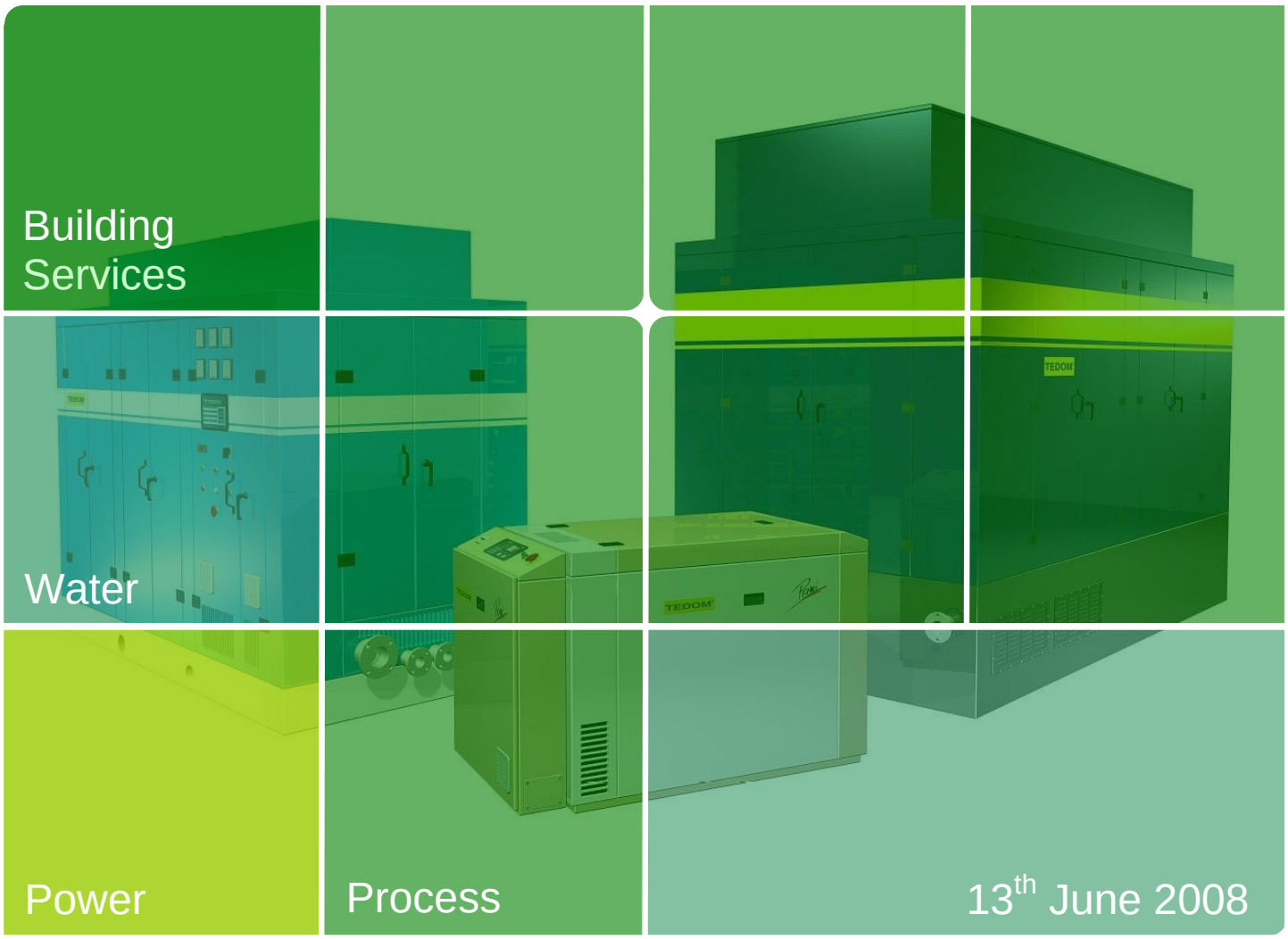

NSW Department of Planning – BASIX – Cogeneration Demonstration Project

Cambridge Apartments

Period Report:

Report 4 – 10 May 2008 to 13 June 2008

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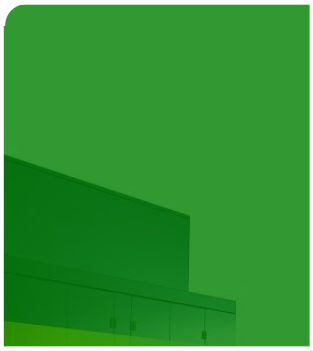

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1 Executive Summary

This Report details the performance of the Tedom F25AP Cogeneration Unit installed at Cambridge Apartments, Chatswood for the period between the 10 May 2008 and 13 June 2008.

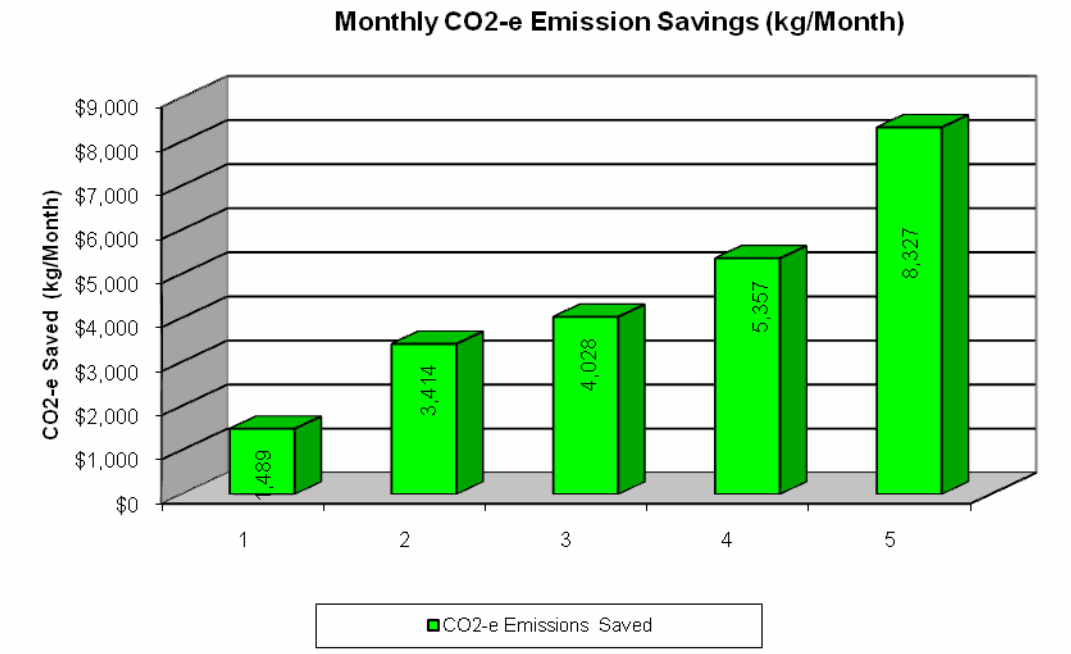
Savings per Month have increased significantly this month due to altering the settings of the units. The cogeneration thermostat is now set to shut the machine off at 70ºC (the machine now starts at a tank temp of 40ºC)

The Raypak hot water units have been set to 58 ºC turn off temperature with a starting temperature of 55ºC to maintain the building system 55ºC temperature.

Building occupancy is close to 100%. The cogeneration has run more hours, with a slight drop in efficiency due to more starts, and a wider operation range. Overall Efficiency (as a ratio of *fuel energy in* : *thermal + electrical energy out*) is now at **73.98%**.

Use of the Cogeneration Unit during the Reporting Period saved a total of **8,327 kg CO2-e** as compared to a No-Cogeneration Scenario using solely Raypak Gas Boilers for Hot Water and importing Electricity from the grid.

Since Commissioning, the Cogeneration Unit has **saved a total of 24,920 kg CO2-e**. The Emissions Savings (kg CO2-e/month) is shown below:



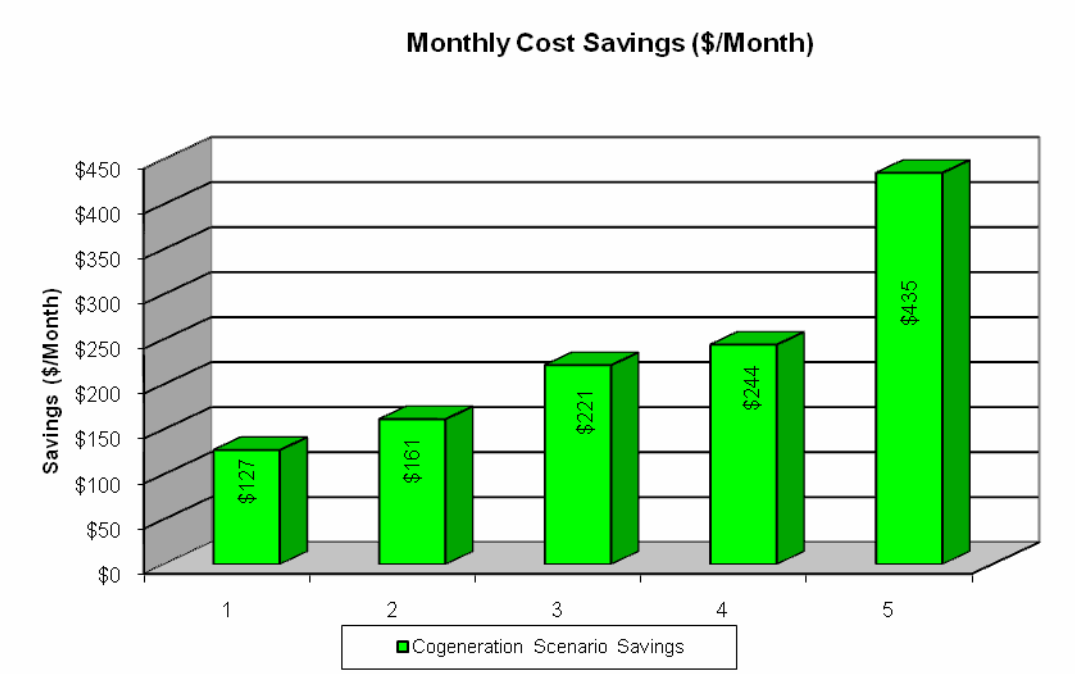
For the Reporting Period, the Cogeneration Unit consumed a total of **4,796 m³** of Natural Gas and generated **12,239 kWh** of Electricity and **23,077 kWh** of Heat.

This gives the unit an **Electrical Efficiency** of **26.64%** and a **Thermal Efficiency** of **48.34%.** As stated earlier, the **Overall Efficiency** of the Cogeneration Unit is **73.98%**.

The electrical efficiency of the unit is consistent with previous months, however thermal efficiency has decreased from the previous month – but overall is reasonably consistent with previous months.

In addition to Emissions Savings, the Cogeneration Unit also provides **Cost Savings** – saving a total of **$435** over the Reporting Period when compared to a No-Cogeneration Scenario.

Since Commissioning, the Cogeneration Unit has **saved a total of $1,188**. The Monthly Cost Savings of the Cogeneration Scenario compared to the No-Cogeneration Scenario is shown below:



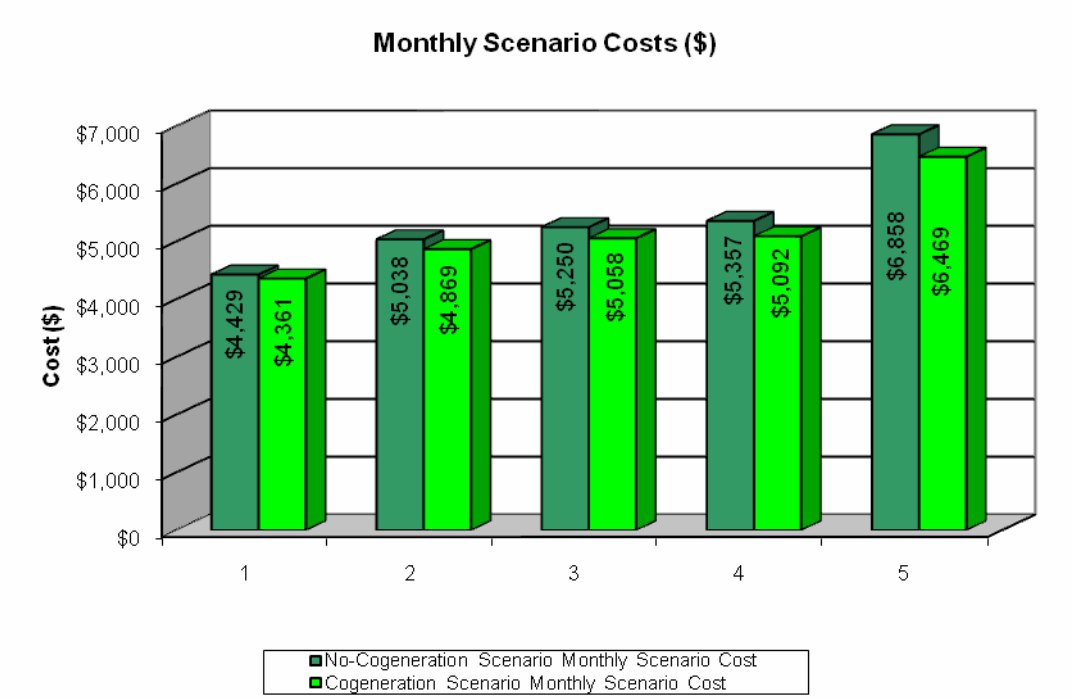
With the current payback rate of **$435/Month**, it will take **35 Years** to pay back the $185,000 Installation Cost of the Tedom F25AP Cogeneration Unit. This is due to the Cogeneration Unit operating in the proportions of 8.70% Peak/50.72% Shoulder/40.58% Off Peak as well as the current price of Electricity. Electricity prices are rising, and the contract obtained for the building is very competitive at the moment. Savings would increase significantly if the unit operated mainly at peak periods.

Carbon Credits (including NGACs) have not been included in the analysis.

2 Analysis & Conclusion

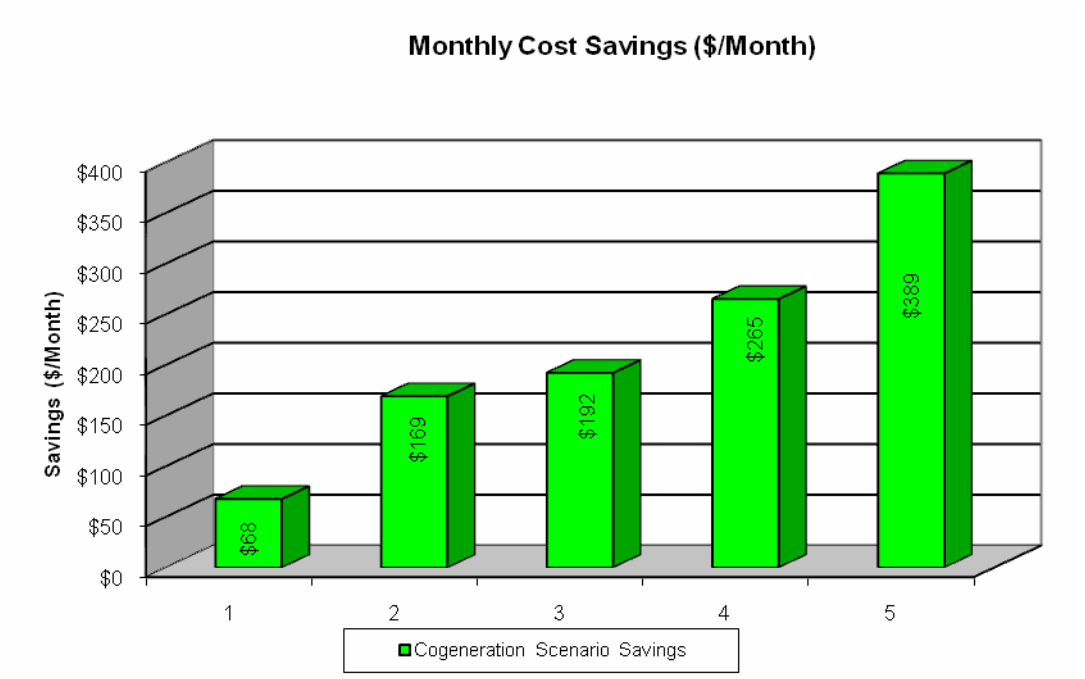
2.1 Costs

Monthly Scenario Costs are shown below.



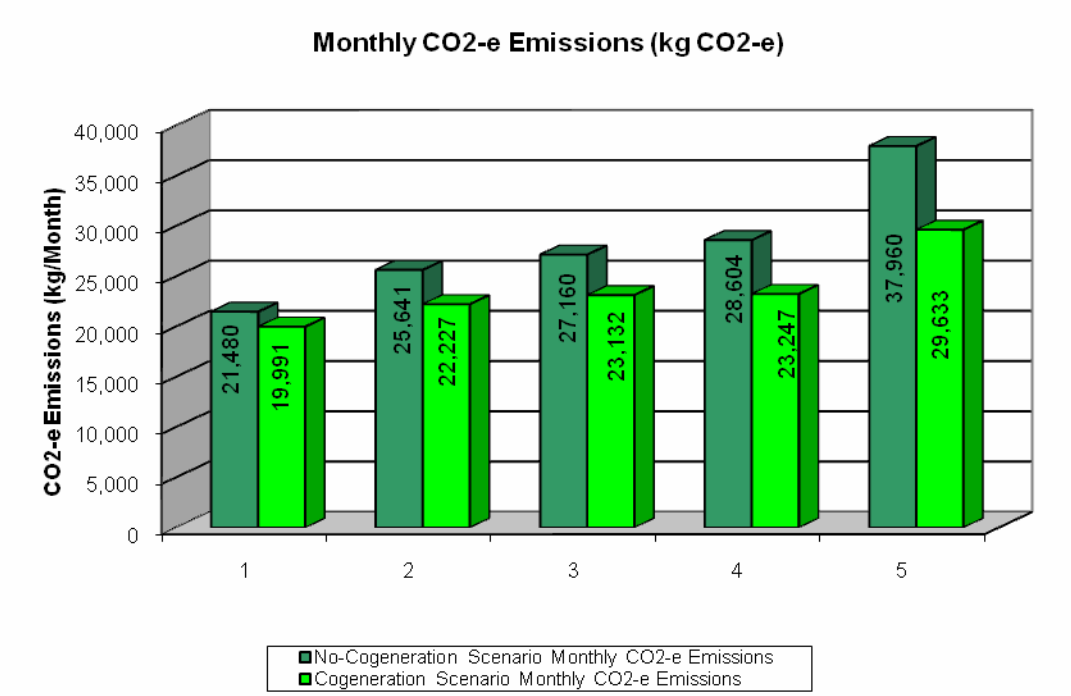
Savings per Month have increased significantly this month due to altering the settings of the units. The cogeneration thermostat is now set to shut the machine off at 70ºC (the machine now starts at a tank temp of 40ºC)

The Raypak hot water units have been set to 58 ºC turn off temperature with a starting temperature of 55ºC to maintain the building system 55ºC temperature.

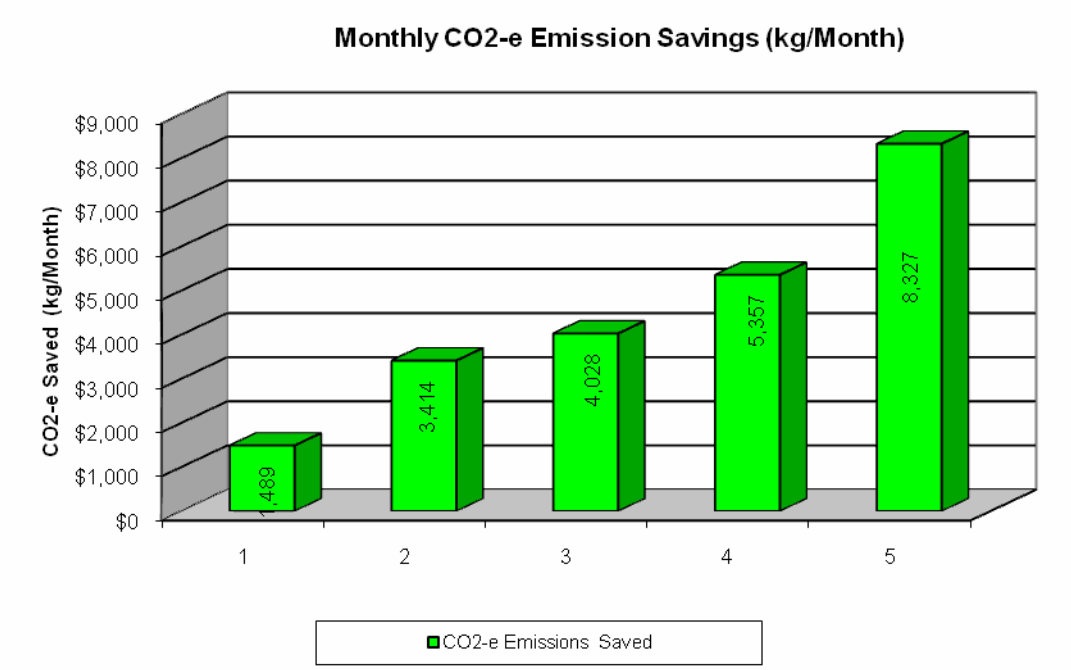


2.2 Emissions

The use of the Cogeneration Unit results in a significant CO2-e Emissions reduction (given the size of the unit). A comparison of the Monthly CO2-e Emissions for each Reporting Period is shown below:

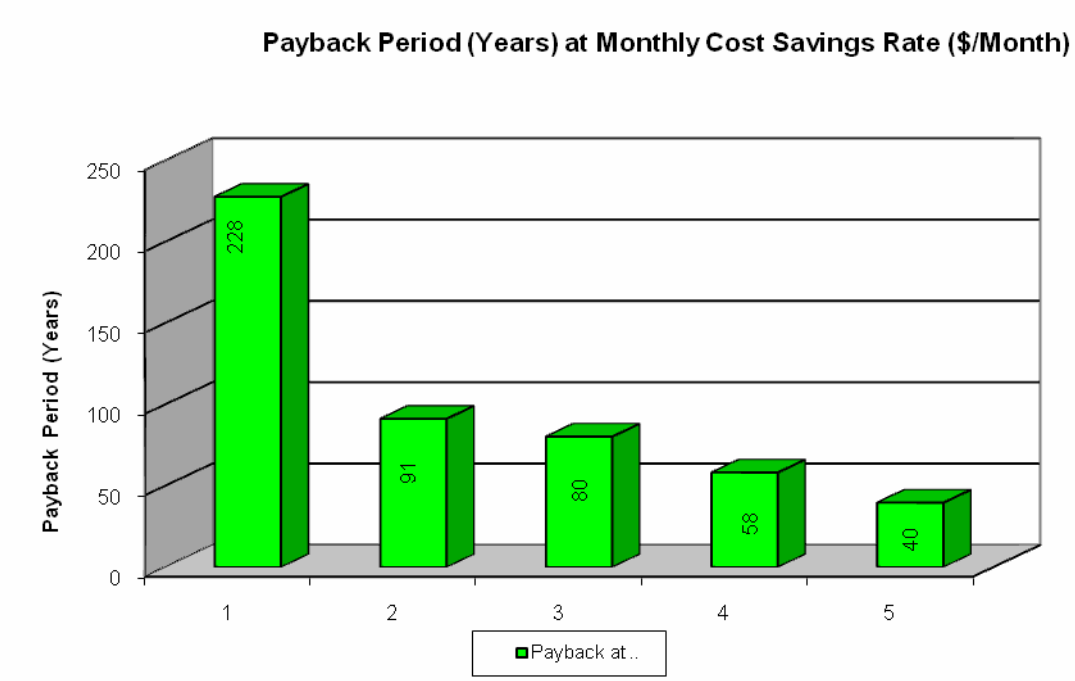


Emission Savings per Month have increased significantly as shown in the graph below. This is due to the increased running of the cogeneration unit and reduction in solar hot-water gains due to low sun and temperatures during the last month.



2.3 Payback Period

The payback period has altered as shown in the graph below:



This is due to the Cogeneration Unit operating in the proportions of 8.70% Peak/50.72% Shoulder/40.58% Off Peak as well as the current price of Electricity.

Whilst the Cost Saving and Payback Period is extremely poor, the Emissions Saving is significant.

2.3.1 Standard Installation Cost of Hot Water Boilers

The payback of the project can be reduced if the unused hot water system is reduced. The cogeneration unit was installed with the option to turn it off and run on a standard 100% redundancy hot water system.

Future installations should incorporate the cogeneration into the system and hence reduce the size and cost requirements of the hot water system. Sizing the cogeneration unit for the total building needs will result in economies of scale in some applications.

2.3.2 Solar

Initial solar thermal heating on the site reduces the heat requirements for the cogeneration unit with the result that the cogeneration unit savings are reduced.

2.4 Carbon Credits

There **exists the option** for Carbon Trading through the New South Whales Greenhouse Abatement Scheme using certificates known as New South Whales Greenhouse Abatement Certificates (**NGACS**) – NGACS are credited **per Tonne of CO2-e saved** (tCO2-e).

Currently, with **uncertainty in Carbon Tax and Trading Schemes** imposed by the Australian Government, this result does not reflect highly on the advantages of operating a Cogeneration Unit.

This may change in the future with the introduction of a Carbon Tax or Carbon Trading Scheme – where Carbon Credits would be awarded to those who can reduce or offset their Carbon emissions.

2.5 Conclusion

Savings per Month have increased significantly this month due to altering the settings of the units. The cogeneration thermostat is now set to shut the machine off at 70ºC (the machine now starts at a tank temp of 40ºC)

The Raypak hot water units have been set to 58 ºC turn off temperature with a starting temperature of 55ºC to maintain the building system 55ºC temperature.

Whilst the Cost Saving and Payback Period is extremely poor, the Emissions Saving is significant for the size of the unit.

The unit continues to improve in efficiencies. If the savings remain significant this month, then increasing the temperature the units start could improve the savings further. Heavy rain over the previous weeks and lower temperatures could have affected HW requirements from the cogeneration, as well as the temperature changes.

It is recommended to;

- Monitor the system for this month to see if the savings are consistent for next month.

In future is is recommended to:

- Set Cogeneration and Gas Boiler Systems to run at **appropriate times**, i.e. Cogeneration Systems should be operated in Peak times wherever possible, in order to **maximise cost savings**.
- **Size** Cogeneration and Gas Boiler Systems **appropriately** according to the building they are installed in in order to ensure the units **run at maximum efficiency** and produce a **higher emission offset** compared to not using Cogeneration.
- Keep the **Emission Savings potential**, both as **Environmental** (kg/CO2-e emitted) and **Financial** (Carbon Credits Traded), in mind when considering the **long-term benefits** of operating a Cogeneration Unit.