Energy Savers Plus Program

targets significant energy savings for

Southern Queensland piggeries

PROPOSED SOLUTION

*Potential energy savings from **Lighting** up to **66%*** and **Solar** up to **27%*****

*Of total site lighting consumption

**Of total site consumption

Key facts

Farm / Industry

Piggeries

Product

Pork

Location

Southern Queensland

Case Study Focus

Lighting upgrade and solar photovoltaic installation

Solutions

Replace existing lighting with LED and install solar photovoltaic systems

The Energy Savers Plus Program is funded by the Queensland Department of Energy and Water Supply

QFF

ERGON ENERGY NETWORK

Queensland Government

Site profiles

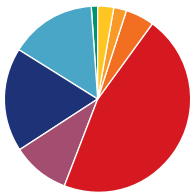
Energy audits were completed for several piggeries in Southern Queensland where common energy saving opportunities identified included lighting upgrade and solar PV installation.

Currently many of the sheds at each site are lit by fluorescent tube or metal halide high bay lighting with lighting accounting for between 1% and 8% of total energy consumption at each site.

Energy Demand Breakdown

Typical Site Energy Consumption Breakdown

Lighting: 3%
Cooling: 2%
Feeding: 5%
Heating: 46%
Pumping: 10%
Ventilation: 18%
Effluent System: 15%
Other (including amenities and refrigeration): 1%



Total: 537 MWh p.a.

Post implementation, total usage would reduce to 499 MWh p.a. after lighting upgrades (50% saving) and implementation of solar PV (typically 30kW).

Lighting consumption at the piggeries currently consists of:

- Fluorescent T8 tube lamps (typically 40W each)
- Metal halide high bay lamps (typically 400W each)

Action

Audits of site energy consumption recommended a number of energy conservation measures for the piggeries including:

- Replacement of heat lamps with new heat mats (payback periods between 4 and 5.3 years)
- Shed lighting upgrade (payback periods between 2.0 and 4.1 years)
- Installing solar PV power systems (payback periods between 3.7 and 6.6 years)
- Other quick-wins such as "Switch off" signs to remind staff to turn off fans and lights in empty sheds, fan belt tensioning, tariff reviews and energy monitoring.
- Suggestions with longer payback periods such as roof insulation and retrofitting energy efficient fans.

Results

Some sheds at the piggeries have been upgraded to utilise LED lighting, but many sheds are still lit by either fluorescent lamps or metal halide high bay lamps. LED lighting generally consumes less energy and has a longer lifespan than fluorescent or metal halide lamps and therefore results in lower energy and maintenance costs.

A typical opportunity for upgrade of fluorescent lamps is replacement of existing T8 tubes of 40W each (including ballast) with 18W LED tubes, a power saving of 55%. A common opportunity for upgrade of high bay lamps is replacement of 400W metal halide lamps with 100W LED alternatives, a power saving of 75%.

On four of the sites, there were also opportunities identified to install solar PV systems utilising existing shed roof areas to offset energy consumption during the day. In each case the PV array was sized to ensure that most generated power would be used on site and minimise the amount of excess energy exported to the grid.

In one case, there was also an opportunity to install a solar PV system to an existing water supply pump to offset power from the pump and would be installed on the roof of the flowmeter shed. Overall, there were opportunities identified to install seven separate solar PV systems over the four sites with savings of up to 27% of the site total consumption.

Recommendations

Solution 	Lighting Upgrades					
	Site A	Site B	Site C	Site D		Site E
	Replace 109 T8 Fluoro with LED tubes	Replace 140 T8 Fluoro with LED tubes	Replace 281 T8 Fluoro with LED tubes	Replace 3 Metal Halide High Bay with LED	Replace 32 T8 Fluoro with LED tubes	Replace 86 T8 Fluoro with LED tubes
Est. energy savings (kWh/annum)	6,292	9,252	16,654	2,100	3,011	1,629
Est. operating cost saving	$1,900	$2,095	$3,941	$560	$486	$295
Est. cost to implement	$6,180	$6,930	$16,228	$1,617	$1,478	$594
Payback period (years)	3.3	3.3	4.1	2.9	3.0	2.0
Est. demand reduction	2.5kW	3.1kW	6.2kW	1kW	1kW	0.2kW
Est. energy savings (of site lighting consumption)	48%	60%	66%	34%	49%	9%

*Table above represents average paybacks per site where sites have multiple sheds.

The projected energy and cost savings from the lighting projects vary depending on the hours of use of each of the fittings and the cost of power to the site.

Solution 	**Solar PV Installation** (with payback less than 6 years)								
	Site A Options				Site B Options		Site C	Site E Options	
	3kW at 50° Azimuth	8kW at 22° Azimuth	30kW at 60° Azimuth	100kW at 60° Azimuth	9kW at 345° Azimuth	15kW at 345° Azimuth	30kW at 15° Azimuth	30kW at 340° Azimuth	75kW at 340° Azimuth
Est. energy savings (kWh/annum)	4,970	11,745	49,171	152,183	13,853	23,088	48,933	48,966	114,137
Est. operating cost saving	$1,324	$3,050	$9,637	$31,553	$3,911	$6,518	$9,258	$9,611	23,627
Est. cost to implement	$4,869	$11,346	$48,644	$162,235	$14,606	$24,344	$48,644	$48,644	121,545
Payback period	3.7 years	3.7 years	5.0 years	5.1 years	3.7 years	3.7 years	5.3 years	5.1 years	5.1 years
Est. demand reduction	0.8kW	1.8kW	7.5kW	25kW	6.1kW	2.3kW	7.5kW	7.5kW	18.8kW
Export to Grid	0kWh	0kWh	0kWh	11,721kWh	0kWh	0kWh	0kWh	0kWh	8,278kWh
	Est. energy savings (of site total consumption)								
	1%	2%	9%	27%	7%	12%	5%	11%	25%

Greater utilisation of on-site generated power results in shorter payback periods. The variation in energy and cost savings between solar systems depends on a number of factors including:

- Tilt of the panels
- Orientation to maintain solar yield
- Utilisation of power generated by solar PV on site
- Tariff arrangement.

Options greater than 30kW are subject to a connection agreement. Note that assessments of solar systems with paybacks greater than 6 years have not been included.

Forecast energy savings	Site A	Site B	Site C	Site D	Site E
Baseline electricity consumption (kWh/sow)	278.4	91.3	306.1	433.5	272.9
Electricity consumption following implementation (kWh/sow)	244.2	72.1	301.0	428.4	240.4
Electricity savings (kWh/sow)	34.2*	19.2	5.1	5.1	32.5*

*Smaller solar PV system adopted where multiple options were presented for the same location.

Note that Site D energy consumption is higher than other sites largely because it includes an on-site feed mill which is a high energy user.

Case studies

To see how other agriculture businesses are saving energy and costs, go to **www.qff.org.au/energysavers**