

# Energy Savers Plus Program

targets significant energy savings for a Queensland horticulture farm

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taila  
energy  
savings

23.57%

## Key facts

### Farm / Industry

Horticulture

### Product

Rockmelons, honeydew melons and sugar cane

### Location

Clare

### Irrigation

Trickle and flood irrigation

### Pumps

Centrifugal

### Solution

#### Implemented:

Variable speed drives and pump alignment

## Farm profile

The farm near Clare grows approximately 900 hectares of rockmelons and honeydew melons that are harvested from April through to December.

The typical production mix on site is 65% rockmelons and 7% honeydew and 28% watermelons being integrated with cane production.

The site includes a processing facility for the melons, which includes fruit sorting, packaging and cold storage.

### Current energy demand

The audit report recommendations included:

- turning off the primary fruit inspection motors during periods of non-use
- Irrigation and water transfer pumps
- refurbish several pumps
- Melon washing system
- installation of an evacuated tube solar collector hot water system for the hot dip
- Hot dip water tank

- Fruit sorting and processing machinery water tank to replace the existing electric
- Fruit packaging equipment heating elements.

- Cold room refrigeration **Refrigeration:** Initiatives identified for

The farmer has an ongoing program to refrigeration system improvements included:

- install variable speed drives to all irrigation pumps on site to realise energy savings
- variable speed control of evaporator fans from pumping at a lower pump speed or Hz.
- refrigeration coil remediation to remove contaminants
- Savings of approximately 40 to 50% have been achieved.
- replacement of seals on cold rooms.

### Action

The audit report also recommended implementing new temperature sensor technology in the cold rooms to mimic the evaluated: internal temperature of the fruit.

- Turning equipment off during periods of non-use recommended installation of a variable speed drive to one of the irrigation pumps tested
- Pump refurbishments which did not have a unit already installed. A variable speed drive was also recommended for the melon wash station pump.
- Refrigeration coil remediation
- Cold room temperature control
- Solar heating system to hot dip tank **Laser Alignment:** Further investigation on pump operation focused on conducting laser

A subsequent investigation evaluated pump alignment of each irrigation pumps shaft alignment to reduce vibration to achieve or belt drive to increase bearing life, reduce more energy efficient operation. maintenance and demonstrate reductions in energy used to drive pumps when correctly aligned. From improving pump mountings

### Results

Of the energy saving opportunities evaluated, seven initiatives were identified with potential energy savings of 7% of the site total consumption and a combined payback maintenance and lifecycle savings were period of 3.5 years (approx.) achieved on one pump alone in addition to a significant increase in seal and bearing life due to reduced vibration levels.

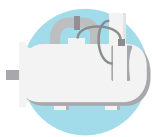
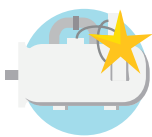

The Energy Savers Plus Program was funded by the Queensland Department of Energy and Water Supply



# Recommendations

The energy audit recommendations are summarised below:

Solution	Pump Refurb.	Solar Hot water system	Refrigeration system improvements	Pump Laser Alignment (15 pumps)	Pump Variable Speed Control (2 pumps)
Est. energy savings (kWh/annum)	9,113	29,048	49,420	27,500	18,795
Est. operating cost saving	\$1,652	\$10,286	\$9,444	\$5,500 <sup>o</sup>	\$4,022
Est. cost to implement	\$2,500	\$50,625	\$30,254	\$9,000*	\$17,059
Payback period (years)	1.5	4.9	3.2	1.6	4.2
Est. demand reduction (kW)	-	22	6	7	3
Est. energy savings	10%	100%	11%	3%	15%

Forecast savings in operating costs	 Existing system	 Upgraded system	 Reduction in operating costs
Annual operating cost	\$417,663	\$386,759	-
Cost to implement	-	\$109,438	-
Operating costs for first 4 years	\$1,670,652	\$1,656,474	\$14,178
Annual operating cost for years 5 to 10	\$417,663	\$386,759	\$30,904
Total energy costs for 10 years	\$4,176,630	\$3,977,028	\$199,602

## Actual savings

A summary of the energy savings achieved by the farmer implementing VSD to pump installations across the whole of farm and from improving pump alignments is estimated below. The added benefit of implementing laser alignment of pumps has been to improve pump bearing life by up to 700% reducing ongoing pump maintenance costs.

Solution	Pump Alignment (one pump)	Pump Variable Speed Control (all irrigation pumps)**
Energy savings (kWh/annum)	27,500	423,924
Operating cost saving	\$5,500 <sup>o</sup>	\$107,310
Est. cost to implement	\$9,000*	\$261,522
Payback period (years)	1.6	4.2
Energy savings	3%	49%

<sup>o</sup> Savings for one pump.

\* Alignment study across multiple pumps (15 in total). A further \$8000 spent to complete alignment to 10 pumps.

\*\* Extrapolation over all pumps.

## Farmer feedback

Our packainga shed and irrigation costs are extensive and we have already realised significant energy and cost savings through implementation of pump variable speed control and pump alignment, and VSDs on refrigeration condenser units, coil remediation, air curtain seals. We are now looking to implement VSDs on our remaining irrigation pumps, investigating savings associated with heating of the hot water melon tanks and a large size PV Array.

**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.**