

Energy Savers Plus Program

targets significant energy savings for a
North Queensland horticulture farm

PROPOSED SOLUTION 

Potential site energy savings

19%

Key facts

Farm / Industry

Horticulture

Product

Mangoes and tomatoes

Location

Bowen

Key Energy Use Onsite

Packing Sheds
 Refrigeration
 Lighting
 Irrigation – Drip and Micro

Solution

Proposed:
 Lighting upgrade and solar photovoltaic installation

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



Farm profile

The farm located near Bowen in North Queensland produces mangoes and tomatoes with two processing sheds in operation. One is dedicated to mangoes and the other to tomato production.

The bulk of site energy usage is for the processing sheds (approximately 66%), which each have cool rooms for storage of the produce as well as sorting and packing facilities. An office and workshop are included in the mango packing shed. The other major energy user on site is the network of submersible irrigation pumps for delivering bore water to the crops.

Current energy demand

The site energy consumption consists of:

- A tomato shed which is the largest consumer of electricity on the farm and is used for sorting, packaging and cooling of tomatoes. There are eight refrigeration rooms with compressors ranging between 5.5 and 10kW.
- A mango shed which is the second-largest consumer of electricity on the farm and is used for sorting and packaging of mangoes with a conveyor system that draws approximately 7.4kW. There are five refrigeration rooms used to cool the mangoes with compressors ranging between 5.6kW and 7.5kW.
- Irrigation, four pumps ranging between 7.5kW and 18kW supply bore water to the mango and tomato crops.

Action

An audit of site energy consumption evaluated:

- refrigeration system efficiency
- pump system efficiency
- variable speed controls
- lighting upgrades
- solar photovoltaic (PV) installation.

Results

Of the energy saving opportunities evaluated, three initiatives were identified within a 5 year payback threshold with potential

energy savings of 13% of the site total and a payback period of 3.8 years (approx.).

There are 30 x T8 florescent light fittings in the tomato and mango sheds that the audit report recommends replacing with LED tubes for energy savings of 75%.

Recommendations also included installation of a 30kW solar PV system on the tomato shed and a separate 30kW PV system on the mango shed. Sizing of solar PV systems was complex due to the variances in site electricity consumption during the year. Generally a solar array is sized to meet the energy needs of the site as this is worth more than exported power. Though the site's operations are seasonal, the avoided high cost of electricity during the production season provides sufficient financial return to offset the lower value of electricity exported during the off season.




Other potential energy saving opportunities range from 5.2 to 10.8 year payback periods. With all energy savings opportunities included, the site would save nearly \$50,000 annually with an average payback of 4.8 years.

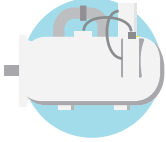
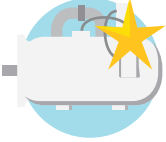

Other opportunities with payback periods greater than 5 years included:

- refurbishing refrigeration systems with new seals, coil remediation and valve, fan and compressor upgrades.
- repairing and replacing refrigeration pipe insulation
- either refurbish one of the submersible pumps or install a variable speed drive to realise energy savings of 10-15%.

Recommendations

The energy audit recommendations are summarised below:

Solution	 Lighting upgrades	 Solar PV on tomato shed	 Solar PV on mango shed
Est. energy savings (kWh/annum)	2,074	40,688	27,900
Est. operating cost saving	\$838	\$16,807	\$12,452
Est. cost to implement	\$2,145	\$56,100	\$56,100
Payback period (years)	2.6	3.3	4.5
Est. energy savings	45%	14%	33%

Forecast savings in operating costs	 Existing system	 Upgraded system	 Reduction in operating costs
Annual operating cost	\$152,983	\$122,886	-
Cost to implement	-	\$114,345	-
Operating costs for first 4 years	\$611,932	\$605,889	\$6,043
Annual operating cost for years 5 to 10	\$152,983	\$122,886	\$30,097
Total electricity costs for 10 years	\$1,529,830	\$1,343,205	\$186,625

Farmer feedback

The audit identified extensive areas that require improvement, some of which we are aware of. We look forward to improving our energy efficiency both in the packing sheds as well as out in the field with our irrigation pumps.

This case study was originally developed during 2018-19 as part of the Queensland Government funded Energy Savers Plus Program, delivered by the Queensland Farmers' Federation.