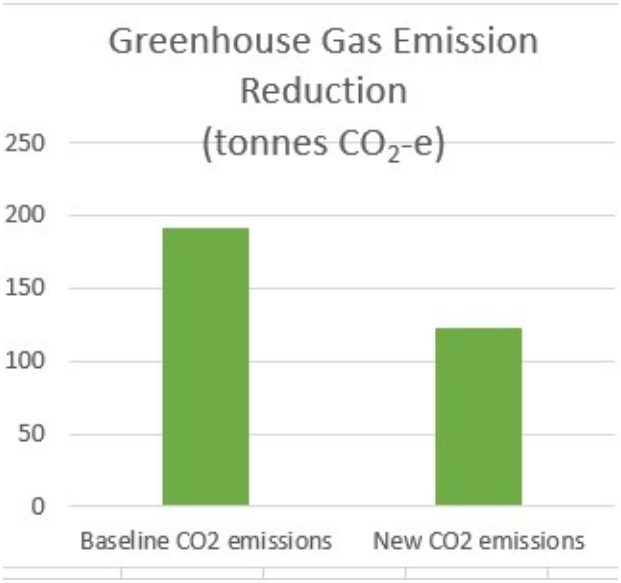
ENERGY EFFICIENT COUNCIL BUILDINGS CASE STUDY: INDIGO SHIRE OFFICE 'THE PINES'

2017

Indigo Shire's main office building, "the Pines" is located in Beechworth, Victoria. Once part of the Mayday hills asylum, this iconic heritage listed building was built in the 1930s and had a significant internal upgrade when the council purchased the building in 2013. The building accommodates around 45 staff, meeting rooms and the council chambers. The building does not currently have rooftop solar PV.

Wodonga council staff undertook an energy efficiency assessment on the Pines as part of a joint project with Indigo Shire funded under DELWP's Collaborate Council's Sustainable Fund Partnership Program.



The energy efficiency assessment:

- Was conducted in accordance with AS 3598.1:2014:
  Energy Audits Part 1: Commercial Buildings.
- Involved a review of two years' of electricity bills
- Installed a data logger on the main switchboard to capture the electrical load profile of the site
- Analysed data from three weeks of live monitoring
- Included site inspection and staff consultation

The energy efficiency assessment identified:

⇒ Ongoing savings of $13,484 per year
⇒ Return on investment of 5.5 years
⇒ Green house gas emission reduction of 36%

If all recommendations are implemented

The Pines at Beechworth

Key Findings

⇒ The data logging showed there was significant energy consumption over the weekend when the building was unoccupied. Initial investigations revealed this was caused by a defective thermostat setting which was subsequently resolved. However, additional monitoring the next weekend showed that the consumption was still much higher than expected. Further investigation with the manufacturer of the HVAC system are required.

⇒ The kW consumption is consistent year to year; it appears the major contributor is heating in the winter months. The HVAC system may require further fine tuning to improve efficiencies. Roof top solar PV should also offset this day time consumption considerably.

⇒ The installation of a suitably sized solar system (approximately 30kW) would be sufficient to largely offset the day time consumption. However due to heritage considerations, this size may not be possible. An innovate option to accommodate the solar, and provide shade, is to place the solar panels on the roof of a covered section of carpark. This would need additional capital to construct the carpark roof structure.

⇒ The external mercury vapour lights should be replaced with LED fittings, which not only consume less power, but also require less frequent maintenance and replacement. Rebates are available to partially offset the cost.

⇒ The line voltage is high and unstable, reaching a maximum of 255.37 volts during the monitoring period. The site is equipped with high value solid state electronic equipment which could be damaged by high and unstable voltage. An Automatic Voltage Optimiser will reduce power consumption as well as maintenance bills.

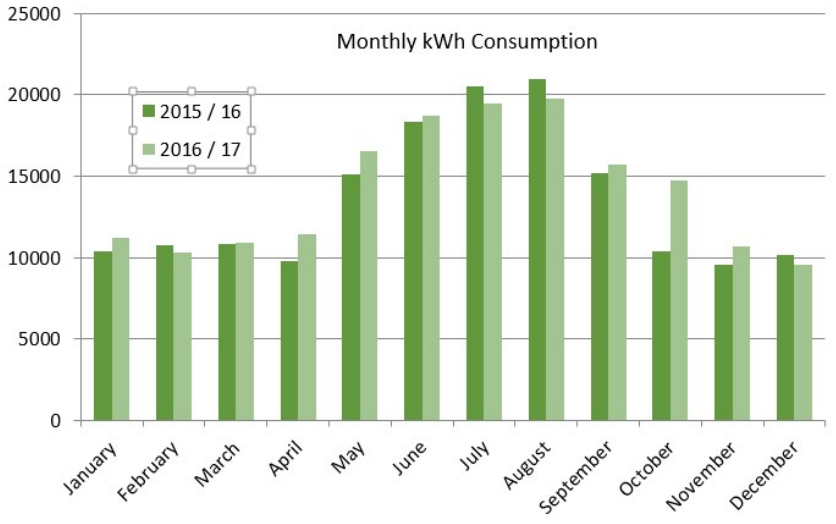
⇒ The power factor was quite good, but could be improved with power factor correction equipment to reduce the maximum demand charges. The return on investment for this item is very long, and therefore it has been omitted from the calculations and recommendations (cost is $12,000 and savings from reduced demand charges are likely to be around $508/year).

⇒ Demand charges have been calculated from consumption at approximately 2pm on summer weekday afternoons (13/12/16, 23/1/17, 10/2/17, 2/3/2017). The average kVA across these measurements was 51.67kVA, which is substantially lower than the maximum kVA demand during the monitoring period (97.47). Therefore, there is potential that the electricity bills could increase (if the demand charge is read when the kVA demand is high), resulting in a worst case scenario of an additional $180/month in demand charge fees. Power factor correction equipment would keep the kVA down and avoid this. So too would advance knowledge of the critical peak demand times and behavioural changes to limit consumption during those periods.

Live monitoring results summary from Metertrac device

Parameter:	Minimum	Average	Maximum	Recommended
Power factor	0.94	0.98	1	≥0.95
Voltage	237.51	247.11	255.16	220*
Amps	11.93	40.93	135.77	-
kVA demand	8.8	29.77	97.47	-
kW demand	8.07	28.16	91.95	-

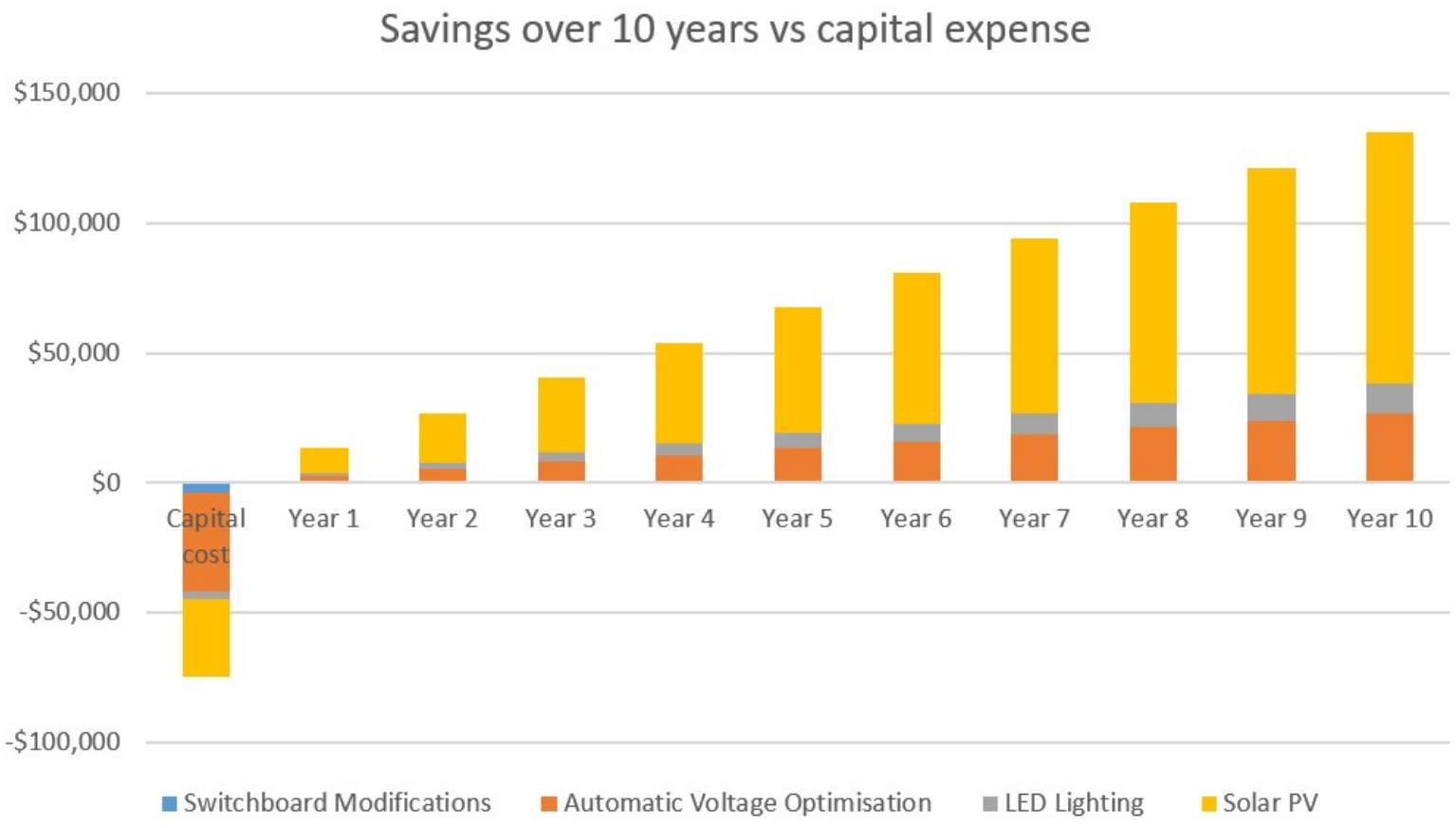
**recommended voltage based on equipment nameplate*



Recommendations, cost and benefits

The capital recommendations are listed in the table below, with estimated costs, savings and return on investment calculations. The power factor correction has not been included in the financial tables due to poor return on investment. The main reason to install power factor correction equipment is insurance against demand charge changes, rather than cost savings against the current baseline.

Recommended equipment	Total Cost (purchase & install)	Annual electricity bill and maintenance savings	Rebates (one-off)	Return on investment (months)
Switchboard Modifications	$4,000	n/a	n/a	0.00
Voltage optimisation	$38,000	$2668	n/a	170.91
LED Lighting	$3,000	$1152	$324	27.88
Solar PV (30kW)	$45,000 (approx.)	$9664	$15,000	37.25
Totals	$85,000	$13,484	$15,324	66.46



Action Plan

Action	Timing	Responsible
Further investigate reasons for high consumption when the office is unoccupied, i.e. thermostat and HVAC, and rectify	*(for ISC to complete)*	Brett Direen
Investigate installation of appropriately sized solar PV system (taking into account heritage requirements and shading by the pine trees).		Helen Jones
Replace exterior mercury vapour lights with LED fittings (Photo below)		Brett Direen
Upgrade switchboard to allow AVO (install change over switch and circuit breaker).		Brett Direen
Install automatic voltage optimisation (AVO) equipment		Brett Direen
Arrange with AusNet Services to get SMS notification of critical peak demand charge days, and then implement organisational initiatives to try to limit consumption on those days via behavioural mechanisms. (During peak demand in summer (December – March) AusNet Services has five periods which it nominates as its critical peak pricing period, where charges for the coming year are determined—if consumption can be reduced during these five periods, the annual cost of electricity will be reduced).		Helen Jones

Photo: External mercury vapour lights to be replaced with LED

Conditions and caveats:

- *Further cost breakdown is available in the Excel project workbook, available on request.*
- *The required size of the additional solar panels will be calculated after other recommendations have been implemented to ensure the sizing is optimal for the new electricity consumption.*
- *All figures are based on information within the current electricity account and information provided by the client .*
- *Rebates quoted for VEECs (lighting) and SGC (solar) rebates are estimates*

Further information and calculations to verify statements in this report are available on request.
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