RECONDITIONING OF THE AIR CONDITIONING UNIT IN THE ADMINISTRATION CENTRE

Final Progress Report
December 2013
FORWORD

This final report for the Reconditioning of the Air Conditioning Unit in the Administration Centre at Gloucester Council is prepared to fulfil the requirement of the Australian Government, Department of Industry’s funding requirement. The report presents the detail of the project activities from concept to completion.

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.
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Summary
Gloucester Shire Council was successful in its application for a Federal Government Energy Efficiency grant in January 2013, to upgrade the air conditioning unit within the Gloucester Council administration building.

The administration building has been built over time with separate sections being added in different years. The building has historically had an inefficient air-conditioning system. With the availability of the energy efficiency grant, the air conditioning unit was able to be reassessed and the unit recalibrated. This allowed an energy saving to Council of 11% compared to the same period last year. Staff and the general public are satisfied with the stable, comfortable temperatures within the building.

Publicity of the initiative was wide spread, with a maximum amount of people exposed to the energy efficiency message, through a local Festival, radio and newspapers.

The partnership between the Federal Government and Gloucester Council to revue and reduce the amount of energy utilised by the air conditioning system within the administration building and to spread the energy saving message, was deemed a success.
Introduction

The Council administration building is an important meeting place for the residents of Gloucester. The building is one of the few places in Gloucester where community groups can meet to hold large functions and meetings. The community regularly use the Council administration buildings to pay bills, use the motor registry, entertain dignitaries, and for training. These events are held on a daily basis with the meetings and functions holding up to one hundred people. The staff that serves the community also uses the Council buildings daily.

The Gloucester Shire Council administration building has developed over time and now has two levels, with an older section at the bottom, and a newer section above. The air conditioning system however, has not been updated over the same time period and as such there are inefficiencies within the system. This is illustrated by the temperature differences within the building, where in the lower part of the building the temperature can be over 30 degrees, whilst in the higher part of the building, the temperature will be 22 degrees.

Gloucester Council was successful in its bid for a Community Energy Efficiency Program (CEEP) grant to re-evaluate the air conditioning unit, to make the system more energy efficient, and to advertise the importance of energy efficiency.

Project Objective
The main objectives of the Energy Efficiency Project grant in Gloucester were to:

a. reduce the amount of energy used by the air conditioning unit in the Gloucester Council administration building.

b. illustrate the savings made by investing into energy efficiency within Council buildings and

c. advertise the energy and cost savings to effect the community into action and save energy within their own homes and businesses.
Discussion

Scheme concept

A team of Council staff was put together to oversee the grant structure and expenses. Five energy contractors were contacted with regard to completing an audit of the air conditioning system within the Council administration building, with one contractor chosen for both the audit and the reconditioning work.

An energy audit of the Gloucester administration building air conditioning unit and lighting was completed on February 7th 2013, with the contractors reporting the air-conditioning unit energy use was found to be “extremely high, and the services inadequate and unreliable” (Futurebrite report 1).

Contractors, Futurebrite, were chosen as the contractor. The total value of the project was projected to be $30,000.
During May 2013, the contractor implemented the recommended changes detailed in their report and documented their changes (Futurebrite report 2). Electricity use within the administration building was also monitored on a regular basis and recorded on the Council website, with the use of energy within the administration building compared to use during the same period in the previous year, reported.

Advertising proofs for print, the web and radio were approved by the Department of Climate Change and Energy Efficiency (DCCEE), with advertising for the CEEP project commencing in line with the Gloucester Sustainable Living Festival held on October 12th 2013. Gloucester Council rejoined Planet Footprint, and will further advertise the energy savings in the local paper and on the web site throughout 2014.

**Air conditioning units**

There are nine units within the building, with most of them working inefficiently. The contractors found:

1/ **Foyer AC**,  
On inspection the filter type was found to be the wrong selection for this unit and was restricting the airflow considerably. The filters were removed, with new filters ordered. Once the unit was re-powered the airflow was re-balanced and the temperature sensor re-calibrated. The system is working to standard.

2/ **General Office West AC 3**,  
This unit had no airflow to the western offices and was not working to standard. On inspection of the filters it was found that the filter type was the wrong selection for this unit and had been restricting the airflow considerably. The filters were removed, with new filters ordered. The airflow was balanced and achieved 1.5 – 2.3 m/s air velocity to the offices. The temperature sensor was re-calibrated. The system is now working to standard.

3/ **General Office South AC 4**,  
This unit had low airflow to the southern zone of the main offices and was not working to standard. On inspection of the filters it was found that the filter type was the wrong selection for this unit and had been restricting the airflow considerably. The filters were removed, with new filters ordered. The airflow was balanced the temperature sensor was re-calibrated. The system is working to standard.

4/ **Services Counter AC 6**,  
This unit had low airflow to the services counters facing the Foyer and was not working to standard. On inspection of the filters it was found that the filter type was the wrong selection for this unit and had been restricting the airflow considerably. The filters were removed, with new filters ordered. The airflow was balanced the temperature sensor was re-calibrated. The system would not control to temperature. On investigation it was found that the Temperature sensor had been installed in the wrong location and was sensing the temperature of AC 3 & 4. The sensor was fitted in the Southern-Services counter on the rear wall. The system is now working to standard.

5/ **Store / Staff Area AC 2, 7**
On inspection of the filters the filter type was found to be the wrong selection for this unit and was restricting the airflow considerably. The filters were removed, with new filters ordered. Once the unit was re-powered the air flow was re-balanced and the temperature sensor re-calibrated. The system is working to standard. Note: The Temperature sensor for this Unit is located in the return air grill in the walkway area. If the door at the end of this corridor is left open the temperature becomes out of calibration and temperature variances occur in the staff room. If the door cannot be closed the sensor needs to be moved by the maintenance contractor inside the staff room.

6/ General Managers Meeting Room AC 5
On inspection of the filters the filter type was found to be the wrong selection for this unit and was restricting the airflow considerably. The filters were removed, with new filters ordered. The airflow was balanced the temperature sensor was re-calibrated. The system is working to standard.

7/ General Manager AC 7.
On inspection of the filters the filter type was found to be the wrong selection for this unit and was restricting the airflow considerably. The filters were removed, with new filters ordered. The airflow was balanced the temperature sensor was re-calibrated. The system is working to standard.

8/ Existing Building AC 8.
The unit had low airflow and could not service the area.
2 Hi Wall split systems have been installed to supplement this unit on extreme days.
On inspection of the filters the filter type was found to be the wrong selection for this unit and was restricting the airflow considerably. The filters were removed, with new filters ordered. The static pressure of the fan deck was increased and the airflow balanced, increasing the airflow to the Eastern offices. The temperature sensor was recalibrated and the system is working to standard.
Note: The supplementary Air Conditioning Units should only be used for extreme days when the main unit cannot satisfy the load.

9/ Meeting Room / Chambers AC 10.
This unit had low airflow and was not working to standard. On inspection of the filters the filter type was found to be the wrong selection for this unit and was restricting the airflow considerably. The filters were removed, with new filters ordered. This also contributed to an excessive noise in the meeting room. The airflow and was balanced and the temperature sensor re-calibrated. The system is working to standard.
Note: The return air grills located on the walls of the meeting room need to be modified by the Maintenance Contractor. 50mm angle sheet metal needs to be installed inside the ductwork to support new pleated disposable filters.

This unit is at the end of its serviceable life and needs to be replaced in the foreseeable future. For budgetary consideration an amount of $25,000 - $30,000 should suffice.
Project Funding

The project was managed by Gloucester Shire Council staff. The project was partially funded by the Federal Government’s Community Energy Efficiency Program, which set out to provide $20,000 toward the project, with Gloucester Council providing $10,000 in cash and $10,000 in kind.

The project has been successfully completed, with all of the Milestones in the funding agreement met. The project was achieved under budget. The contributions made by Gloucester Council totalled $19,685; $10,017 in kind and $9685 in cash. Table 1 and 2 show the following income and expenditure that has been spent on the Community Energy Efficiency Program by Gloucester Council and the Commonwealth Government at commencement of the project.
Table 1: Income and expenditure for the Community Energy Efficiency Grant by the Commonwealth Government and Gloucester Council.

<table>
<thead>
<tr>
<th>Expenditure Item</th>
<th>Dept. Funding</th>
<th>Actual Dept. Funding</th>
<th>Other Contributions (cash)</th>
<th>Actual Council Contribution</th>
<th>Total Actual Spent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy efficiency report</td>
<td>$3,000</td>
<td>$3,000</td>
<td>$0</td>
<td>$0</td>
<td>$3,000</td>
</tr>
<tr>
<td>Recondition of air conditioning system</td>
<td>$17,000</td>
<td>$15,347</td>
<td>$4,000</td>
<td>$4,592</td>
<td>$19,939</td>
</tr>
<tr>
<td>Monitoring and evaluation</td>
<td>$0</td>
<td>$0</td>
<td>$3,500</td>
<td>$2,950</td>
<td>$2,950</td>
</tr>
<tr>
<td>Communication and promotional activities</td>
<td>$0</td>
<td>$0</td>
<td>$2,500</td>
<td>$787</td>
<td>$787</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>$20,000</strong></td>
<td><strong>$18,347</strong></td>
<td><strong>$10,000</strong></td>
<td><strong>$8,329</strong></td>
<td><strong>$26,676</strong></td>
</tr>
</tbody>
</table>

Table 2: Gloucester Council in kind contribution to the CEEP air conditioning project

<table>
<thead>
<tr>
<th>Non cash</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Complete project evaluation</td>
<td>$5,000</td>
<td>$6,699</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Complete advertising and promotion</td>
<td>$5,000</td>
<td>$3,318</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>$10,000</strong></td>
<td><strong>$10,017</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Outcomes of the Project
The energy management practices of Council have improved since the CEEP grant. Regular monitoring of electricity use of the administration building is now occurring. Planet Footprint has been employed and regular reporting on energy use on all Council buildings is taking place. Improved management practices of Council have been documented through advertising the saved energy in the local newspaper, on local radio and through the well patronised annual Gloucester Sustainability Festival. Publicity of the program, it is anticipated that the improved energy management practices of the Council will encourage the general public to develop and sustain good energy management on their property. Ongoing publicity through Council mediums (annual report, staff newsletters, local newspaper) and Planet Footprint will also encourage this. The grant has benefited the community through the increased amount of comfort from the efficient air conditioning of the Council administration building to the general public and staff, energy savings, and has served as encouragement and incentive to the general public and business, as to what can be achieved. Staff have stated that the public have commented that it is “a real relief “to come into the cool of the administration building. There were many positive statements from the community about the initiative at the Sustainability Festival, with comments such as, “there should be more of this happening. It just makes so much sense to save energy and costs in this way”.
Project Energy Efficiency Improvement

Baseline data for the project was provided (see Table 3) prior to project commencement.

Table 3: Energy efficiency and projected savings from the air conditioning project, Gloucester Council

<table>
<thead>
<tr>
<th>Energy Efficiency Estimate Method</th>
<th>The simulation used to provide the estimates is based on the 2012 Building Code of Australia from JV3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseline Energy Usage</td>
<td>300,000 kWh per annum</td>
</tr>
<tr>
<td>Baseline Energy Efficiency</td>
<td>200 kWh x 3.6 = 720 MJ per m² .annum</td>
</tr>
<tr>
<td>Energy Efficiency Improvement</td>
<td>Reduction 55 kWh x 3.6 = 198 per m² .annum</td>
</tr>
<tr>
<td>Reporting Data (Measuring Energy Efficiency and Additional Data)</td>
<td>A total area of 1500 m² and 80 occupants 85 per cent average operational occupancy level Daily hours of operation: 8am to 5pm Building construction date 1978</td>
</tr>
<tr>
<td>Cost of Activity</td>
<td>$30,000</td>
</tr>
<tr>
<td>Estimated Cost Savings</td>
<td>$4,000 per annum</td>
</tr>
</tbody>
</table>

There has been approximately three months since the air conditioning system has been rectified, falling within one billing period 1st of May to the 29th of July. During this period, the amount of daily energy used, as per the electricity bill for these three months dropped from 344.83 kWh to 306.04 kWh compared to the same period last year. This is a drop of 11.24% in energy use, and a drop in greenhouse gas by 0.7 of a tonne. Extrapolated from the previous annual energy use from the electricity bill:

Table 4: Annual actual electricity use and projected savings from the air conditioning project, Gloucester Council

<table>
<thead>
<tr>
<th>Energy Efficiency Estimate Method</th>
<th>Taken from electricity bills</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseline Energy Usage</td>
<td>125518.12 kWh per annum</td>
</tr>
<tr>
<td>Baseline Energy Efficiency</td>
<td>111398 kWh x 3.6 = 401033 MJ per m² per annum</td>
</tr>
<tr>
<td>Energy Efficiency Improvement</td>
<td>Reduction of 14120 kWh x 3.6 = 50832 MJ per m² per annum or 11.24%</td>
</tr>
<tr>
<td>Reporting Data (Measuring Energy Efficiency and Additional Data)</td>
<td>Taken from electricity bills</td>
</tr>
<tr>
<td>Cost of Activity</td>
<td>$30,000</td>
</tr>
<tr>
<td>Actual Cost Savings</td>
<td>$4,079.26 per annum</td>
</tr>
</tbody>
</table>

The baseline energy use figures from Table 4 differ from the anticipated energy use. It was stated in the original application that there is an annual baseline use of 300,000 kWh usage, whereas the electricity bill estimates 125518.12 kWh, annually. This discrepancy is believed to be in the data supplied initially by Planet Footprint. Further, in the original application, Council anticipated a reduction in electricity use of 25%. The saving in those three months has been 11.24%. This relates
to an annual saving of around $4079.26. This is very similar to the projected savings at the beginning of the project.

During the period the air conditioner was monitored, Gloucester had the hottest weather conditions for this period on record. Therefore energy savings may be greater still when conditions are cooler.

The CEEP project has contributed to a broader focus on energy consumption. The uptake of the energy meters Council hire’s out to the public have increased since the project was advertised.

It is further estimated that around 2000 people from the local Gloucester community and 500 people from the surrounding areas were exposed to the message of energy efficiency.

Conclusion

The partnership between the Federal Government’s CEEP grant and Gloucester Council to revue and reduce the amount of energy utilised by the air conditioning system within the Council administration building, was a success. The energy management practices of Council have improved since the grant with regular monitoring of electricity use of the administration building now occurring. Planet Footprint has been employed and regular reporting on energy use on all Council buildings is now taking place. Improved management practices have been documented through advertising the saved energy in the local newspaper, on local radio and through the well patronised annual Gloucester Sustainability Festival. Through publicity of the program, it is anticipated that the improved energy management practices of the Council will encourage the general public to develop sustainable energy management. Ongoing publicity through Council mediums (annual report, staff newsletters, local newspaper) and Planet Footprint will encourage this.
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

[Organisation Name]

☑️ 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: [Signature] Date: 9/4/14

Name: [Name]

Position: [Position] Organisation: [Organisation Name]

Witness Signature: [Signature] Date: 9/4/14

Name: [Name]

Position: [Position] Organisation: [Organisation Name]

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.