippsland Field Days at 1.30pm on Friday 9 May 2014, and was open to the public.

**Launch promotion included:**

Thirty-five formal invitations sent, including to the following dignitaries: The Hon Ian Macfarlane MP (Minister for Industry), Mr Mal Thorpe (Manager Community Energy Efficiency Program), Mr Darren Chester MP (Federal Member for Gippsland), Mr Tim Bull MP (Member for Gippsland East), and local Councillors and Directors of East Gippsland Shire Council, as well as members from the Environmental Sustainability Advisory Board.

A media release appeared in the local newspaper before the event (April 2014) and on the shire website, inviting the public along with the promise of “giveaways, displays and a renewable energy trailer containing information about sustainable living and how to reduce your household electricity.”

See Attachment 2 – Invitation to launch media release.

Sustainability Gippsland website event promotion, see Bright Futures launch details on the Sustainability Gippsland website under events section see [http://www.sustainabilitygippsland.com/event/launch-of-bright-futures-in-east-gippsland](http://www.sustainabilitygippsland.com/event/launch-of-bright-futures-in-east-gippsland)

The launch was announced over the loud speaker at the East Gippsland Field Days instructing visitors on the launch details.
The Deputy Mayor Cr Peter Neal and Michael Oxer, Chair of the Environmental Sustainability Advisory Board were guest speakers at the event.

See Attachment 3 – Deputy Mayor Cr Peter Neal launch speech notes

**Energy efficiency quiz competition**

As part of the launch there was a community energy efficiency competition. Attendees were asked to complete a questionnaire, with the chance to win one of three household energy meters.

See attachment 4 – Quiz.

The survey asked questions relating to the street light display at the Field Days, household energy use, by asking the following questions:

*Tick the top 3 things you could do in your house to save energy and cut your energy bills:*

- Install ceiling insulation (and consider wall and underfloor insulation)
- Keep warm air in the house in winter and cool air in during summer
- Set the thermostat a little lower in winter and a little higher in summer
- Make sure your fridge door seals are tight and turn off any extra fridges if not needed
- Only heat and light the rooms you use
- Think about using energy efficient lights such as LED’s and change away from halogen down-lights
- Switch appliances off at the wall when not in use
- Use a cold wash cycle to wash cloths and dry on the line
Overall there were 13 entries over the two days, with the successful candidates sent letters on 16 May 2014 along with their prize of a household energy meter.
See attachment 5 – Letters to the winners.

**Giveaways & displays**
The following Bright Futures giveaways, items and displays were featured at the launch and other events throughout the project (as detailed below):
Temporary tattoos - quantity 500

Summary Flyer - quantity 500
See Attachment 6 – Summary Flyer.

Key rings / torches - quantity 300

Street light display and retractable banners (x2)
**Post launch media**

An article featured in the local newspapers (Bairnsdale Advertiser, Snowy River Mail and Lakes Post on 12 May 2015 page 3) and on the East Gippsland Shire Council website after the event.

See Attachment 7 – Post launch media coverage.

**4.3 During Installation**

**Display posters**

During the installation works at the Lakes Entrance Aquadome posters were placed around the foyer informing patrons of the works being undertaken, and the likely interruptions to the centre.

See Attachment 8 – Bright Futures posters Lakes Aqua

**Renewable Energy Demonstration Trailer (REDT)**

Renewable Energy Demonstration Trailer (REDT) appeared at the following events and engaged a number of community members about energy efficiency at home:

<table>
<thead>
<tr>
<th>Event</th>
<th>Date</th>
<th>No. people engaged</th>
</tr>
</thead>
<tbody>
<tr>
<td>East Gippsland Field Days</td>
<td>9 &amp; 10 May 2014 (launch)</td>
<td>Close to 70 people</td>
</tr>
<tr>
<td>Raymond Island Sustainability Festival</td>
<td>20 September 2014</td>
<td>25 people</td>
</tr>
<tr>
<td>Seniors Week, Bairnsdale Sporting &amp; Convention</td>
<td>6 to 10 October 2014</td>
<td>18</td>
</tr>
<tr>
<td>Centre</td>
<td>Paynesville Library Mini Expo</td>
<td>Sunday 12 October 2014</td>
</tr>
<tr>
<td>--------------------------------------------</td>
<td>-------------------------------</td>
<td>------------------------</td>
</tr>
<tr>
<td></td>
<td>Orbost Agricultural Show</td>
<td>9 March 2015</td>
</tr>
<tr>
<td></td>
<td>Orbost Secondary College</td>
<td>Tues 10 March 2015 (am)</td>
</tr>
<tr>
<td></td>
<td>Marlo Primary School</td>
<td>Tues 10 March 2015 (pm)</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td></td>
</tr>
</tbody>
</table>

The REDT displayed the *Bright Futures* banner and promotional products (temporary tattoos, summary brochure & keyrings) at each of these events.

At the Orbost Agricultural Show there was an LED sample street light and people were handed out the *Bright Futures* postcards, with the energy helpline details.


Marlo Primary School students had an afternoon session with Ian Southall on Tuesday 10 March 2015.
Students of Marlo Primary School showing Ian Southall their model of an energy efficient building with renewable energy.

Ian Southall consulting the community about energy efficiency options at the Orbost Agricultural Show (9 March 2015).

**Postcards for Energy Helpline**

There were 600 postcards printed on 100% recycled content card, using natural dyes and powered by Solar PV. The postcards were distributed widely from 15 February 2015 onwards, at selected events and through the following library and service centres:

- Bairnsdale Corporate Centre: 273 Main Street
- Bairnsdale library: 22 Service Street
- Lakes Entrance: 18 Mechanics Street
- Omeo: 179 Day Avenue
- Orbost: 1 Ruskin Street
- Paynesville: 55 The Esplanade
Mallacoota: 70 Maurice Avenue

The postcards were printed in 3 different colours (200 of each colour):
High electricity bills? Need independent advice?

Residents and small business owners in East Gippsland Shire can call 9385 8555 for a free 20 minute consultation on energy concerns, building plans or ways to be energy efficient. Make sure you have an electricity bill handy!

For more information visit positivecharge.com.au/eastgippsland
An initiative of East Gippsland Shire Council’s Bright Futures project.

A bright future for East Gippsland

The Bright Futures project is aiming to save around $500,000 yearly through energy efficiency.

This project is jointly funded by the Australian Government, and East Gippsland Shire Council.

For more information visit eastgippsland.vic.gov.au/brightfutures or call 5153 9500.

Disclaimer: “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.”

Australian Government
Department of Industry and Science

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Australian Government
Department of Industry and Science
Postcard distribution:

- Over 80 handed out to patrons of the Orbost Agricultural Show on 9 March 2015;
- Fifty given to school students at Marlo Primary School and Orbost Secondary college on 10 March 2015;
- Fifty distributed at East Gippsland Field Days (Friday 1 and Saturday 2 May 2015)
- Forty at the launch of the new East Gippsland Environmental Sustainability Strategy 2014-17 event – that coincided with earth hour and an environmental short film festival on Saturday 28 March 2015;
- Thirty handed out to school students at Mallacoota Kitchen to Compost Launch (2015); and
- One Hundred handed out to cafes in Bairnsdale to display and giveaway
Postcards being handed out at the Orbost Agricultural Show, with the REDT in the background on 9 March 2015.

Websites

Bright Futures information has appeared on the following three websites:

East Gippsland Shire Councils website - for the life of the project, the following pages have been updated as required:

Specific to the Lakes Entrance Aquadome the following site was created for the public to access updates, from 26/08/2013 onwards:
http://www.eastgippsland.vic.gov.au/Plans_and_Projects/Bright_Futures_energy_efficiency_Project/Lakes_Entrance_Aquadome

The general Bright Futures webpage was created on 26/08/2013:

The Ask the energy experts helpline landing pages went live from 25/11/14
http://www.eastgippsland.vic.gov.au/Plans_and_Projects/Bright_Futures_energy_efficiency_Project/Positive_Charge_energy_helpline

The link to the landing page of the Energy Helpline has appeared on the East Gippsland Shire Councils main webpage since January 2015. See below.

The energy helpline has appeared on the East Gippsland Shire Councils front page since January 2015.

See Attachment 9 - Website hit analysis.

Sustainability Gippsland created a Bright Futures page used to promote:

Bright Futures launch (April 2014) http://www.sustainabilitygippsland.com/event/launch-of-bright-futures-in-east-gippsland and

“Easy Ways to Save on your Energy Bills” workshops in East Gippsland under the events section http://www.sustainabilitygippsland.com/group/bright-futures-in-east-gippsland. The Energy Info
Hub travelled to East Gippsland to show people easy ways to save on their energy bills. The interactive sessions were free on November 10, 11 & 12 in Bairnsdale, Orbost & Paynesville.

Positive Charge Energy Helpline for East Gippsland residents and business owners was placed on the Positive Charge website http://www.positivecharge.com.au/eastgippsland

Presentations & Events

Two presentations were developed by East Gippsland Shire Council officers, to promote the Bright Futures program of works to the general public:

Bairnsdale Chamber of Commerce and Industry presentation was given by the Project Manager Sustainability, Lester Wharfe and the Sustainability Officer, Rebecca Lamble on 6 August 2014.

The presentation highlighted the process by which energy efficiency measures for businesses could be implemented using the Lakes Entrance Aquadome pool heating and lighting project as an example. Opportunities for business including sources of funding formed part of the presentation.

Attendees were invited to submit an informal expression of interest in participating in efficiency projects prior to a general question session.

East Gippsland Environment Strategy 2014-17 launch & Earth Hour Short-Film Festival in the Bairnsdale Library forecourt. Eric Sjerp (Environmental Sustainability Advisory Board), Mayor Cr Peter Neal (Mayor) and Mr Gary Gaffney (CEO) all spoke about what has been achieved and the current focus on Bright Futures.

Launch of the new East Gippsland Environmental Sustainability Strategy 2014-17 events, that coincided with earth hour and an environmental short film festival (there were approximately 40 people in attendance) on Saturday 28 March 2015. Information about Bright Futures was presented by the Mayor and CEO.
Left to right: Sustainability Officer, Eric Sjerp (technical expert), Rob Dimsey (DELWP), Project Manager Sustainability, Cr Peter Neal (Mayor), Rob Wilersdorf (EGCMA), Russ Peel (technical expert) and Sustainability & Capacity Building Coordinator.

East Gippsland Shire Council was approached by members of the public, having seen the various promotional articles in the newspapers (Community Connect articles and media releases) relating to Bright Futures. As a result the Sustainability Officer, Rebecca Lamble gave the following two presentations:

Presentation (power point) to Bairnsdale Regional Health Service (BRHS) Environmental Sustainability Committee Meeting held on 15 October 2014. An outcome of the presentation was an invitation to the Sustainability Officer to become a permanent member on the hospitals environment committee.

See Attachment 10 – BRHS presentation.

A power point presentation was delivered on environmental outcomes from the previous strategy, and the current and future focus on Bright Futures at the Mitchell River Rotary meeting on Monday 4 May 2015. Approximately 20 community members were in attendance.

See Attachment 11 – Rotary Presentation 4 May 2015

_Free Lunchtime Screenings (in Bairnsdale library forecourt)_

Community lunchtime screenings were organised during spring 2014, for the public to bring their lunch and watch the following environmental short films:
Community Connect

A full page feature appeared in the Community Connect Summer edition (Page 5).

See Attachment 17 – Community Connect Summer 2015

It can also be found on the following website link:


Video of Bright Futures summary

The video of before and after the installation of works can be viewed here:

4.4 Post Installation / Ongoing

*Smart Living booklet*

The design of the 70 page Smart Living booklet was funded as part of this project. It will be launched in November 2015 and then made available on the website.


See Attachment 12 – Smart Living Booklet
**Foyer digital display monitor**

In the foyer of the Lakes Entrance Aquadome an LED digital display monitor is showing the community the Bright Futures project information including links to the control and monitoring system via Bitpool.

**Energy Breakthrough**

East Gippsland Shire Council is supporting the four local schools to attend the Energy Breakthrough event in Maryborough in late 2015. Students attending learn all about the science of energy. The Bright Futures logo will be displayed on T shirts and the human powered vehicles.

**Energy Helpline**

The Positive Charge Energy Helpline will continue in some capacity for another 12 months, with greater promotion throughout the community.

**Website**

The Bright Futures landing page will continue on the East Gippsland Shire Council website for another 18 months.
5. OUTCOMES AND BENEFITS OF THE PROJECT

5.1 Meeting Objectives

The Lakes Entrance Aquadome CEEP project has met its specific objective of reducing energy use at the pool and reducing operating costs. This has been achieved in a low socio-economic, regional community, a key target area of Community Energy Efficiency Program.

The works at the Aquadome have been very prominent and, being a well-used public facility in Lakes Entrance, it is a very public demonstration of smarter energy use.

Feedback from pool users has shown support for the project and its outcomes.

The Bright Futures communications activities promoted the works at the Aquadome and provided the wider public with the links to encourage the uptake of better energy use and savings.

5.2 Energy Efficiency Outcomes

In the short period that the main energy efficiency measures have been in place at Lakes Entrance Aquadome overall energy consumption has gone down by 15% and costs by 30%.

These figures are based on a comparison of the base year (2013-14) with the year in which the upgrades occurred (2014-15). Complete financial year figures were used because of the problems (unreliability) in using utility data over short time periods and seasonal variations in energy demand.

Given that the heat pumps were only operating for 3 months of the financial year and the pool blankets for seven months, greater reductions can be expected in 2015-16.

The scale of these reductions are indicated by the monthly savings made in the later part of 2014-15. For June 2015 the Consultant Engineer demonstrated the following changes in consumption compared to June 2012:

<table>
<thead>
<tr>
<th>Consumption</th>
<th>June 2012</th>
<th>June 2015</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monthly LPG (GJ)</td>
<td>638</td>
<td>233</td>
</tr>
<tr>
<td>Monthly Electricity</td>
<td>148</td>
<td>238</td>
</tr>
<tr>
<td>Monthly Total (GJ)</td>
<td>786</td>
<td>471</td>
</tr>
</tbody>
</table>

This represents a 40% overall energy reduction overall for the month of June.

The improvement target for the heating systems was a reduction from 11.98 MJ/L down to 4.84 ML/L or a 60% reduction. It can be seen that the gross utility bill data shows that the project is well below this at only 15% due to the recording period. The June 2015 data drawn from gas meter interval records and electrical interval records shows a figure much closer to the target at 40%.

Further moves toward the 60% target can be expected as during the summer months the air sourced heat pumps increase their efficiency and the requirement for auxiliary gas use will be reduced. Ongoing fine tuning of the control system will yield further efficiency improvements.

The cost savings at the Lakes Entrance Aquadome are very encouraging showing a saving in the 2014-15 financial year of over $84,000 compared to the previous year. This is a result of the energy efficiency improvements plus reductions in the unit costs of both LPG and electrical power. Overall cost savings should exceed the target in the 2015-16 financial year.
5.3 Other Benefits

5.3.1 Monitoring and Control

The control and monitoring system allows close scrutiny on the energy use for fault diagnosis and further energy improvement.

An example of fault diagnosis stemmed from complaints of low temperatures in “the learn to swim” pool. The monitoring data from Bitpool showed regular drops in temperature which equated to cold water top up. A significant and prolonged drop in water temperature and an increase in output of the heat pump indicated a faulty value. This led to significant water leakage and the pool being continually topped up with cold water. Without the monitoring system this situation could have continued unnoticed until unusually high LPG and water bills indicated the situation.

An example of monitoring to improve performance has arisen after studying the pattern of use of auxiliary gas to augment the air heating. It can be seen in the sections of Bitpool data that much of this gas use occurs over night when ambient temperatures fall. Air temperatures could be allowed to fall after the pool blankets have been deployed as evaporation and condensation should not be the problem they previously were before pool blankets.

5.3.2 Pool Blankets

Reduced water and chemical usage through a reduction in evaporation are stated benefits of pool blankets. These benefits have not been quantified as yet but the evidence is well documented.

5.3.3 LED lights

The LED lighting has a reduced maintenance requirement. Whilst this has yet to become evident in costs there is great confidence this will affect the maintenance and repair bills on site. The new LED lighting is covered by a 3 year return to site warranty so should they fail the repair is at no cost to EGSC.

The quality of lighting in the pool has improved with positive feedback from pool users.

5.3.4 Staff Awareness of Smart Energy Use

Over the course of the upgrades Lakes Entrance Aquadome staff have become engaged with the project and are more aware of the energy related issues affecting the facility. An improved understanding of energy efficiency helps build the capacity of staff to implement other measures including simple behaviour change.
6. DEMONSTRATION AND COMMUNICATION OUTCOMES

6.1 Impact of Bright Futures energy efficiency activities on the community

It was not possible to truly evaluate the impact of Bright Futures on the community. The only real way to determine the community impact would be to look at the overall energy use across the entire shire from industry, business and the general community, before and after the project. Unfortunately the various motivations for undertaking energy efficiency vary from cost saving, to an ethical desire to reduce carbon emissions. It would be difficult to extricate the messaging of Bright Futures from other media and opportunities from other state and federal programs.

Anecdotal evidence suggests the popularity of the Renewable Energy Demonstration Trailer has been a key way to promote and provide independent energy efficiency information, without fear of selling a product.

The Bright Futures program has elevated the sustainability role Council plays – and 7 phone calls were received about free light bulbs and other ways to access energy efficiency products, usually provided as part of the VEET scheme.

Patrons of Lakes Entrance Aquadome were handed a paper survey over the course of a week in early September 2015, with an incentive being a free swim, gym or coffee voucher. A total of 33 patrons answered the survey. Survey results are here:

<table>
<thead>
<tr>
<th>Lakes Entrance Aquadome survey questions to 33 patrons (Sept 2015)</th>
<th>Total answers</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Q1. What new equipment have you noticed?</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LED lights</td>
<td>27</td>
<td>82%</td>
</tr>
<tr>
<td>Pool heating system (air sourced heat pumps)</td>
<td>21</td>
<td>64%</td>
</tr>
<tr>
<td>Pool blankets</td>
<td>27</td>
<td>82%</td>
</tr>
<tr>
<td><strong>Q2. How much energy do you think is being saved from the pool blankets?</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5%</td>
<td>5</td>
<td>15%</td>
</tr>
<tr>
<td>20%</td>
<td>20</td>
<td>61%</td>
</tr>
<tr>
<td>60%</td>
<td>12</td>
<td>36%</td>
</tr>
<tr>
<td><strong>Q3. What energy efficiency projects at home have you done:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Draft proofing</td>
<td>19</td>
<td>58%</td>
</tr>
<tr>
<td>Insulation</td>
<td>30</td>
<td>91%</td>
</tr>
<tr>
<td>Double glazing</td>
<td>4</td>
<td>12%</td>
</tr>
<tr>
<td>Switched to LED lights</td>
<td>25</td>
<td>76%</td>
</tr>
<tr>
<td>Standby power eliminator</td>
<td>12</td>
<td>36%</td>
</tr>
<tr>
<td>Solar hot water (from electric storage)</td>
<td>15</td>
<td>45%</td>
</tr>
<tr>
<td>Other:</td>
<td>8</td>
<td>24%</td>
</tr>
</tbody>
</table>
Other included
6 = “solar panels”
1 = “blinds for windows”
1 = “generator”
1 = “standby power eliminator for 2 tvs and a PC”

Q4. Have you been influenced (at home or work) by the energy efficiency upgrades at Lakes Entrance Aquadome? If yes, please describe in what way?

<table>
<thead>
<tr>
<th></th>
<th>Total</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>5</td>
<td>15%</td>
</tr>
<tr>
<td>No</td>
<td>12</td>
<td>36%</td>
</tr>
<tr>
<td>Blank</td>
<td>15</td>
<td>49%</td>
</tr>
</tbody>
</table>

Comments
I enjoy swimming more because of extra comfort.
Swimming makes me feel good.
Yes - turning off lights, insulating house, looking at solar power.
Yes - looking at solar
I had already done improvements at home
No I live in a caravan.
Yes, I in a small way. The pool in a larger capacity, adds to more, so being sustainable for the future.
No already had ours in place

Q5. Your general feedback on the project:

Heaps brighter, cost effective.
Prob not notice
Politically correct
I think it is a good initiative considering the centre has the highest energy consumption.
Cost effective
A very good initiative
Go for it!
The staff are very helpful and caring.
All good
Very good.
Lower running costs. Good.
Very good - every XX are worth making
Seems good - everything helps
Good ideas!!
Great idea
Excellent except change rooms are cold. While doing aerobics light above spa is too bright.
Very good
Great improvement
Good for the public
Great idea - don’t stop now
Excellent
Water is still too cold for winter
Water too cold for elderly
Its good but water sometimes a bit cool in water

Q6. Why is energy efficiency important?
Puts more money in your pocket
Saves power costs
Reduces global warming
$ and planet
$ and planet
With an ongoing growing population throughout the world changes need to be made to ensure
the world is ? and sustainable. Energy efficiency plays a big part in sustainable future. In my
opinion.
Good for the environment
Better for the environment
To get rid of that dirty coal
Save on costs/power, good for the environment
Pool still too cold
Water to cold
Save the planet!
Efficiency gives more comfort.
For the environment.
Saving money.
Climate control (hopefully)
If you’re environmental conscious it is ?
For the environment and saving money
Costs and environmental benefits.
Mostly cost
Save the planet and good for planet
Saves cost and environment
Costing
Because of climate change
1. Environment 2. Cost to users
Cuts down carbon
Climate change
Climate change
There are too many of us! All using too much power, in a non-sustainable way
To keep costs down and help environment

6.2 Reaching the community with communications activities

The following list provides an indication of the reach of the Bright Futures communication activities;

- Website – 706 page views
- Media releases – unknown reach (local newspapers only)
- PowerPoint presentations – 4 presentations to 76 attendees
- Renewable Energy Demonstration Trailer – 258 people
- East Gippsland Field Days – 70 people (2014 and 2015)
- Energy Helpline / Positive Charge Subscriptions – 14 residents
- Lakes Entrance Aquadome specific survey – 33 residents

6.3 Community feedback

General feedback has been extremely positive. The project aligns with a major Council objective of
‘leading by example’, and energy efficiency is receiving more recognition with the way Council does
business. Energy efficiency is now in the Council Plan, and is being actively recognised across the organisation.

<table>
<thead>
<tr>
<th>The following comments were made in survey question number 5, asking for general feedback on the project:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heaps brighter, cost effective.</td>
</tr>
<tr>
<td>Prob not notice</td>
</tr>
<tr>
<td>Politically correct</td>
</tr>
<tr>
<td>I think it is a good initiative considering the centre has the highest energy consumption.</td>
</tr>
<tr>
<td>Cost effective</td>
</tr>
<tr>
<td>A very good initiative</td>
</tr>
<tr>
<td>Go for it!</td>
</tr>
<tr>
<td>The staff are very helpful and caring.</td>
</tr>
<tr>
<td>All good</td>
</tr>
<tr>
<td>Very good</td>
</tr>
<tr>
<td>Lower running costs. Good.</td>
</tr>
<tr>
<td>Very good - every? are worth making</td>
</tr>
<tr>
<td>Seems good - everything helps</td>
</tr>
<tr>
<td>Good ideas!!</td>
</tr>
<tr>
<td>Great idea</td>
</tr>
<tr>
<td>Excellent except change rooms are cold. While doing aerobics light above spa is too bright.</td>
</tr>
<tr>
<td>Very good</td>
</tr>
<tr>
<td>Great improvement</td>
</tr>
<tr>
<td>Good for the public</td>
</tr>
<tr>
<td>Great idea - don’t stop now</td>
</tr>
<tr>
<td>Excellent</td>
</tr>
<tr>
<td>Water is still too cold for winter</td>
</tr>
<tr>
<td>Water too cold for elderly</td>
</tr>
<tr>
<td>Its good but water sometimes a bit cool in water</td>
</tr>
</tbody>
</table>

6.4 Broader uptake of energy efficiency activities

Fifteen percent of survey respondents (of the 33 patrons who undertook the survey at Lakes Entrance Aquadome in September 2015) said they had been influenced by the Bright Futures project at their recreation centre, in their workplace or home (see survey answer to question 4 in section 6.1 above).

In addition, to gain an understanding of the users at the Lakes Entrance Aquadome, patrons were asked about why they thought energy efficiency is important - see comments under question 6 in section 6.1 above. Many people have made the link between energy efficiency, the environment and cost savings – and would like to see more of it.

Subsequent to the successful announcement of CEEP funding and commencement of the Bright Futures energy efficiency works, East Gippsland Shire Council undertook to pursue other energy efficiency projects, valued at over $100,000. The local livestock exchange upgraded their metal halide lighting to LED’s and lighting upgrades were implemented in two Council offices. Bright Futures has been a significant way to demonstrate the benefits across the organisation and throughout the community.

Uptake of improved energy management practices in the broader community has not been possible to monitor. However, EGSC are working and sharing ideas with the Bairnsdale Regional Health
Service (BHRS) as a result of the Bright Futures media releases in the local newspapers. BHRS also are undertaking energy efficiency projects. Through the Resource Smart Schools Facilitator role EGSC is continuing to advise local schools on how undertake energy audits and make savings through energy efficiency.

6.5 Opportunities for local industry and business

The establishment of the energy helpline was for both residents and local businesses. The energy helpline has been promoted through the Economic Developments local newsletter. The presentation at the Bairnsdale Chamber of Industry and Commerce demonstration to those local businesses how to approach energy efficiency projects, and the multiple benefits – reduced operating costs and emission reductions (which also demonstrate corporate responsibility).
7. BUDGET

7.1 Budget Summary

The overall budget shows a small underspend of $6022.32 from a total budget of $665,617. This equates to a 0.9% variance. The main heating and lighting equipment budgets came close to the original budgets overall. Project control was overspent whilst budgets for communications, specifications, close out documentation and project management plans were underspent. Project control comprised mainly the salary contribution of the Project Manager and Project Supervisor. There were two principal reasons for the overspend in project control - These where;

- A large part of the development of the project plan, equipment specifications, communication activities and close out documentation was undertaken by the Project Manager whose salary was listed under project control
- There was a requirement for additional project control time devoted to the project due the time delays and technical issues encountered during the project.

Budget Summary Table

<table>
<thead>
<tr>
<th>Activity</th>
<th>CEEP Budget</th>
<th>EGSC Budget</th>
<th>Total Budget</th>
<th>Actual Expenditure</th>
<th>Variance</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.1 Project Management</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.1.1 Project Management Plan</td>
<td>3,980.17</td>
<td>2,019.83</td>
<td>6,000.00</td>
<td>2,784.00</td>
<td>3,216.00</td>
</tr>
<tr>
<td>3.1.2 (13) Project Control (Baseline &amp; Ongoing Energy Consumption Monitoring)</td>
<td>36,511.44</td>
<td>18,528.56</td>
<td>55,040.00</td>
<td>83,751.06</td>
<td>28,711.06</td>
</tr>
<tr>
<td>3.1.3 Communications Activities / Bright Futures in East Gippsland</td>
<td>21,864.41</td>
<td>11,095.59</td>
<td>32,960.00</td>
<td>26,240.76</td>
<td>6,719.24</td>
</tr>
<tr>
<td>3.1.4 Close Out Documentation</td>
<td>1,326.72</td>
<td>673.28</td>
<td>2,000.00</td>
<td>-</td>
<td>2,000.00</td>
</tr>
<tr>
<td>3.2 Procurement and Installation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.2.1 Peer Review on ASHP Suitability</td>
<td>1,990.09</td>
<td>1,009.91</td>
<td>3,000.00</td>
<td>1,280.00</td>
<td>1,720.00</td>
</tr>
<tr>
<td>3.2.2 Air/Water Heating System, Ducting &amp; Control Specification</td>
<td>17,910.77</td>
<td>9,089.23</td>
<td>27,000.00</td>
<td>14,355.84</td>
<td>12,644.16</td>
</tr>
<tr>
<td>3.2.3 Air/Water Heating System, Ducting &amp; Control Design, Supply, Install &amp; Commission</td>
<td>339,674.49</td>
<td>172,375.51</td>
<td>512,050.00</td>
<td>502,764.87</td>
<td>9,285.13</td>
</tr>
<tr>
<td>3.2.4 Lighting Upgrade Specification &amp; Design</td>
<td>3,316.81</td>
<td>1,683.19</td>
<td>5,000.00</td>
<td>199.00</td>
<td>4,801.00</td>
</tr>
<tr>
<td>3.2.5 Lighting Upgrade Supply &amp; Install</td>
<td>14,970.09</td>
<td>7,596.91</td>
<td>22,567.00</td>
<td>28,219.15</td>
<td>5,652.15</td>
</tr>
<tr>
<td></td>
<td>441,545.00</td>
<td>224,072.00</td>
<td>665,617.00</td>
<td>659,594.68</td>
<td>6,022.32</td>
</tr>
</tbody>
</table>

Heating equipment upgrades

The actual expenditure on the main heating equipment upgrades was very close to the original budget figure ($9,285.16 under budget). However, there were some significant deviations in the composition of the total figures. These can be listed as;

- Pool Blankets - The original budget did not include a figure for pool blankets. The peer review strongly recommended that pool blankets be a first step in the upgrade. The installation of pool blankets accounted for $51,701 of the overall budget allocated to the heating upgrades.
- Air/Water Heating System - The core technology change after pool blankets was a switch from LPG to air sourced heat pumps as a primary heat source. The overall cost of the heat pumps for pool water heating and pool air heating was lower than had been budgeted for.
- Electricity Supply Upgrades - The use of air sources heat pumps necessitated an upgrade to the power supply to the Lakes Entrance Aquadome. Ausnet Services provided the transformer upgrade and underground cable upgrade to the EGSC supply point at no cost to EGSC. The underground supply from the supply point to the actual building required an upgrade along with the metering and main switchboard. The costs of these works were $59,850.
• Decommissioning of existing atmospheric LPG boilers- The boiler for the pool heating and spa heating were decommissioned and replaced within the overall budget. The atmospheric boilers were replaced with high efficiency condensing boilers.

Lighting Upgrades
The original application was based on a consultant’s report which did not fully identify all the lights requiring change over. A significantly greater number of lights were changed compared to the project plan and original consultant’s report. For example, 152 T8 tubes were replaced with LED tubes compared to 36 in the project plan. Lighting in the pool changing rooms could not be retrofit tubes only as the surface mount fittings were found to be water affected and needed replacement. Overall the pricing of LED lights dropped over the project period allowing a significantly larger upgrade program to go ahead whilst overspending by 25% ($5662.15)

Additional costs
There was a number of unforeseen expense items resultant from the use of the heat pump technology;
  • Refitting of the original plant room into a store room so that the air handling units could be housed inside the building it what were originally store rooms
  • Construction of fencing and shed walls to protect the externally mounted pool water heating heat pumps

7.2 Value for Money
The project achieved value for money by adhering to EGSC procurement policy whereby all purchasing was undertaken in a competitive environment.

8. PROJECT OPERATION MECHANISMS AND PROCESSES

8.1 Project responsibilities
Project management was managed internally with the following general responsibilities;
  • **Director Development** overall responsibility for the project as strategic owner of recreation facilities
  • **Manager Council Enterprises** oversight of the project and inform Executive Group of the progress
  • **Project Manager (Sustainability)** delivery of the project, reporting requirements, liaison with stakeholders
  • **The Consulting Engineer** technical input for the project, including development of specifications, tender design and evaluation and commissioning of heating equipment
  • **Project Supervisor (Buildings)** on site contract supervision and liaison
  • **LARC Centre Coordinator** was available for onsite liaison, integration with existing plant equipment and overall operating requirements and input into design
  • **The Sustainability Officer** coordination of Bright Futures East Gippsland communication program and the monitoring and evaluation components, and play the role of Project Support
8.2 Project processes

The management of the project utilised existing Council structures, processes and reporting frameworks. EGSC is well placed to manage building infrastructure projects with a dedicated capital projects team working with strategic planning staff, finance staff and operational staff. EGSC’s governance directorate had oversight of the processes throughout the project with particular emphasis on procurement and Council reports.

8.3 Procurement and implementation

For major cost items greater than $150,000 dollars a public tender process was followed. This would involve all levels of the team listed above. The Consulting Engineer and Project manager developed specifications with inputs from LARC Centre Coordinator, the Sustainability Officer and the Manager Council Enterprises. The tender evaluation panel, acting as a steering group, assessed options and made recommendations for further oversight by EGSC Executive Group and ultimately Councillors themselves. The development of a formal Council report necessitates a rigorous appraisal of the procurement process, the available options and the rationale of the final recommendation. This was the process by which the main heating equipment was procured.

Implementation then fell back to the Project manager and project supervisor with liaison with council stakeholders and contractors. Further technical input and advice was provided by the consulting engineer as required.

Components of the project falling in the $10,000 to $75,000 brackets including: Lighting upgrades; pool blankets; boiler upgrades; foyer display screen system; and electrical upgrades employed a request for quotation process as per EGSC’s procurement policy. Specifications were developed by the Project Manager with input from the consulting engineer and other council staff as required. Quotations were evaluated by the project manager with input from other members of the project team. The purchase order approval was routed through appropriately delegated officers up to the Manager Capital Projects.

Implementation then fell back to the Project manager and project supervisor with liaison with council stakeholders and contractors.

Items up to the value of $10,000 were procured as per EGSC’s procurement policy requiring 3 quotes and a purchase order. The purchase order approval was routed through appropriately delegated officers. Implementation of these smaller items fell to either the project manager or the project supervisor.

Contract management was the responsibility of the Project Manager and Project Supervisor with input for the Contract Coordinator and Manager of Strategic Planning.

Communications activities were managed by the Project Manager with support from the Sustainability officer and utilising EGSC’s communications unit.
9. **CONCLUSION**

The Lakes Entrance Aquadome CEEP Project (2243) was successful in a major energy efficiency upgrade of a community facility in a regional and low socio-economic region of Victoria. The upgrade significantly improved the energy efficiency of the facility and the communications activities of the Bright Futures program ensured that this was demonstrated and noticed by the general public.

The most striking result of the energy efficiency upgrades is the huge reduction in LPG usage and the savings this generates. There has been an increase in the electrical consumption at the site but this was to be expected by shifting the bulk of the heating load to air sourced heat pumps. The reduction in energy consumption from LPG was seven times greater than the increase in electrical energy consumption.

The energy efficiency upgrades occurred late in the financial year so the impact comparing 2013-14 to 2014-15 did not achieve the target predicted. However, when a complete year has elapsed with the measures in place it is expected that the project will meet its target. Energy efficiency improvement will continue into the future as a result the ability to monitor conditions and consumption through the SCADA system.

East Gippsland Shire Council was able to implement the project utilising existing capital project processes and procedures and to do this within the overall budget of the project.

Some delays occurred as a result of requirements for electrical upgrades and the knock on effect this had on the main contractors.

The Bright Futures communication package promoted the project and energy efficiency within the community through an extensive range of media. The communications activities helped ensure the project met the broader aims of the Community Energy Efficiency Program, acknowledged the significant contribution of the Australian Government and positioned East Gippsland Shire Council as a leader in energy efficiency.
10. DECLARATION

DECLARATION

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 __________________________ (Name of organisation).

☐ 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.
11. PROJECT ENERGY EFFICIENCY IMPROVEMENT REPORT

11.1 Summary Table Air/ Water Heating

<table>
<thead>
<tr>
<th>Building, Facility or Site 1</th>
<th>Lakes Entrance Aquadome</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name of Building, Facility or Site 1</td>
<td>Lakes Entrance Aquadome</td>
</tr>
<tr>
<td>Location (address)</td>
<td>Palmers Road, Lakes Entrance</td>
</tr>
<tr>
<td>Type of building, facility or site</td>
<td>25m indoor swimming pool and recreation centre</td>
</tr>
<tr>
<td>Activity Type and Measure</td>
<td>Air/water heating and cooling, ducting, control system etc</td>
</tr>
<tr>
<td>Plus Pool Blankets</td>
<td></td>
</tr>
<tr>
<td>Baseline Energy Usage</td>
<td>7549814 MJ (using 2013-14 data)</td>
</tr>
<tr>
<td>Baseline Energy Efficiency</td>
<td>11.98 MJ/Litre</td>
</tr>
<tr>
<td>Energy Efficiency Improvement</td>
<td>4.84 MJ/litre (59.6%) - Target</td>
</tr>
<tr>
<td></td>
<td>10.16 MJ/litre (15.2%) - Achieved 2014-15</td>
</tr>
<tr>
<td>Reporting Data (Measuring Energy Efficiency and Additional Data)</td>
<td>On site energy sources = LPG and electricity</td>
</tr>
<tr>
<td>Energy content factor for LPG (25.7 GJ/kL)</td>
<td>Total volume of pool water = 630,000 litres</td>
</tr>
<tr>
<td>Cost of Activity</td>
<td>$643,050</td>
</tr>
<tr>
<td></td>
<td>Actual Cost $502,765 plus Project Management and Design/Specification Costs</td>
</tr>
<tr>
<td>Estimate Cost Savings</td>
<td>$143,412</td>
</tr>
<tr>
<td></td>
<td>Actual $84,587.00 in 2014-15 compared to 2013-14</td>
</tr>
</tbody>
</table>

11.2 Utility Data

The figures above are derived from a comparison between gas/electricity invoice data from 2013-14 and 2014-15. Complete financial year data has been used. That data is summarised in the tables below:

<table>
<thead>
<tr>
<th>Year</th>
<th>Gas Usage MJ</th>
<th>Electricity Usage MJ</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>2013-14</td>
<td>5653997</td>
<td>1895817</td>
<td>7549814</td>
</tr>
<tr>
<td>2014-15</td>
<td>4331400</td>
<td>2068363</td>
<td>6399763</td>
</tr>
<tr>
<td>Variation</td>
<td>-1322597</td>
<td>172546</td>
<td>-1150051</td>
</tr>
<tr>
<td>% Variation</td>
<td>-23%</td>
<td>9%</td>
<td>-15%</td>
</tr>
<tr>
<td>Year</td>
<td>Gas Costs</td>
<td>Electricity Costs</td>
<td>Total</td>
</tr>
<tr>
<td>---------</td>
<td>-------------</td>
<td>-------------------</td>
<td>-------------</td>
</tr>
<tr>
<td>2013-14</td>
<td>$196,264.00</td>
<td>$89,903.00</td>
<td>$286,167.00</td>
</tr>
<tr>
<td>2014-15</td>
<td>$125,670.00</td>
<td>$75,910.00</td>
<td>$201,580.00</td>
</tr>
<tr>
<td>Variation</td>
<td>-$70,594.00</td>
<td>-$13,993.00</td>
<td>-$84,587.00</td>
</tr>
<tr>
<td>% Variation</td>
<td>-36%</td>
<td>-16%</td>
<td>-30%</td>
</tr>
</tbody>
</table>

This gross data gives an accurate overall picture of energy usage and costs comparing the latest baseline year with the year in which the upgrades have occurred.

It can be seen that the improvements and savings in 2014-15 are well below the target figures but this is simply explained by the heat pump equipment only being installed in April 2015 and the pool blankets in November 2014 thus only being able to make savings for three months and seven months respectively. Furthermore, the control system was undergoing development throughout the period of April to July 2015.

It can be seen that gas consumption went down by 23% whilst electricity consumption went up by 9% reflecting the change from LPG to electricity use. The overall trend was a 15% reduction in energy use.

Costs dropped by 30% overall and this reflects the energy savings combined with lower prices for gas and electricity. Electricity prices went down significantly for EGSC because of a tender process for the supply to all EGSC sites.

There is confidence that given a whole year's data with the upgrade operating that our energy efficiency improvement targets will be met.

11.3 Gas Meter Data

The gas usage derived from invoice data is only reliable when compared over long time periods because it is not metered as such - The invoices result from bulk LPG gas deliveries by truck. There is no guarantee that each delivery completely fills the storage tanks.

A gas meter with a pulse output was installed in September 2014. The output was monitored remotely via a 3G connection on a server hosted by our consultant engineers - Energy Made Clean.

This has allowed specific analysis of interval data to help identify changes in energy use as a result of the efficiency upgrades. The gas consumption report was produced by Energy Made Clean in mid June 2015 to help confirm the effectiveness of the new system. The full report is provided as Attachment 14.

The table below compares the LPG consumption figures over the period of upgrade with the same period in the previous year. These monthly comparisons give a good indication of the impact of the use of pool blankets and then the heat pumps.
The graph below is a good illustration of the impact of the pool blankets and, later in the year, the heat pumps. There is a baseline of LPG consumption because the spa has its own gas boiler that is not influenced by the heat pumps and the main gas boilers provide heat to the pool changing rooms and provide supplementary heat to the air handling system.

<table>
<thead>
<tr>
<th>Year</th>
<th>Average daily consumption (L/day)</th>
<th>Reduction (L)</th>
<th>% Change to historic data</th>
</tr>
</thead>
<tbody>
<tr>
<td>2014-15</td>
<td>491, 450, 235, 238, 200, 321, 188, 210, 302</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Seasonal weather variations cause the heat demand at the pool to vary over the year and between years. However, a seasonal pattern is clear. The energy savings vary with the seasonal pattern therefore it is not accurate to predict savings from a small data set i.e. compare one month with the previous month.

EMC were able to conclude that 17% reduction in gas usage would be a conservative estimate of the impact of the pool blankets.

### 11.4 Electrical Consumption

The main aim of the upgrades was to reduce overall energy use and costs by switching the main heat demand from LPG to electrical heat pumps. The significant reduction in LPG usage has been shown but this was associated with an increase in electrical consumption. The relative scales of these changes in consumption determine the success for the project.

The gross utility data shows an increase of 9% in electricity consumption compared to a 23% reduction in gas use but given that gas was the main energy source for the building the scale and impact of that reduction far outweighs the increase in electrical consumption. This is borne out by the comparison in GJ whereby the gas reduction is more than 7 times as large as the electrical increase.

<table>
<thead>
<tr>
<th>Gas energy decrease GJ</th>
<th>1323</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electrical energy increase GJ</td>
<td>173</td>
</tr>
</tbody>
</table>

The final commissioning report is provided as Attachment 15. This report provides detail around electrical power consumption. The main source of data was interval data provided by the power retailer ERM. Meters on the individual heat pump units were found to be faulty providing incorrect data. These meters have since been replaced under the defects period. This was inconvenient and presented problems in determining the coefficient of performance (COP) for the individual units but the interval data from ERM clearly showed the impact of the heat pump installation in April 2015.

The commissioning report concludes:

- Initial savings estimates based on utility information suggest that the heat pumps consume an average of 831 kWh (2.99 GJ) per day of electricity in June. Gas savings in May and June showed a reduction in consumption of approximately 500 L (12.85 GJ) per day. This equates to a total energy saving of 9.85 GJ per day.
- Assuming pool blankets account for 17% of this saving the savings that can be attributed to the heat pumps are 415 L (10.67 GJ) per day.
- The energy consumption in June 2012 was 41,143 kWh (148 GJ) of electricity and 24,8404 L (638 GJ) or 786 GJ total.
- In June 2015, electricity consumption was 66,063 kWh (238 GJ) and gas consumption was 9,0605 L (233 GJ) or 471 GJ total.
- In June 2015 the total savings were 315 GJ or 40% compared to June 2012.
- The previous energy performance indicator in the CEEP application was 11.9 MJ/L/year, the projected improvement was 4.84 MJ/L/year or 60% reduction. Assuming that the savings will be greater in summer than in June an annual saving of 60% is achievable.
The basis of the assumption that summer savings will be greater than winter savings hinges on:

- The coefficient of performance of the heat pumps is much greater with summer time temperatures compared to winter time temperatures.
- The heat recovery/air handling heat pumps will not require supplementary gas heating in the summer and so the heating demand of the centre will be met almost exclusively by the electric heat pumps.

### 11.5 Summary Table Lighting

<table>
<thead>
<tr>
<th>Building, Facility or Site 1</th>
<th>Lakes Entrance Aquadome</th>
</tr>
</thead>
<tbody>
<tr>
<td>Location (address)</td>
<td>Palmers Road, Lakes Entrance</td>
</tr>
<tr>
<td>Type of building, facility or site</td>
<td>25m indoor swimming pool and recreation centre</td>
</tr>
<tr>
<td>Activity Type and Measure</td>
<td>Upgrade lights</td>
</tr>
<tr>
<td>Energy Efficiency Estimate Method</td>
<td>Methodology: % saving per light type x no. of lights Recalculated 2015</td>
</tr>
<tr>
<td>Baseline Energy Usage</td>
<td>The baseline lighting energy use is 337,476MJ (Recalculated)</td>
</tr>
<tr>
<td>Baseline Energy Efficiency</td>
<td>134.99 MJ/m2/year</td>
</tr>
<tr>
<td></td>
<td>0.030 MJ/m2/hr of annual operation</td>
</tr>
<tr>
<td>Energy Efficiency Improvement</td>
<td>50.17 MJ/m2/year (Calculated) or a 62.8% reduction</td>
</tr>
<tr>
<td></td>
<td>0.011 MJ/m2/hr of annual operation</td>
</tr>
<tr>
<td>Reporting Data (Measuring Energy Efficiency and Additional Data)</td>
<td>The total area of the Lakes Entrance Aquadome is 2500m2</td>
</tr>
<tr>
<td></td>
<td>Hours of daily operation = 12.36</td>
</tr>
<tr>
<td></td>
<td>Annual hours of operation = 4,515</td>
</tr>
<tr>
<td></td>
<td>Details = The facility is open from 6am until 8pm Monday to Friday and 9am until 6pm on weekends and public holidays (closed Christmas and Good Friday).</td>
</tr>
<tr>
<td></td>
<td>The facility includes:</td>
</tr>
<tr>
<td></td>
<td>• 6 lane, 25m pool</td>
</tr>
<tr>
<td></td>
<td>• Toddlers' pool</td>
</tr>
<tr>
<td></td>
<td>• Spa and Sauna</td>
</tr>
<tr>
<td></td>
<td>• Gymnasium</td>
</tr>
<tr>
<td>Cost of Activity</td>
<td>$22,567</td>
</tr>
<tr>
<td>Actual Cost</td>
<td>$28,219.15 plus Project</td>
</tr>
<tr>
<td>Management and Design/Specification Costs</td>
<td></td>
</tr>
<tr>
<td>------------------------------------------</td>
<td></td>
</tr>
<tr>
<td><strong>Estimate Cost Savings</strong></td>
<td></td>
</tr>
<tr>
<td>The baseline cost for lighting is <strong>$11,249 per year (recalculated)</strong> and the estimated cost savings will be <strong>$7,068.67 per year</strong>.</td>
<td></td>
</tr>
<tr>
<td><strong>The energy cost savings are $7,069 per year</strong></td>
<td></td>
</tr>
</tbody>
</table>

The energy efficiency baseline provided in the project plan was incorrect. It was based on a consultant’s report undertaken in 2012 and the calculations only applied to the pool hall, part of the foyer and gym.

The total area of the building is 2500m² rather than the 1848m² stated. Numbers of lights where underestimated significantly. An extra 152 T8 tubes were replaced with LED’s throughout the centre plus 37 surface mounted troffers in the change rooms. This increase in the number of lights compared to the baseline figures explains the recalculated baseline, the extra expenditure and the increased savings.

The numbers can be verified in the floor plan report provided by the installation contractors in Attachment 12 Site Plan Lighting.

The improvement targets were not quite met but this is a result of the original baseline calculations not taking into account all the lighting in the centre.

The calculated annual saving is 212 GJ which equates to an overall 62% energy saving compared the retrofitted units.

The baseline and energy savings are based on calculations rather direct measurement. It was not feasible to measure (CT Clamp) the lighting circuits. The metering data is not useful when looking at the lighting upgrades because of the much larger impacts on consumption resulting for the heat pumps. The reduction in consumption as a result of the lighting upgrade was masked by the larger increase in consumption caused by the heat pumps. The overall savings potential from the lighting upgrades is many times less than that from the heating upgrades.

It was anticipated that this could be accounted for as each heat pump was equipped with electrical load and consumption monitoring. However, this function of the heat pumps did not operate correctly and has had to be remedied in the defects period of the contract.