MANAGING ENERGY CONSUMPTION AT SEWER TREATMENT PLANTS

SNOWY VALLEYS COUNCIL

INTRODUCTION

Modern sewage treatment plants are highly mechanised, energy hungry Council assets. In the year ending 30th June 2013 the annual cost of electricity consumption at the five sewage treatment plants was $163,728.

During that period the newly constructed Batlow sewage treatment plant was commissioned and the annual electricity cost of this plant was expected to be $22,000 bringing the annual cost to over $174,000 (based on 2013-14 tariffs). Electricity costs have risen significantly over the past few years and are expected to continue to rise albeit hopefully at a slower pace.

BACKGROUND

Sewage treatment plants are designed to treat instantaneous sewage inflows and these plant inflows have loading peaks early to mid-morning, and late afternoon into the evening, with lessor peaks in the middle of the day. Night time flows are usually minimal.

This flow regime is inverse to that of lower cost off peak electricity tariffs that apply between 10.00 pm to 7.00 am. It is not practical to divert and store incoming sewage at treatment plants and then later process sewage during the off peak periods.

Given the demand for the majority of sewage treatment during daylight hours, the provision of solar PV arrays to generate electricity on site and reduce energy costs offers an attractive proposition.

The main demand on power is the cost of aeration.
For each of the plants the power required for aeration alone is

Adelong: 22kW Brush Aeration

- Pasveer Intermittent Decant Extended Aeration (IDEA) EP1300

Batlow: 15 kW Diffused Aeration

- Hybrid Biological Nutrient Removal (HBNR) EP1500


Talbingo: 6kW Jet Pump Aeration

- Intermittent Decant Extended Aeration (IDEA) EP500


Brungle: 2kW Jet Pump Aeration

- Intermittent Decant Extended Aeration (IDEA) EP130


Tumut: 176kW Surface aeration

- Intermittent Decant Extended Aeration (IDEA) EP12000


Solar PV Arrays
Council engaged CDE Energy to investigate the viability of installation of solar PV arrays at each of the sewage treatment plants and the average *Payback Period* was calculated at 7.4 years.

It was suggested that all sewage treatment plants be provided with solar PV installations, and that these be provided over a two year period as follows:

Table 1: Work Schedule

Year	Location	Description	Estimated Cost	Actual Cost
2014-15	Adelong	10 kW solar PV array	$20,500	$13,080
2014-15	Batlow	20 kW solar PV array	$20,500	$30,700
2014-15	Talbingo	10 kW solar PV array	$40,000	$14,846
2014-15	Brungle	5 kW solar PV array	$12,000	$9,030
2015-16	Tumut 1	50 kW solar PV array	$100,000	$79,894
2015-16	Tumut 2	10 kW solar PV array	$20,500	Included in T1
		Total	$213,500	$147,550

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CURRENT SITUATION

Solar PV has been installed at all five sewage treatment plants at a cost of $147,550.
Current data

- Power usage at the sewer plants prior to the project was 669 Megawatt hours (Mwh) of electricity; this was equivalent to 470 tonnes of Carbon Dioxide (CO2) emissions.
- The power usage for the year ending 30th June 2016 was 675,662 kWh
- Total power produced 213,308kWh
- Value a current prices $46,040 (23.02c/kWh - Peak Rate)
- Total power exported 58,815 kWh
- Net Solar power used in STP 154,500 kWh
- Value @ 0.23c/kWh = $35,600
- Payback time of approximately 4 years
- This represents a 150 tonne reduction in CO2 (1MWh = 0.7t)

SOCIAL IMPACTS
Warm Fuzzy Feeling that you are making a difference.

ENVIRONMENTAL IMPACTS

Positive: In the year ending June 30, 2013 Councils five sewage treatment plants consumed 669 Megawatt hours (Mwh) of electricity, this was equivalent to 470 tonnes of Carbon Dioxide (CO2) emissions. The installation of solar PV panels has significantly reduce CO2 emission by 150 tonnes which is equivalent to a 30%.reduction

OPERATIONAL IMPACTS
Nil impact.

Summary:
In sewerage treatment you don't have the luxury of focussing your operations on the "Off Peak" low tariff times. ***When the product arrives you have to deal with it***. The application of solar PV technology to reduce the dependence on imported power has proven to be successful with a very good payback period. Along with this there is a real environmental benefit without impacting on the current operation of the plant.