ATHERTON LIBRARY AND GALLERY
AIR CONDITIONING AND LIGHTING
UPGRADES

FINAL REPORT

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Coordinator Facilities, Tablelands Regional Council

This activity received funding from the Australian Government
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1. Executive Summary

Tablelands Regional Council (TRC) was successful via the Community Energy Efficiency Program funded by the Department of Industry for a grant to upgrade the air conditioning at the Atherton Library and Gallery and also to deliver energy efficient lighting at both Davies Park Sporting Facility, Mareeba and the Atherton Showgrounds Sporting Facility. Throughout 2013 and 2014, TRC successfully delivered a program of works in the Atherton Library and Gallery complex which has resulted in a vast improvement to the energy consumption of the building. A new Air Conditioning Unit was installed to both the Library and Gallery sections of the building.

Initially, the Funding Agreement between the Department of Industry and TRC included proposals for energy efficient lighting upgrades to Atherton Showgrounds and Davies Park in Mareeba as outlined above. This agreement was changed by a Deed of Variation which removed those proposals from the agreement under; SCHEDULE 1 - FUNDING AGREEMENT DETAILS - 4 ACTIVITY

Subsequently, funding was re-allocated to improve track lighting in the Atherton Gallery.

Council engaged a Cairns based company, GHD to provide advice and direction on upgrading of the air conditioning. GHD is one of the world’s leading professional services companies operating in the global markets of water, energy and resources, environment, property and buildings, and transportation. They provide engineering, architecture, environmental and construction services to private and public sector clients. The report highlighted the need to upgrade the previous air conditioning unit due to a number of factors including, but not limited to; age, ongoing maintenance costs and poor energy efficiency. The failing pre-existing unit had been running at approximately 50% capacity for some time and the comfort of staff and Library customers was severely compromised in the warmer months and consequently increased the consumption of energy. Additionally, the air conditioning in the Gallery could not accurately regulate the temperature and humidity control required that is a requirement in that facility.

The previous track lighting system throughout the Gallery also operated at a high temperature and required frequent globe replacements. The heat generated by the existing lighting also had the potential to damage art works.

The upgraded air conditioning units and the new track lighting system has resulted in an estimated annual reduction in costs to TRC, of almost $20,000 in energy consumption costs.

For TRC, the realisation of the ongoing benefits of this project has highlighted the need to upgrade other facilities throughout the region in a similar manner. Therefore further similar projects will be proposed at other council facilities in future Capital Budgets.

KEY LEARNINGS –
- The savings to be realised as a result of this project have prompted Council to internally audit all of its facilities and ensure they are all being managed in a cost effective manner which will include securing the correct energy tariffs and charges for each. Council’s Water & Waste have since reduced some of their infrastructures power use and costs by around 10K per year by switching tariffs.
• The complexity of the project could have been simplified if a single reporting and managing body had been responsible for all related project management. Several staff were involved throughout this process and this would not occur in the future.
• Council will continue to make the most of similar grant programs if they are offered in the future.
• Council will continue to engage the community in discussion regarding future facilities and sites which could benefit from this type of upgrade.

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 therein.

2. Project Objectives

Develop and promote energy efficient options through education and communication at high usage facilities, showcasing best practice improvements to the community.

Outcomes to be achieved by delivering and utilizing the project’s outputs are listed below:
• Improved thermal efficiency, amenity and energy usage of Atherton Library/Regional Gallery complex.
• Decreased maintenance and energy costs at the Atherton Library and Regional Gallery complex.
• An informed community, knowledgeable on resources, benefits and opportunities to improve energy efficiency at home, in the workplace or community facilities.
• Increased usage of upgraded facilities.
• Decrease in complaints and risks associated with amenity of upgraded facilities.

Success will be monitored upon the key benefit areas of:
• Energy efficiency
• Reduced ongoing costs
• Improved amenity
• Informed community knowledge in relation to improving energy efficiencies
• Decrease in complaints by users

Further, it was the intention of TRC to improve the environment and energy consumption of one of Council’s most highly utilised facilities.

Both the Atherton Library and Gallery are two facilities that are well utilised by the local community and provide access to literature and the arts for all – including disadvantaged and low socio-economic groups which would otherwise be denied such access.

Artists and exhibitors appreciate the opportunity the facilities provide and Council receives feedback from across the community reinforcing the positive impact the Gallery and Library has amongst the wider community.

Groups of artists include indigenous, ethnic and lower income retirees and the Gallery provides a prestigious venue in which to display the works to the public.
In a tropical climate it is important to cool and ventilate in an effective and energy efficient manner and the upgrade of the air conditioning at both of these sites has been very well received by members of the public.

Any improvements will result in the reduction of ongoing maintenance costs and set a new standard of energy efficiency previously not seen in Council’s older buildings.

Most importantly, the staff and customers not only needed to see and feel the benefits of the project, but to understand via an informed process, the importance of the reduction in future costs to the facility.

3. Project Energy Efficiency Activities

Due to the age and condition of the air conditioning unit throughout the Atherton Library/Gallery complex, that facility was selected to have funds allocated as a high priority as soon as they were available. Further consultation revealed an aging and inefficient lighting system in the gallery which also not suitable for exhibiting artworks.

The lighting technology was improved by way of a cooler LED lighting system called ‘ARCTIC 6’. The system is a series of premium European designed track light which has replaced the metal-halide system.

The installed air conditioning units are comprised of several individual components. These components have their own energy efficient technologies built in;

- ‘Actron Tri-Capacity Split Ducted Unit’ which consumes around 44% less energy than the previous compressor. There are 2 Actron units which service the Gallery and library independently.
- ‘Innotech Minim 3 controller’ (a PLC type – Programmable Logic Control) which allows specific setting for the unit to deliver efficiently to individual areas. This is design specific hardware.
- ‘Heat Exchangers’ are also fitted. These are externally fitted and sub-cool the fresh air before it enters the building and the rest of the system. Both areas have heat exchange technology in service.
- ‘Hot water reheat’ which is a more efficient uses recirculating water to manage the humidity levels rather than relying on traditional electric elements. The hot Water Reheat unit is servicing the gallery section.
- ‘Daikin inverter Technology’ allows fans to run on automatically as varying speeds depending on conditions. This unit is installed in cassette form to service the gallery reception area independently of the rest of the building.

The individual units were selected due to their energy efficient technologies which reflect the many different manufacturers chosen to contribute to the project.
Some engineering challenges arose to ensure correct installation of the main plant. The Plant Room had to be reconfigured as the new units design and design meant it could be accommodated in the existing room as previously assumed. Extra steel reinforcing was also installed in the ceiling of the library to prevent sagging due to the previously uncalcuated weight distribution of the unit. The confined space for the installation made it difficult along with the small but additional cost of doing so. A more concise site inspection by the engineers prior to the final design, may have revealed the the issue and the delay, although only minimal, would have been prevented.

4. Demonstration and Communications Activities

The Tablelands community has a strong commitment to sustainable growth and while ensuring its agricultural industry continues to flourish, the community as a whole need to ensure it employs best practice environmentally wherever possible.

Council must also show that it is taking steps to improve its practices environmentally and upgrading one of its most highly utilised facilities to reap the benefits of improved energy efficiency, was a logical next step.

Library customers had been advised by staff of the upcoming changes to the facility for some time and in many ways the customer’s feedback regarding the conditions of the facility made this project a priority.

Advertisements were placed in the local papers advising of the dates of closure so that works could commence on site.

The Gallery Staff then advised their customers by way of emailed newsletter, that an exhibition was due to open which would showcase the improvements. The newsletter also made mention of the Australian Government funding received for the project.

Two newly installed signs positioned adjacent to the main facility entrances advise any customers entering the building of the energy efficient improvements to the facility and the contribution made through the Government funded program.

Media publications in Tablelands based newspapers have advised the community of the beneficial changes to their facility. This publication included comment from the TRC Mayor Rosa Lee-Long.

Upon completion of the commissioning of the upgrades, an event was organised for the 9th January 2015 to showcase the upgrades coinciding with an opening of a new exhibition in the gallery. Councillor Peter Hodge spoke of the improvements to all attendees. The attendees included members of the public, members of the gallery, the exhibiting artist (from Brisbane) and contractors whom worked on the project. An official of Ausindustry was invited but was unable to attend due to the short notice. The event was advertised on the TRC website and Facebook page. The local papers were closed for the Christmas period and an advertisement could not be placed in them.
5. Outcomes and Benefits of the Project

The original baseline energy consumption analysis which was prepared in 2013 under Atherton library and art gallery A/C E.C.A and also the lighting E.C.A. Energy Consumption Analysis.

Minor modifications to the original documentation have resulted in a slight increase in the baseline energy usage figure originally set at 192,286KWH. As a result of the decision to run the air conditioning for 24 hours increasing usage, the baseline figure was adjusted to 239,779KWH as explained in the next paragraph.

The reason for the change in the baseline figure was due to the Art Gallery authority’s decision that the air conditioning units serving Area J (Reception) shall operate 24 hours similarly to the main Art Gallery air conditioning unit. The decision was made on the basis that some of the art displayed in this area requires air conditioning as per the main art gallery exhibition room. During the tender stage, the Library and Art Gallery Authorities agreed to retain some of the Air Conditioning units which originally were designated for decommissioning.

Replacing the Library's (Area A & B) air conditioning system will increase energy usage as the old system is working at 50% capacity. Replacing the Library's (Area C) air conditioning system will also increase energy usage as the old system is working at 70% capacity. The system had been in this condition for the past 24 months. The maintenance on the old system was ongoing and servicing was regularly required outside of the quarterly schedule. These improvements will help reduce ongoing maintenance costs.

Replacing the Art Gallery’s (Area I, J & K) air conditioning unit will increase energy consumption during the larger functions as the air conditioning unit will cater for 90 people and respective 900k/s of outside air. However, from an overall perspective the air conditioning unit will provide annual energy savings through the adoption of a heat pump re-heat system in lieu of electric heaters.

Overall the modifications to the air conditioning system will result in an estimated baseline energy efficiency improvement of 354MWh per annum, a 32% reduction which equates to a saving of $19,910 (based on electricity tariff of 25.5 c/kWh). Lighting – Overall the modifications to gallery lighting system will result in an estimated baseline efficiency improvement of 219kWh per annum. This is a 58% reduction from the original installation which equates to a saving of $762 per annum (based on electricity tariff of 25.5 c/kWh). The estimated payback period is 14 years.

It is expected that energy efficiency markets will grow worldwide. Improved data and analysis will enhance the ability of residents and Council to understand the market more fully—notably in terms of investment inputs, savings outputs, and the impact on energy efficiency outcomes. Increased focus on the issues of energy security, economic growth, sustainable development and climate change mitigation, which can each be enhanced through improved energy efficiency, is likely to support continued growing emphasis on energy efficiencies such as this project.

The evidence so far is clear in that energy efficiency has played, and continues to play, a large and valuable role in energy sustainability. This is highlighted through improved amenity
of the building, greater comfort, better lighting quality in the gallery and improved health outcomes, improved working conditions and environmental benefits.

The Humidity Control technology will assist with respiratory function and the improved lighting will assist with eyestrain. Both of these health issues were raised when the old systems were in place. Dust was also an issue due to accumulation throughout the old ducts which are now fitted with higher quality filters.
The older system was noisy due to worn out mechanical parts. The new system is much quieter with insulated ducts and has improved the overall ambience in all sections of the building.

Additionally, improved tradesperson access to system units due to the reconfiguration of the original plant room, improved ladder access systems and improved electrics are all major benefits.

Since completion, attendance figures in the Library have increased and although those increases are not confirmed as being a direct result of the upgrades, Library Staff are certain the improvements have directly increased the time customers are spending in the facility due to the increased comfort level. Library Staff no longer receive complaints.

Council has ensured it has met the objectives of the CEEP program and has lead the way in the Tablelands region by showcasing a facility which clearly displays the benefits associated with including the latest energy efficient technologies.
The feedback from the Tablelands community has been extremely positive. All socio-economic and disadvantaged groups have access and regularly use the facility.

The improved comfort levels throughout the library are clear as more people who drop in for a browse end up sitting down and reading for longer than they would have prior to the upgrades. The community now also has an art gallery that can exhibit works more professionally and will be able to attract higher quality art works and artists. The ambience created by the upgraded climate control and lighting is exceptional.

Plans of the proposed upgrades were displayed on the front counter of the Atherton Gallery in the lead up to the closure prior to construction. All Library users were able to view the designs while making their transactions. Since the project was completed, the TRC Website ‘News’ page which hosts the upgrade information, has averaged 955 hits per month.

The Tablelander Newspaper has a readership of 17,000 per month. The publication advertised the closure dates of the facility and later an editorial with photographs, which provided information on the energy efficient upgrades and advised customers the facility was ready to use. Users of the facility are greeted by signage referring to the government contributions upon their arrival.

The positive reaction from users of the facility combined with the predicted cost savings will ensure TRC will continue to utilise similar technologies in future upgrades when possible.
6. Budgets

The project was achieved within budget, however, Milestones 4, 5 and 6 payments have not yet been received. Please note all figures quoted are exclusive of GST. Whilst the original funding agreement stated funding from the Department of Industry and Science of $349,376.00 and $196,586.00 by TRC which equated to a total of $545,962.00, equating to a 64/36% split, Council completed a Deed of Variation on 25 June 2014 to increase our contribution by $57,438.00 meaning Council’s total contribution was $254,024.00 bringing the total project allocation to $603,400. The total spend of the project has come in under budget at $534,765.10 and this underspent does not affect the funding split as per the original application.

The lighting to the Davies Park Sporting Ground and the Atherton Showgrounds Sporting Ground were removed from the project and lighting for the Atherton Gallery was performed as per the Deed of Variation.

The nature of the technology created some unexpected costs, these being a supporting beam needed to be installed and small cosmetic repairs required in the gallery.

There were no issues with co contributions to the project.
## Project Income and Expenditure

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Those items listed in yellow cannot be included as the funding agreement was not executed until 17 December 2013 and all figures only include expenditure since 17 December 2013

### Expenditure for 2013 - 2014
- $83,802.59

### Expenditure for 2014-2015
- $450,962.51

### Total Eligible Expenditure
- $534,765.10

#### Original Funding Agreement - 17 December 2013
- Department of Industry and Science - 64% $349,376.00
- Tablelands Regional Council - 36% $196,586.00
- **Total Project** $545,962.00

#### Deed of Variation dated 25 June 2014
- Department of Industry and Science - 64% $349,376.00
- Tablelands Regional Council - 36% $196,586.00
- TRC additional contribution as per Deed of Variation 25/6/2014 $57,438.00
- **Revised Total Project** $603,400.00

#### Actual Project Costs
- Total contribution by Department of Industry and Science $349,376.00
- Total co-contribution by Tablelands Regional Council $185,389.10
- **$534,765.10**

### Underspend from Revised Total Project
- $68,634.90

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<td>Milestone 6</td>
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<td><strong>Total</strong></td>
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7. Project Operations, Mechanisms and Processes

The project was managed by TRC by two Project Managers over the course of the works. Prior to the commencement of works, the initial stages from proposal through to design and quoting were also managed by TRC with input from GHD.

Overall, the onsite project was delivered as per the Project Plan and only 2 small delays hindered the process. Even with a Heat Pump unit arriving damaged due to transport carelessness, a second unit was custom made and delivered 2 weeks later without a major impact on the completion date.

The discovery of a sagging roof section under the weight of the new roof top system installed at the library provided a further delay and additional steel reinforcing was required in the roof cavity. This also provided an opportunity to inspect the building in further detail which has given us further insight to the design of the structure. This knowledge will be useful when considering any future works or alterations to the building should they be required.

The control system needed to be designed & programmed to manage many different components, some of which would usually have their own control units. This was a complex system to operate at the commissioning stage but after a few tweaks and tests was soon working as designed.

Some small cosmetic issues were not considered during the project scope stage. The scope did not include allowance to repair some wall sections which had old units or control panel/switches removed. This was not difficult to tidy up but just added to the workload.

Council was able to close the library for a 2 week period while major installations occurred, but for the majority of the time tradespeople were on site while the library was open. The noise at times was a challenge due to the nature of the library environment but overall the library staff were kept up to date of project status and advised of upcoming potential annoyances.

The management process had its fair share of challenges due to different TRC departments being involved throughout the process. Extensive engineering was also required by an external party and additionally, staff involved in the earlier planning stages of the project left TRC as the practical stages commenced. Similarly, issues with Australian Government staff changes meant communication often had to restart. From inception of the grant, TRC has had seven separate contacts within the Department. Understandings and agreements negotiated previously haven’t necessarily been handed over to the replacement staff. This has created challenges and uncertainty for TRC staff who have also faced similar challenges with changes in staff.
8. Conclusion

Although at times a challenging project for this council, due to the type of facility chosen to
be upgraded, TRC’s entire community will benefit from the improvements to this highly
utilise two of its most highly utilised facilities. The feedback and comments from the
community and staff are evidence of that, along with predicted long term cost savings of the
energy efficient design.

TRC can see the benefits of the technology used and are looking ahead to sourcing other
facilities that could potentially benefit from the same potential savings. The predicted cost
saving of approximately $23,000 per year for energy consumption costs at the facilities is an
exceptional result at a time when TRC is experiencing a smaller budget and challenging
financial constraints.

If a similar project was managed by TRC in the future, Council would be better placed to
manage all aspects of the project by the one department. TRC would then be better
equipped to undertake the project with that single department focussed on all aspects,
including onsite inspections, Milestone Reporting and funding acquittal. Additionally,
consistency within the Department of Industry would also assist with this process and the
extensive reporting requirements were not necessarily congruent with efficient funding
acquittal.

Despite all of the challenges, we have been able to deliver a quality project on time and
under budget.

TRC is extremely grateful for the financial contribution provided by the Department of
Industry as this project would not have been possible without their assistance.
9. 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 an satisfactory completion of Milestones.

Authorised Officer Signature: __________________________ Date: __/__/15

Name: __________________________

Position: __________________________ Organisation: __________________________

Witness Signature: __________________________ Date: __/__/15

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 2002, 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>
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<tr>
<th><strong>PROJECT TITLE</strong></th>
<th>Atherton Library Gallery Air Conditioning &amp; Lighting upgrade</th>
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<td>Tablelands Regional Council</td>
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<td><strong>DATE</strong></td>
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<td><strong>PROJECT ID</strong></td>
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### Building, Facility or Site 1
- **Name of Building, Facility or Site 1**: Atherton Library & Gallery Building
- **Location (address)**: 16 Robert St Atherton
- **Type of building, facility or site**: Public library and public gallery, brick construction.
- **Activity Type and Measure**: Upgrade of HVAC system

### Energy Efficiency Estimate Method
- Camel (Version 5.10.2) heat load calculation and data conversion to annual energy consumption

### Baseline Energy Usage
- Minor modifications to the original documentation have resulted in a slight increase in the baseline energy usage figure originally set at 192,286 kWh. As a result of the decision to run the air conditioning for 24 hours increasing usage, the baseline figure was adjusted to 239,779 kWh as explained in the next paragraph.

The reason for the change in the baseline figure was due to the Art Gallery authority's decision that the air conditioning units serving Area J (Reception) shall operate 24 hours similarly to the main Art Gallery air conditioning unit. The decision was made on the basis that some of the art displayed in this area requires air conditioning as per the main art gallery exhibition room. During the tender stage, the Library and Art Gallery Authorities agreed to retain some of the Air Conditioning units which originally were designated for decommissioning.

### Baseline Energy Efficiency
- 304 kWh x 3.6 = 1093 MJ per m² annum

### Energy Efficiency Improvement
- Reduction to 994 kWh x 3.6 = 354 MJ per m² annum

### Reporting Data (Measuring Energy Efficiency and Additional Data)
- **Floor area of 741 m² (air conditioning spaces only)**
- **Building construction date:**
  - Library A&B 1976
  - Library C 2003
  - *Art gallery 2007"
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<td><strong>Name of Building, Facility or Site</strong></td>
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<tr>
<td><strong>Activity Type and Measure</strong></td>
<td>Upgrade of lighting to 158m² gallery space</td>
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<td><strong>Energy Efficiency Estimate Method</strong></td>
<td>Calculation and data conversion to annual energy consumption</td>
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| **Reporting Data (Measuring Energy Efficiency and Additional Data)** | Floor area 158m²  
Original lighting installation date: 2007 |
| **Cost of Activity**             | $29,000 |
| **Estimated Cost Savings**       | $762 per annum |