



Case Study Palmerston Farm

Palmerston Farm is a Therapeutic Community offering a residential rehabilitation program designed for people over 18 years old wishing to address their substance issues. The core program is 14 weeks, with residents having the opportunity to remain in the Therapeutic Community for up to a year. The 10 acre semi-rural property is located 30 minutes south of Perth and offers 29 residential places and further transitional housing for three graduates of the program.

The primary goal of a Therapeutic Community is to create a nurturing and reflective environment that empowers individuals to make the positive changes they want to make in their life. This is accomplished through personal growth within a community of concerned people working together to help themselves and one another.

The aim of the program is to provide a safe environment, to encourage a sense of purpose in life and to foster a natural desire for personal growth, self-knowledge and self responsibility. We believe this personal development enables residents to instigate and maintain the changes required to face the challenges of effective everyday living. The program includes active involvement in the therapeutic community as the primary task, developing optimal mental and physical health and well-being, self-management skills and social skills training, vocational training, biodynamic horticultural and nursery work, counselling and group work, sport and recreational involvement and art and craft work.

Energy and Greenhouse Audit Summary

The Energy and Greenhouse Audit was conducted on the 24th February 2010. The auditors analysed the electricity, gas and water consumption of the site, determined key behaviours regarding energy and water usage through interviews with staff and critically assessed the property's energy and water efficiency.

There are a number of key energy and water structural issues with the Palmerston Farm property:

- A number of buildings did not have insulation;
- There were numerous Incandescent light globes;
- The hot water system were inefficient and were not sufficient for resident requirements;
- Palmerston Farm is off scheme for water and all drinking water has to be sourced through an energy intensive system of bore pumps and reverse osmosis processes.

The behavioural issues at Palmerston Farm included:

- Leaving office and residential equipment on standby;
- Leaving lights on when not needed;
- Inappropriate and conflicting settings for the air-conditioning systems;
- Length of showers.

Recommendations

The following recommendations were provided to the management at Palmerston Farm. They include both behavioural recommendations and potential retrofitting.

1	Ensure office and residential equipment is not left on standby. Turn appliances off at the wall
2	Install ceiling insulation in buildings that require it
3	Weather strip external doors and windows
4	Seal any unnecessary openings in ceilings and provide any necessary exhaust fans with self-closing vents
5	Set air-conditioners in summer at a temperature between 22-24C and in winter between 19-21C
6	Turn off air-conditioners when rooms are empty
7	Provide external shading for refrigerative units
8	Replace incandescent globes with CFL's or LED's
9	Turn lights off in rooms when not in use. Install motion sensor if required.
10	Replace CRT monitors with energy efficient LCD's
11	Switch off hot water boosters during summer and ensure they have timers
12	Fix solar hot water system in women's house
13	Meter bore pumps to check efficiency of system
14	Install low flow shower heads and plumbing fittings

Retrofits

Water Saving

Of primary concern at Palmerston Farm was their water use. As the property is off grid for water, they have to extract water from two onsite bores. Bore water is not fit for human consumption so the water has to be put through a reverse osmosis filtration and UV filtration system. This process is very energy intensive.

The initial step in the retrofitting process was to determine the efficiency of the bore pump and reverse osmosis system. If the system was not working efficiently, then it would be imperative to invest in improving the efficiency of the system, therefore reducing energy costs. To do this, it was essential to know how much water was being extracted from the bores and how much water become waste water after the reverse osmosis process.

Two bore meter pumps and irrigation meter pumps were installed. These pumps measured input and output of water. After monitoring the system for a month, it was established that the system was working efficiently. The process also provided Palmerston Farm with critical information about their water use, of which they didn't previously have. This information can guide any future investments in the modification and retrofitting of the water processing system.

Because water is an expensive commodity at Palmerston, due to the high energy costs of extraction, reducing its use would have significant energy and financial savings. Obviously behaviour change is the primary tool for reducing water use. However, because Palmerston Farm is a drug and alcohol rehabilitation therapeutic community, where clients are going through significant life changing experience and other behaviour and mental health issues are being addressed, changing behaviour around water use is not a priority. To accommodate this, water saving devices were installed on all taps and shower heads. This reduced water flow from up to 15 litres per minute down to 9 litres per minute. This would save a significant quantity of water each year and the additional energy used to extract that water.

Insulation

The age of some of the residence at Palmerston Farm meant that at time of construction, it was not legislated that insulation was a requirement of construction. The three buildings that do not have insulation have had insulation of an R-value of 3.5. An R-value of 3.5 is the minimum requirement of the Australian Building Code for new buildings. R-values do go up to 5, which provides a better thermal protection, however the additional thickness would not have fitted between the joists in the roof space.

Heat Pump

The women's residence hot water is currently serviced by a solar hot water system. This is an excellent way to heat water as it is the one of most energy efficient means of heating water. However, the capacity of the current system is not large enough to service the residence, with hot water from the solar hot water system running out regularly; therefore an electric booster kicks in, which is the least efficient way of heating water. In addition, a second bathroom and more bed space are being added to the residence to accommodate an increase in residents. To overcome the short fall in current and future hot water supply through energy efficient means, a heat pump has been installed. This will provide significant amounts of hot water with no electricity being required to operate the system.

Photovoltaic System

A 3kW photovoltaic system has been installed at Palmerston Farm. This will provide them with approximately 4600kWh of self-generated electricity per year. This will dramatically reduce their electricity expenditure whilst saving approximately 4600 kg's of GHG per year. In the near future, much of the land surrounding Palmerston Farm will become a new housing development. This will mean that they are likely to be connected to the water and natural gas grid, meaning that they would no longer be required to draw their water from the bores and use the reverse osmosis system. This would reduce their energy use dramatically resulting in the proportion of their energy produce from the photovoltaic's, possibly even being able to export electricity to the grid.

Lighting

Energy use from lighting contributes significantly to Palmerston's energy use. To help address this, sensors have been installed in the three communal bathrooms, which controls the lighting and exhaust fans. In addition, two LED lights have been installed, replacing incandescent lights.

Summary

Palmerston Farm is a unique facility, providing an essential service through a therapeutic community model. The challenges faced by Palmerston Farm, in reducing their energy and water use, arise from being off-grid for water and the priorities of the residence. Taking these factors into consideration, the audit recommendations and retrofit had to reflect the needs of the organisations and its residence. Therefore, monitoring and reducing water use was critical in achieving a long-term approach to water preservation and ultimately energy conservation.

Once water monitoring, baseline information gathered and use reduction were achieved, addressing energy consumption and resident comfort was attended to. This included the installation of a photovoltaic systems heat pump, insulation and lighting sensors. All of these works will have significant contributions to the reduction of Palmerston Farm's energy use and greenhouse gas emissions.