Lismore City Council would like to acknowledge contributions from the Australian Government to this energy efficiency project. The 1:3 shared funding arrangements between Council and the Australian Government presented a favourable financial position which allowed the project to proceed.

Lismore City Council agrees that in any publicity in relation to this document, Council will acknowledge the financial or other support received from the Australian Government, in the manner approved by the Department of Industry. It is also acknowledged that Council will obtain the Department’s written approval for each public announcement or publication Council makes in relation to this project and this document.

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

Lismore City Council (LCC) is a regional council located within the Northern Rivers region of NSW.

This project involved energy efficiency upgrades at two Council owned sites. Council undertook energy efficiency upgrades at:

1. Council’s main Corporate Administration Centre (CAC), using three technologies including LED lighting, Steril-Aire ultra-violet light emitters (to improve existing air conditioning efficiency and reduce airborne viruses and bacteria) and trialled heat reflective paint technology.
2. Replaced existing systems with inverter type air conditioning units at the CBD Office, a smaller customer service centre/office building, located in the Lismore CBD.

Both buildings are listed in Council’s top 20 energy-consuming properties.

Council also formed partnership with a local community group, the Lismore Sustainability Community Forum (LCSF) whom facilitated the ‘Sustainable Streets Challenge’ program, delivering energy literacy to 66 targeted participants. The program created awareness in energy efficiency, changed behaviour and improved energy management practices amongst participants. It also raised community awareness of this program as well as previous, current and future energy efficiency initiatives to be carried out by Lismore City Council.

The CAC achieved a combined total of 15.9% reduction in energy consumption derived directly from the three retrofits implemented with combined total savings of $15,922 per annum. The CBD Centre met its targeted projections resulting 48% energy reduction through redesign and replacement of energy efficient air conditioning systems with savings of $3,552/annum. The energy efficiency initiatives have reduced the combined electricity consumption at the two sites by 362,977 kWh annually which is saving Council $19,474 per year in electricity costs, and has reduced Council’s greenhouse gas emissions by 69 CO2e tonnes per year.

The project was funded through an Australian Government grant matched with funds from Council’s revolving energy loan scheme; a fund that is continuously replenished by cost savings achieved through the implementation of new energy efficiency initiatives. The total cost of the project was $253,623 and the payback period against the revolving energy loan is 4.3 years.

The project required inter-departmental collaboration between the Environmental Strategies, Asset Management and Finance sections within Council. The internal project team liaised with energy consultants including the energy auditor and several specialist contractors.

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.
2. **PROJECT BACKGROUND**

Lismore City Council has been working towards energy efficiency and reducing greenhouse gas emissions (GHG) for over a decade. The first Solar Photovoltaic systems were installed on Council buildings in 2009. Lighting retrofits commenced in 2010, as well as a review of the vehicle fleet to reduce fuel consumption. This led to the extraordinary achievement of curbing councils six year strong emissions growth trend. Emissions were reduced by 4% in just one year by the end of the 2011 financial year, and continued to set a downward trend. This was achieved primarily through a reduction in electricity consumption and fuel usage.

Prior to project implementation Council engaged a consultant to conduct AS3598:2000 Level 2 energy audits at the two sites. The audits identified that the Corporate Centre HVAC system accounted for 60.2% of all energy use and lighting at 14.5%. The air conditioning system at the CBD office accounted for 61.6% of the electricity consumption.

3. **PROJECT AIMS**

The Community Energy Efficiency Program objectives are to:

1. *Support a range of local councils and community organisations to increase the energy efficiency of different types of non-residential council and community-use 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.*

2. *Demonstrate and encourage the adoption of improved energy management practices within councils, organisations and the broader community.*

Through this project Council aims to improve energy efficiency over the two council buildings by retrofitting proven technologies (LED Lighting, inverter type AC units and UV-C filters) as well as trialling the emerging technology of heat reflective paint.

The communications component of the project aims to engage and deliver energy literacy directly to the community. Indirectly, Council will form a partnership with a local community group, the Lismore Sustainability Community Forum (LCSF), to facilitate the ‘Sustainable Streets Challenge’ program, delivering energy literacy to low socio-economic and disadvantaged groups.

This project should deliver significant energy reduction over the two council sites and encourage the adoption as well as the continuation of improved energy management practices within council and the broader community. The project should also contribute towards Council’s greenhouse gas reduction target identified in the adopted Renewable Energy Master Plan (REMP) [http://www.lismore.nsw.gov.au/cp_themes/default/page.asp?p=DOC-QMM-54-48-20](http://www.lismore.nsw.gov.au/cp_themes/default/page.asp?p=DOC-QMM-54-48-20)
4. ENERGY EFFICIENCY ACTIVITIES

4.1 The Corporate Administration Centre

Lismore City Council’s Corporate Administration Centre (CAC) is located at 43 Oliver Avenue, Goonellabah. It is a 2 storey building constructed in the early 1990s surrounded on 3 sides by a car park. The building sits on a southeast facing slope and the lower floor extends partially underneath the (main) upper floor. The building is roughly a rectangle with the main roof line running northeast to southwest. The roof is beige-grey colourbond metal. The roof has different sections with different roof pitches, mostly medium grade between 20-30 degrees. The external walls are brick/concrete and glass, with good shading over most external windows.

The CAC operates as the main Council administration and customer service centre providing office accommodation for up to 100 staff. The building consists of a main reception/lobby area, office space, several meeting rooms and kitchens on the main upper floor. The lower floor includes the Council chamber, the Mayor’s office, one smaller office space, utility rooms, storage and a staff lunch room.

The building’s electricity supply is via a three phase Time of Use (TOU) electronically metered service on a network tariff with charges for electricity consumption and peak demand.

4.1.1 Pre-Retrofit Power Consumption

As per the pre retrofit audit report, energy consumption per technology/sector for the CAC is provided below:

- HVAC (Air conditioning) - 60.2%
- Computers, IT, Media, Office - 15.6%
- Lighting - 14.5%
- Hot water heating – 6.2%
- Food service and refrigeration – 3.3%
- Facility specific equipment – 0.2%
4.1.2 Technologies Implemented

Based on the audit report energy assessment and recommendations the following technologies were considered and implemented, as they required relatively ‘moderate’ capital outlay with high projections in energy efficiency outcomes and associated financial savings.

**LED Lighting**

The audit report suggested that Council could save up to 59.6% of all lighting related energy costs by replacing all internal and most external flood lights with LED or Induction alternatives. LED lighting technology has improved overtime in relation to performance, reliability and cost. This makes LED the ideal choice for replacing existing fluorescent tubes, halogen downlights, CFL downlights and external flood-lights.

Acting on the audit report recommendation, Council completed the LED lighting retrofits on 14 November 2014.

**UV-C Steril-Aire Filter**

The audit report recommended retrofitting UV filters to the existing ducted system on the supply side of conditioned air, in order to reduce bacteria build up on coils and inside the ducts. This in turn would extend ongoing maintenance cycles, reduce airflow constrictions and provide cleaner and bacteriologically safer air.

Prior to project implementation, Council conducted trials using Steril-Aire emitter technology. Results from the trials indicated reduction in power consumption by 12% and elimination of up to 99% of airborne viruses and bacteria and other microbes found within the HVAC system.

Based on the audit report recommendations and trial conducted, Council installed and commissioned UV Steril-Aire emitter technology on 18 July 2014.

**Heat Reflective Paint**

The audit report identified heat reflective paint as a new and emerging technology that could be considered. Heat reflective paint was portrayed as a great way of utilising passive methods to reduce the heat load entering the building. Heat reflective paint technology claims to reduce temperatures on roof surfaces and cavities, resulting in changes to ceiling/room temperatures, which contribute to lower AC running costs and lower peak demand charges. Based on the auditor’s desk top research and audit report recommendations, Council trialled heat reflective paint technology on the exterior of the CAC building on 24 October 2014.
4.2 The CBD Office

Lismore City Council’s CBD Centre building is located at 55 Magellan Street, Lismore. The building was constructed in the 1920s and is a single building in the shape of large ‘villa’ on one floor with an attic that contains the air handling unit of the ducted air conditioning and a small dedicated server and communications room. The building is roughly a square with the orientation being northeast-southwest and northwest to southeast. The northeast facing roof section incorporates a PV solar system of approximately 3.5-4kW peak capacity. The external walls are solid brick and the roof is relatively new and is light coloured colourbond.

The building’s electricity supply is via a three phase electronic meter on a flat rate tariff (peak only) and billed by the broker “Powerdirect” in 3 months intervals. One other electronic meter services the PV solar installation.

4.2.1 Pre-Retrofit Power Consumption

As per the pre-retrofit January 2013 energy audit report, the pie chart below presents the breakdown of energy consumption per technology/sector for the CBD Office.

As per the pre retrofit audit report, energy consumption per technology/sector for the CBD Office is provided below:

- HVAC (Air conditioning) – 61.6%
- Kitchen, food service and refrigeration – 21.3%
- Computers, IT, Media, Office – 10.7%
- Lighting -6.2%
- Facility specific equipment – 0.3%
Figure 2: Breakdown of pre retrofit energy consumption per technology/sector for the CBD Office

4.2.2 Technology Implemented

The central AC unit was over 20 years old, and was not efficient as the unit’s electric coils heating component was situated in the air supply ducts. This type of heating was extremely inefficient by today’s standard and the audit report recommended replacement as the proposed new inverter type systems would provide reduction in power consumption by approximately 48%. Acting on audit report recommendation Council decommissioned the old HVAC systems and installed inverter technology wall mounted split system air-conditioning units at the CBD Office. The units were commissioned on 03 July 2014.

5. Project Outcomes

This section of the report focuses on project outcomes from retrofit measures implemented. It will discuss pre and post-retrofit energy consumption baselines, assess the energy efficiency outcomes, provide commentary on technologies implemented and provide general observations with regards to the technology’s effectiveness and suitability for future consideration and implementation by Council. It also provides summary of lessons learnt from project delivery.

The technical assessment information/data contained within this section is guided by the CEEP Post Retrofit Energy Efficiency and Technology Assessment Report conducted by Powersmart dated May 15, 2015.

5.1 The Corporate Administration Centre

Data logging was carried out over a two week period and assessment of power bills showing actual energy consumption and kVA demand charge (a network charge based upon the highest recorded demand during a billing period, which is the maximum amount of electricity supplied to a site in any 30 minute interval) have been compared as part of the CEEP post retrofit assessment process. In general and over a 12 monthly basis, power consumption for this site has dropped by 10.6%, while kVA peak demand was reduced by approximately 12%.
Table 1: Corporate Administration Centre - Summary Table

<table>
<thead>
<tr>
<th></th>
<th>Baseline kWh</th>
<th>POST retrofit projected kWh</th>
<th>Projected savings %</th>
<th>POST retrofit actual kWh</th>
<th>Actual savings %</th>
<th>Actual savings $ per year</th>
<th>Actual CO₂e savings tons</th>
</tr>
</thead>
<tbody>
<tr>
<td>HVAC - UV emitters</td>
<td>176,751</td>
<td>150,238</td>
<td>15%</td>
<td>152,006</td>
<td>14.0%</td>
<td>$5,911</td>
<td>22.0</td>
</tr>
<tr>
<td>HVAC - Refrigerant</td>
<td>167,211</td>
<td>155,318</td>
<td>7%</td>
<td>161,195</td>
<td>4.0%</td>
<td>$1,610</td>
<td>6.0</td>
</tr>
<tr>
<td>Lighting retrofit internal</td>
<td>60,388</td>
<td>50,721</td>
<td>49%</td>
<td>50,788</td>
<td>49.0%</td>
<td>$7,090</td>
<td>26.3</td>
</tr>
<tr>
<td>Lighting retrofit external</td>
<td>11,960</td>
<td>4,205</td>
<td>65%</td>
<td>6,578</td>
<td>45.0%</td>
<td>$1,290</td>
<td>4.8</td>
</tr>
<tr>
<td><strong>Total (of above)</strong></td>
<td><strong>416,990</strong></td>
<td></td>
<td></td>
<td><strong>395,566</strong></td>
<td><strong>15.9%</strong></td>
<td><strong>$15,922</strong></td>
<td><strong>59.1</strong></td>
</tr>
<tr>
<td>Total site kWh</td>
<td>460,367</td>
<td></td>
<td></td>
<td>411,722</td>
<td>10.6%</td>
<td>15,922</td>
<td>59.1</td>
</tr>
</tbody>
</table>

Figure 3: Corporate Administration Centre - Pre and Post kWh consumption

Figures 4 and 5 below show power consumption (energy) and peak demand as per billing data for the Corporate Administration Centre pre retrofit and post retrofit assessment periods.

Figure 4: Corporate Administration Centre - kWh consumption
As per Figures 4 and 5, the PRE and POST power consumption data show a positive trend in falling energy consumption as well as kVA demand charges but do not show conclusive evidence that all retrofit measures delivered the anticipated energy and cost savings. It should be noted that only 2 (heat reflective paint and LED Lighting) of the 3 measures were installed within the 5 months leading up to the post retrofit energy/technology assessment report study.

5.1.1 Evaluation of anticipated and realised energy savings

LED Lighting Retrofit

As per the post retrofit energy audit report, the energy efficiency and cost savings associated with internal lighting retrofit delivered as expected at 49% whilst external lighting delivered 45% against projected 65%.

LED lighting is a proven technology. The energy efficiency and cost savings associated with the lighting retrofit delivered results as expected and comes highly recommended for future applications.

UV Emitters Technology

As indicated earlier, it is too early to confirm that the projected energy efficiency and carbon reduction targets against initial baselines are 100% accurate due to the short assessment period. With this in mind, the auditor indicated that the anticipated HVAC related energy cost savings of 15% should be realised in the future. It was recommended that further monitoring and desktop assessment is to be carried out around November or December, when all retrofit measures will have been operating over a 12 month period accounting for all four seasons.

It should be noted that UV Steril-Aire emitter technology trials conducted pre retrofit provided valuable data for consideration as part of the technology/ project viability assessment process. Post retrofit technology assessment is showing a clear trend delivering expected energy efficiency and financial savings against initial projections from the case study conducted. Similar trials prior to retrofit for new/ emerging technologies are highly recommended for future projects.
Heat Reflective Paint Technology

Prior to project implementation, Council considered a trial using heat reflective paint technology with the view to establishing whether or not this technology can and should be used at other Council sites in the future.

Considering the cost associated with the delivery of heat reflective paint technology, energy efficiency improvements for office buildings could be achieved and delivered through other proven technologies. In retrospect, and according to the auditor, the Corporate Administration Centre, a two story building with standard blanket insulation installed underneath the roofing metal and patchy bulk insulation on top of the ceilings, is not an ideal candidate for heat reflective technology. Heat reflective paint technology would be more effective in non-air-conditioned warehouses and sheds with otherwise unprotected roofs.

5.1.2 Adjustments to energy savings calculations

When comparing power billing data from pre-retrofit (baseline) to post retrofit periods, variations such as weather patterns, changes in number of patrons / users of the facility, changes to operating hours etc. were accounted for as part of the assessment process.

The report has taken into account and included these variations as part of post retrofit energy/technology assessment reporting process. The following factors that give rise to small adjustments have been included:

1. Mean Temperature Anomaly for NSW East Coast: 2010-11 was 0 and in 2014-15 was +1.1 degrees C. The most significant monthly anomaly is for the month of July, where the mean minimum temperature in 2014 is 4.3 degrees lower than in 2010.
2. Staff numbers: 4 staff members from outlying offices were incorporated into the building in March 2015, just outside the assessment period.
3. The auditor identified that there was an increased number of work places with 2 monitors rather than 1. However, the energy efficiency of new monitors has improved dramatically, so that the extra monitors and the replacement of existing, less efficient monitors in our opinion creates a zero energy balance.
4. The auditor also noted increased number of personal printers; however, efforts made by Council staff to make smarter use of power saving features, combined with smarter use of electric water heaters (ZIP) following the 2011 energy audit are likely to offset any increase in power consumption.
5.2 CBD Office

<table>
<thead>
<tr>
<th>CBDC Summary Data</th>
<th>Baseline kWh</th>
<th>POST retrofit projected kWh</th>
<th>Projected savings %</th>
<th>POST retrofit actual kWh</th>
<th>Actual savings %</th>
<th>Actual savings $ per year</th>
<th>Actual CO2e savings tons</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air conditioning</td>
<td>23,868</td>
<td>12,411</td>
<td>48%</td>
<td>12,411</td>
<td>48%</td>
<td>$3,552</td>
<td>10.2</td>
</tr>
<tr>
<td>TOTAL site kWh</td>
<td>34,366</td>
<td></td>
<td></td>
<td>17,215</td>
<td>50.1%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 2: CBD Centre Summary Table

Figure 6: CBD Centre PRE and POST kWh consumption

Figure 7 below shows power consumption (energy) for the CBD Office for pre retrofit and post retrofit assessment periods.

As per Figure 7, the CBD Office showed significant reductions in power consumption before the air-conditioning units were retrofitted as part of this project, particularly in the SPRING quarter. It should be noted that the high energy consumption in Spring 2011/12 period was due to a program malfunction which resulted in the (old) air-conditioning unit running 24/7.
unnoticed over an extended period. The problem was eventually identified and corrected with the AC unit reprogrammed to operate during business hours. For operational reasons, an additional bypass timer switch was also installed so that the AC unit can operate outside of business hours as and when required.

The only technology implemented at the CBD site was the HVAC system. The pre-retrofit audit report for the CBD Office identified that HVAC accounts for 62% of the total energy cost. A system upgrade is highly recommended as the system is over 20 years old and inefficient. The post retrofit assessment confirmed pre-retrofit projections resulting in 48% energy reduction through redesign and replacement of air-conditioning systems with more energy efficient inverter type systems. Other benefits of the new system includes reduction in noise and vibration levels, reduction in maintenance costs and provides a more comfortable work environment due to better balanced air flow.

The auditor was not aware of the full nature of the site’s operation after Council ceased occupying the CBD Office and it was leased to another company. Because of this some assumptions were made as part of the post retrofit assessment process. However, technical specifications of old and new air conditioning equipment were made available. The auditor assessed that energy and cost savings had been delivered as expected, resulting in 48% energy savings. Inverter type split system air-conditioners are proven technologies and come highly recommended for consideration and implementation in similar sites.

5.2.1 Adjustments to energy savings calculations

The report has taken into account and included variations as part of the post retrofit energy/technology assessment reporting process. The following factors that give rise to small adjustments have been included:

1. Mean Temperature Anomaly for NSW East Coast: 2010-11 was 0 and in 2014-15 was +1.1 degrees C. The most significant monthly anomaly is for the month of July, where the mean minimum temperature in 2014 is 4.3 degrees lower than in 2010.

2. For most of the assessments periods in 2011-12 and 2013-14 the building has been occupied by Lismore City Council with (largely) unchanged staff numbers and operations. However, during the last quarter of the assessment period in 2014 (June – September) Lismore Adult Community Education (ACE) occupied the building for almost the entire period. During this same quarter, the air conditioning was replaced and commissioned on 4/7/2104.

3. The total site power consumption dropped from the PRE retrofit assessment period to the POST period by almost 83%. The auditor was not aware of the full nature of the ACE operation but it would be reasonable to assume that the energy intensity of the ACE was far lower than previously under LCC occupation.

6. SUMMARY OF LESSONS LEARNT

In addition to comments provided previously specific to the project sites, this section highlights some generic lessons learnt for future consideration in delivery of similar projects.

Lesson 1

LED Lighting technology proved to be a reliable technology to reduce energy costs with predictable energy and cost savings. As demonstrated at the Corporate Administration Centre, there is a high correlation between anticipated and realised outcomes. LED Lighting retrofits are particularly useful for office-type sites and facilities with a high degree of flood lighting, such as warehouses, sports facilities, car parks etc.
Lesson 2
There are now several suppliers of technology that reduce the operating costs of air conditioning systems by way of reducing/preventing the build-up of bacterial plaque. Benefits include higher airflow rates (which equate to lower power costs), better protection against corrosion and a cleaner indoor environment.

From the assessment of Steril-Aire emitter technology from pre-trial and post retrofit installation, UV emitter technology confirmed improvements in air flow and increases in energy efficiency resulting in lower power consumption. The 14% improvements are encouraging and, with further analysis, this technology may come in as expected at 15% or even better. The full picture will only emerge once the UV emitter technology operates for at least a full 12 month cycle.

Lesson 3
A relatively new and emerging technology implemented was heat reflective paint. The post retrofit energy/technology assessment did not show a significant (5% or better) impact of this technology on HVAC related power consumption.

In hindsight, the Corporate Administration Centre cannot be considered as an ideal site for this technology. Heat reflective paint may be suitable at other sites such as non-air-conditioned warehouses, sheds, workshops and/or large industrial buildings. However, the application of heat reflective paint technology achieved relatively small percentage in energy efficiency improvement but no doubt contributes to the lifespan of the roof through preservation measures. If roof restoration were required for future projects, the extra cost for heat reflective paint technology may be worth the initial expenditure.

Lesson 4
Power monitoring and data logging has proven to be an essential tool for selecting retrofit technologies and for monitoring results. Technologies have improved over time and today multi circuit data loggers that can send data to 'cloud' based servers where the power or kVA demand can be monitored in real time.

It has also become less costly to conduct long-term power monitoring thanks to a new generation of more affordable power monitors. At the same time energy retailers provide better web interfaces that allow viewing site or meter based load profiles, kVA demand, power factor and load factor in real time or as historical data. Some retailers provide these interfaces for free; others charge a small service fee. It would have delivered valuable insights if better and more data had been collected in the pre retrofit period as well as post retrofits.

In the opinion of the auditor, the extra cost of more comprehensive power monitoring will pay back many times because the predictability of the impact of retrofit measures will be greatly enhanced. Clients will benefit from receiving more accurate planning information. The match of retrofit technologies to the site specific requirements can be enhanced and the full potential of energy efficiency retrofit measures can be explored and projected with better accuracy.

Lesson 5
A collaborative approach across Council departments is essential to ensure effective and timely delivery in accordance with the project plan and funding agreement. Changes to the project including technology advancement, infrastructure changes, and time delays should be identified early to allow for re-calculation of the cost/benefit analysis and associated pay-back period.
7. SUMMARY OF PROJECT OUTCOMES AND BENEFITS

The May 15, 2015 Powersmart Post Retrofit Energy Efficiency & Technology Assessment reported the following outcomes:

- Over a 12 monthly period, power consumption for the Corporate Administration Centre dropped by 10.6%, while kVA peak demand reduced by approximately 12%.
- Energy efficiency and cost savings associated with the LED lighting delivered as projected with 49% in energy improvement and savings of $8,380/annum.
- Energy efficiency and cost savings associated with the UV filter technology delivered 14% against the projected 15% in energy improvement and savings of $5,931/annum.
- A very simple payroll report generated showed that staff sick days reduced from 450 days prior to retrofit to 367 days after retrofit of Steril-Aire emitter technology.
- Heat reflective technology achieved 4% against the projected 7% in energy improvement resulting moderate savings of $1,610/annum.
- The Corporate Administration Centre achieved a combined total of 15.9% reduction in energy consumption derived directly from the three retrofits implemented with combined total savings of $15,922 per annum. The payback period for this site is 4.7 years.
- The CBD Centre met it’s targeted projections resulting 48% energy reduction through redesign and replacement of energy efficient inverter type air conditioning systems with savings of $3,552/annum. The payback period for this site is 3.5 years.

In short, this project delivered the following over the two project sites:

- Savings of 77,881 kWh
- Financial savings of $19,474 per annum
- Reduced 69 tonnes of CO2-e
- Delivered within budget at the cost of $253,623
- Payback period of 4.3 years to Councils revolving energy loan fund through direct savings.

8. PROJECT DEMONSTRATION AND COMMUNICATIONS COMPONENT

The Project’s ‘Education & Awareness Raising’ component was developed in two parts:

i. Sharing project outcomes and lessons with community, other Councils and organisations.
ii. Sustaining lessons beyond the project period within Council and the community.

This section presents the communication related activities which were delivered as part of the project.
8.1 Sharing project outcomes and lessons learnt with community, other Councils and organisations.

1. CEEP related visual displays were installed at Council’s Corporate Administration Centre

2. Signage explaining the building retrofits/ upgrades undertaken and the energy efficiency achievements made, were installed in the foyer of the Corporate Administration Centre to inform Council’s customers.

3. A short video which outlined Council’s Energy Efficiency Projects was developed.
   - Embracing Energy Efficiency at Lismore City Council short video: [https://www.youtube.com/watch?v=-etkcG5Wc8A](https://www.youtube.com/watch?v=-etkcG5Wc8A)
4. A brochure describing this and previous Energy Efficiency Projects was developed.

6. The project team developed and distributed media releases to local newspapers and other media outlets before, during and after project completion.

7. A media release acknowledging the community partnership and project outcomes was done at completion of the ‘sustainable streets challenge’ energy efficiency community partnership project.

8. The project team provided case studies, including project outcomes and lessons learnt, and a video to the NSW Local Gov’t & Shires Association (LGSA), to be promoted through the “Sustainability Snippets” e-newsletter, which will be circulated to all NSW Councils.

9. CEEP project outcomes were published in Council’s Employee Newsletter and on the internal staff intranet.
The project team promoted the two project sites and associated energy efficiency technologies through Local Matters publication and at the 2014 Sustainable House Day Trade Show & Seminar.

Local Matters is a fortnightly publication produced by Lismore City Council that includes information on Council related matters such as upcoming events, Council initiatives and projects, meetings, development applications, and items on public exhibition. Local Matters is delivered to more than 23,000 homes and PO boxes in the Lismore LGA via Australia Post and to 861 current subscribed members receiving online version.
Sustainable House Day (SHD) is a major national event occurring in September every year that showcases some of Australia's most sustainable homes to the public. On 13 September 2014, Council in partnership with Byron Shire Council, The Green Building Centre, Byron Community College, Nimbin Neighbourhood Centre, North Coast Institute of TAFE and Rous Water coordinated the Sustainable House Day Trade Show event held at The Bangalow A&I Hall to share water and energy efficiency ideas and help turn the Lismore and surrounding community into a model of sustainability.

The 2014 Lismore SHD Program objective was to increase the uptake of green building design, use of recycled materials, eco-efficient household appliances, and eco-retrofitting of homes and businesses across the region. Themes covered all aspects of sustainability but the major focus was on energy efficiency and water usage within homes. Council used the SHD Trade Show event as an opportunity to promote the energy efficiency project and facilitate energy efficiency literacy/ information directly to the community.
8.2 Sustaining lessons learnt beyond the project period within Council and community.

1. The project team updated Council’s CEEP webpage on completion of the project, highlighting final project outcomes including energy efficiency outcomes, financial savings as well lessons learnt from the project delivery.

2. The project team developed an energy efficiency project Fact Sheet which detailed project outcomes. This can be used beyond the project completion date at regular events – local shows, trade displays, conferences and seminars, with school groups and at Council’s annual Sustainable House Day event.

3. The project team reported, presented and shared project outcomes to other local sustainability groups and the Northern-Rivers regional-based team of environmental educators, to inspire and ensure the project is sustained beyond the project period.

9. THE ENERGY LITERACY PARTNERSHIP PROJECT COMPONENT

The project also included establishment of an educational partnership with the Lismore Community Sustainability Forum (LCSF) to deliver energy efficiency literacy and education to low-income residents, with the aim of increasing the community’s understanding and uptake of energy efficiency initiatives. The initiative was delivered through the “Transition Streets Challenge”.

9.1 What is the Transition Streets Challenge?

SAVE ENERGY, SAVE MONEY

We all spend more money on energy over the winter months so get in early and prepare your home to avoid a whopping winter electricity bill.

Get together with people living in your neighbourhood to learn more about saving energy at home and saving money on bills.

The Community Energy Efficiency Program, running from June to October 2014, offers free expert advice and workshops at the best seminars targeted to your specific households.

The program offers:
- Neighbourhood get together
- Expert home energy audits
- Energy efficient technology samples

When: June to October 2014
Where: Lismore neighbourhoods
Transition Streets Challenge is a community education program that encourages neighbours to come together and support each other in becoming more energy efficient within their street.

The Transition Streets program facilitated by LCSF, explored energy usage over a six month period through:

1. A practical workbook that formed the basis for discussion amongst the participants about energy usage and consumption.
2. Facilitated group meetings with provoking discussions highlighting how we take energy for granted. It also provided the opportunity for the 7 groups to develop creative responses that can help the streets become more energy efficient/sustainable. The participants are encouraged to think about what they can do together to be more energy efficient and reduce their environmental impact.

With the assistance of qualified group facilitators, the participants decided what they can do in their own homes to move towards a more energy efficient and sustainable lifestyle.

9.2 Aims of the Transition Streets Challenge

The Transitional Streets program aims to:

i. Change behaviour demonstrated through reduction in overall household energy usage amongst participants, and

ii. Raise community awareness of this, and other energy efficiency initiatives conducted by Lismore City Council and/or other organisations within the Northern Rivers Region of NSW.

9.3 Progressing towards the Aims of the Transitional Streets Challenge

In progressing toward the first aim, our project partner, LCSF:

- Recruited 66 households above the target of 50 to 60.
- Some households were unable to be included in the program because it was full.
- Households were grouped geographically into groups of between 6-11 people.
- Each group met 3 times over the space of 3 months.
- The overall rate of attendance was averaged at 74%.

![Figure 8: Attendance over the three meetings for each group. Please note: Entries over 100% represent participants bringing friends/family with them.](image)
The second aim of the project was delivered through a tour conducted at Council project sites promoting technologies implemented and the benefits of overall projects.

9.4 Outcomes from the Transition Streets Challenge
Outcomes from the ‘Transition Streets Challenge’ are provided below:

9.4.1 Outcomes for participants:
- Increased knowledge in relation to energy source, consumption and general trends.
- Increased awareness of energy efficiency possibilities within the home.
- Completed worksheets assisted participants to understand energy usage.
- Increased awareness and direct link between energy efficiency and financial savings.
- Direct support for individuals through group participation and expert advice from group coordinators.
- Connection to local businesses supplying energy efficient products/devices.
- Connection to other locals/neighbours who are also participants of the program.

9.4.2 Outcomes for the broader community
- Energy efficiency messages from the program were used to engage with the broader community through media releases, publications, local radio, TV coverage and showcase events such as the 2015 Sustainable House Day Trade Show.
- The broader community were exposed to energy efficiency projects through various publications, media exposure and tours.
- Residents from Uniting Aged Care in Goonellabah were heavily involved and through the program they identified an urgent need for an ‘energy policy’ to be developed at a local level.
9.5 Partnership Project Conclusion

The partnership project between Lismore City Council and LCSF was delivered within budget, timeframe and beyond the original project scope and included two additional activities:

i. establishment of LCSF website - http://www.lismoresustainability.org.au and

ii. procurement of four energy efficiency related DVDs to be used for community education purposes. The two above activities will continue to deliver energy literacy to the community beyond the life of the CEEP Round 2 project.

The contribution from Group Coordinators (GCs) was invaluable and effective in delivering the program aims. Qualified GCs facilitated energy literacy with confidence which was well received by participants. GCs were able to provide relevant energy efficiency related information, advice and additional resources as required by respective participants. The GC team supported each other in developing content and trouble-shooting, and provided a personal point of contact for participants. Expert advice from a local Solar and Electrical supplier provided technical assistance and technical knowledge to Group Coordinators, which also bolstered the high quality information available to participants. The use of group facilitators for similar public education programs in the future is highly recommended.

10. BUDGET REVIEW

<table>
<thead>
<tr>
<th></th>
<th>Original Budget Amount (Ex GST) - on application</th>
<th>Revised Budget Amount (Ex GST) - during implementation</th>
<th>Actuals (Ex GST)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corporate Administration Centre</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trial Heat Reflective Coating</td>
<td>$95,400</td>
<td>$100,620</td>
<td>$100,232</td>
</tr>
<tr>
<td>HVAC retrofit - Steril-Aire Emitters</td>
<td>$20,405</td>
<td>$24,869</td>
<td>$24,868</td>
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<tr>
<td>Lighting Retrofit - Internal &amp; External LED</td>
<td>$31,007</td>
<td>$50,802</td>
<td>$54,179</td>
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<tr>
<td>CBD Centre</td>
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</tr>
<tr>
<td>Upgrade of Air-Conditioning System</td>
<td>$17,620</td>
<td>$18,887</td>
<td>$18,887</td>
</tr>
<tr>
<td>General Administration</td>
<td></td>
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<td></td>
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<tr>
<td>&quot;Transitions Streets Challenge&quot; Partnership Project</td>
<td>$30,000</td>
<td>$30,000</td>
<td>$30,000</td>
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<tr>
<td>Communications</td>
<td>$23,500</td>
<td>$13,000</td>
<td>$1,532</td>
</tr>
<tr>
<td>Monitoring, Evaluation and Reporting</td>
<td>$5,000</td>
<td>$5,000</td>
<td>$2,000</td>
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<tr>
<td>Update Energy Audit</td>
<td>$4,000</td>
<td>$4,000</td>
<td>$1,925</td>
</tr>
<tr>
<td>Project Administration</td>
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<tr>
<td>Financial Audit</td>
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<tr>
<td>Contingency</td>
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<tr>
<td>Totals</td>
<td>$248,932</td>
<td>$282,513</td>
<td>$253,623</td>
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</table>

<table>
<thead>
<tr>
<th>Income</th>
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<tbody>
<tr>
<td>Australian government *</td>
<td>$165,955</td>
</tr>
<tr>
<td>Lismore city council</td>
<td>$87,668</td>
</tr>
<tr>
<td>Total income</td>
<td>$253,623</td>
</tr>
<tr>
<td>Total expenditure</td>
<td>$253,623</td>
</tr>
<tr>
<td>Total remaining from revised budget</td>
<td>$28,890</td>
</tr>
</tbody>
</table>

* This includes the final contribution amount from the Australian Government of $19,915 (Ex GST). This is due upon acceptance of this final report.
The project proposal and funding request application was lodged on February 7, 2013. The project acceptance and agreement was finalised on December 16, 2013. Due to the unexpected delay with project announcements compounded further with outdated quotations, and general price increase over time, the project team through the Deed of Variation process revised the original project budget from $248,932 to $282,513 in order to deliver the project scope as per the original project plan.

The LED lighting component was a major contributor to the project budget variation. The original lighting count was inaccurate and a re-count was conducted during the LED procurement process. It was identified that the lighting quantities were higher than the original count provided, in other words, the project scope for the lighting component was greater than anticipated. The project team considered reducing the scope and work within the original budget amount. However, the project team decided to fund the additional amounts required through the project contingency component as well as direct savings identified from the communications budget.

The savings from the original communications budget was made available primarily due to the appointment of 1 additional full time ‘creative’ staff member to Council’s Communications team just after the project commencement. The additional staff member executed most of the communications related activities in-house which saved funds already allocated to external creative agencies. Direct savings of $21,968 from the original communications budget were redirected to LED lighting, Steril-Aire Emitter and Heat Reflective paint retrofit/applications.

In short, the project delivered a combined savings of $19,474 per annum over the two sites. The project was funded through an Australian Government grant matched with funds from Council’s revolving energy loan scheme; a fund that is continuously replenished by cost savings achieved through the implementation of new energy efficiency initiatives. Total project cost project $253,623 and the payback period against Council’s revolving energy loan is 4.3 years.

11. PROJECT MANAGEMENT REVIEW

The upgrade of air conditioning, lighting and trial heat reflective paint at the Corporate Administration Centre and CBD Office was managed in-house. The project implementation structure was based on an existing successful internal partnership between Council’s Environmental Strategies and Asset Management sections.

The same project team had worked together and delivered similar energy efficiency projects in the past. Having managed and gained valuable project management skills from previous experience, the project team was able to clearly identify and defined each member’s roles and responsibilities and included as part of the project management plan. They are presented below:

<table>
<thead>
<tr>
<th>Roles</th>
<th>Name/Title</th>
<th>Responsibilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project Manager</td>
<td>Anthony Magarry</td>
<td>• Ensure all aspects of project installations from planning to delivery</td>
</tr>
<tr>
<td></td>
<td>Assets Engineer</td>
<td>• Oversee energy efficiency installation components delivered within scope, timeframe and budget.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Manage Project Officer (Delivery)</td>
</tr>
<tr>
<td>Project Officer (Delivery)</td>
<td>Steve Dillon</td>
<td>• Prepare tender documentation</td>
</tr>
<tr>
<td></td>
<td>Coordinator Assets</td>
<td>• Manage Tender/quotation process in accordance with Council’s procurement policy</td>
</tr>
</tbody>
</table>

26
<table>
<thead>
<tr>
<th>Role</th>
<th>Name</th>
<th>Responsibilities</th>
</tr>
</thead>
</table>
| Project Officer (Partnership & Communications) | Vanessa Tallon | • Manage contracts and contractors ensuring contracts delivered within time frame, budget and as per specification.  
• Ensure all implementation activities are carried out in accordance with council’s WHS requirements. |
| | Environmental Strategies Officer – Environmental Education |  |
| Project Officer (Monitoring & Reporting) | Anton Nguyen | • Key contact with LCSF community partnership – ensuring energy efficiency literacy module delivered within scope, timeframe and budget.  
• Ensure all activities contained within project communications plan are delivered within scope, timeframe and budget. |
| | Environmental Strategies Officer (Stormwater & Sustainability) |  |
| Energy Consultant Powersmart Energy Efficiency | Michael Qualmann Electrical & Electronic Engineer, NABERS assessor | • Oversee project delivery within scope, timeframe and budget.  
• Undertake post project energy audits and verify savings  
• Prepare and ensure milestones and final reports delivered on time. |

In addition to the project management team, other council staff were also involved in the project. They included the Contracts Officer (quotations), Finance staff (financial records), Corporate Communications team (community engagement) as well as external and independent energy auditor and local businesses supplied and installed the retrofits.

Whilst this project was successfully implemented, there were periods where additional hours were required from key staff to ensure the project was delivered within scheduled timeframes to be included as part of key milestone reporting requirements.

In short, the project team managed this project quite effectively through open and early communication conducted at regular project team meetings coupled with constant and informal progress updates provided directly to the Project Officer (Monitoring & Reporting) as and when required.
12. CONCLUSION

The pre retrofit AS3598 Level 2 energy audit reports proved to be valuable management tool. The audit reports summarised energy consumption levels by respective sectors, identified energy deficiencies and recommended management strategies to improve energy efficiency for the two project sites.

The 1:3 shared funding arrangements between Council and the Australian Government presented favourable financial position which allowed Council to proceed and completed the energy efficiency upgrades as identified and recommended in the original pre retrofit Level 2 energy audit reports.

This energy efficiency project also brought together team members from Environmental Strategies, Assets and Leisure Operations staff across Council. The formation of this integrated project team can be considered as a positive development for Council with staff from the various disciplines contributing and working together towards a common goal – to improve energy efficiency outcomes for council managed sites.

The project delivered outcomes as intended in accordance to the Community Energy Efficiency Program objectives. The funding arrangement provided financial support which allowed Council to improve energy efficiency at the two Council buildings. The communications activities including the Council’s partnership arrangement with a local community group, the Lismore Sustainability Community Forum proved to be an invaluable external partnering strategy. Through collaboration, the partnership arrangement allowed Council to maximise its resources and successfully delivered the ‘Sustainable Streets Challenge’ energy literacy program to low socio-economic and disadvantaged groups within the Lismore LGA.

Key to successful execution of this project was attributed mainly to the skilled and integrated project management team and the implementation of detailed and comprehensive project management and associated communications plan.

In sum, this energy efficiency project was delivered within scope, timeframe and budget.

13. FUTURE DIRECTIONS

Since 2009 Council has achieved significant savings in electricity costs and GHG emissions as a result of energy efficiency initiatives. This project combined with and other energy efficiency projects are key contributors to these savings, and have further demonstrated that energy efficiency initiatives, not only make good business sense, and reduce our greenhouse gas emissions, but they have benefits to the community through education and leadership. Council’s adopted Renewable Energy Master Plan has committed to Lismore City Council to continue this path and become self-sufficient in electricity from renewable resources by 2023. A number of energy efficiency projects including demand reduction and small scale solar are planned to be rolled out in 2015/16 financial year.
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 Lismore City Council.

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

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

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

Authorised Officer Signature: ..............................................................

Date: 29/06/15

Name: Gary Murphy.................................................................

Position: General Manager.........................................................

Organisation: LCC...........................................................................

Witness Signature: ........................................................................

Date: 29/06/15

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

Position: Environmental Strategies

Organisation: LCC

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.
# Project Energy Efficiency Improvement Template

<table>
<thead>
<tr>
<th><strong>PROJECT TITLE</strong></th>
<th>Upgrade of air conditioning, lighting and trial heat reflective paint at the Corporate Administration Centre and CBD Office.</th>
<th><strong>PROJECT ID</strong></th>
<th>CEEP2176</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>FUNDING RECIPIENT</strong></td>
<td>Lismore City Council</td>
<td><strong>DATE</strong></td>
<td>18 June 2015</td>
</tr>
</tbody>
</table>

## Building, Facility or Site 1

| **Name of Building, Facility or Site 1** | Corporate Administration Centre |
| **Location (address)** | 43 Oliver Avenue, Goonellabah NSW 2480 |
| **Type of building, facility or site** | Customer service & Office administration building |
| **Activity Type and Measure** | Upgrade of air conditioning, lighting and trial heat reflective paint |
| **Energy Efficiency Estimate Method** | AS3598:2014 Level 2 Energy Audits |
| **Baseline Energy Usage** | 1,262,038 MJ per annum |
| **Baseline Energy Efficiency** | 1. Corporate Administration Centre (internal to include heat reflective, Sterile Aire and LEDs) = 475.41 MJ/m²  
2. Corporate Administration Centre (External LED Lighting) = 6.4 MJ/m² |
| **Energy Efficiency Improvement** | 1. Corporate Administration Centre (internal to include heat reflective, Sterile Aire and LEDs) = 84.36 MJ/m²  
2. Corporate Administration Centre (External LED Lighting) = 5.24 MJ/m² |
| **Reporting Data (Measuring Energy Efficiency and Additional Data)** | 1. Total internal area of 2723 m²  
2. Total external area of 3700 m²  
   - Daily hours of operation: 8am to 5pm with some out of hour operation including Council meetings and workshops.  
   - Building construction date 1990 |
| **Cost of Activity** | $207,008 (Ex GST) |
| **Estimated Cost Savings** | $15,922 per annum |

## Building, Facility or Site 2
<table>
<thead>
<tr>
<th>Name of Building, Facility or Site</th>
<th>CBD Centre</th>
</tr>
</thead>
<tbody>
<tr>
<td>Location (address)</td>
<td>55 Magellan Street, Lismore NSW 2480.</td>
</tr>
<tr>
<td>Type of building, facility or site</td>
<td>Customer service &amp; Office administration building</td>
</tr>
<tr>
<td>Activity Type and Measure</td>
<td>Replace air conditioning systems</td>
</tr>
<tr>
<td>Baseline Energy Usage</td>
<td>44,681 MJ per annum</td>
</tr>
<tr>
<td>Baseline Energy Efficiency</td>
<td>158.44 MJ/m²</td>
</tr>
<tr>
<td>Energy Efficiency Improvement</td>
<td>146.26 MJ/m²</td>
</tr>
</tbody>
</table>
| Reporting Data (Measuring Energy Efficiency and Additional Data) | - Total area of 282 m²  
- Daily hours of operation: 8am to 5pm with some out of hour operation including meetings and workshops.  
- Building construction date 1920s |
| Cost of Activity                  | $46,615 |
| Estimated Cost Savings            | $3,552 |