Energy Efficiency for Recovery and Resilience Case Studies

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- Farms that reduce resource use through efficiency can reduce costs and increase profit
- By improving the triple bottom line, additional profit can be used to recover from adverse events, be reinvested in people and on projects that improve practices to drive diversity and resilience, ultimately leading to greater sustainability outcomes

The **Energy Savers Plus Program**, delivered by the Queensland Farmers Federation (QFF) with support and funding from the Queensland Department of Energy and Public Works was one initiative addressing these challenges and improving profits by conducting energy audits. Audits work by collecting baseline information about energy consumption and costs, investigating the current systems onsite, recommending efficiency improvements then calculating potential savings.

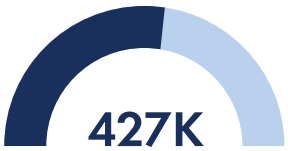
Berries Australia will continue this work by undertaking energy audits on Blueberry farms in the Coffs Harbour region and developing resources to help build capacity for berry growers. This capability comes after receiving grant funding from NSW Local Land Services under the Early Needs Recovery funding.

This article summarises the results of two comprehensive Type 3 energy audits conducted by QFF on Strawberry farms in Queensland.

A solar installation can generate significant energy use savings. Photo credit: Pixabay

Site 1

Current Consumption (kWh)



Current Cost ($)

385.09K

Consumption Post Audit (kWh)

9.88

Energy Saving (%)

24.19

Cost Saving (%)

The reported energy consumption (427,300kWh) is spread between a packing shed, workshop and office areas, an air compressor, three large and two small cold rooms. The site had prezviously installed two small 5kW solar powered irrigation pumps and a 100kW solar PV system on the shed.

Consumption at the packing shed is split over two peak packing periods, February to April, and June to August. Due to the seasonality of production, there are six months of low consumption and with electrical network restrictions in place there is a cap on exports to the grid, reducing potential income.

It is important to consider that as regulations on the network begin to change additional export to the grid may be allowed.

Based on the current consumption, the audit highlighted a no cost quick win by changing from Tariff 62 to 50 (Large Demand) resulting in a saving of $12,094 per year. Additional savings of $1,919 per year could be achieved by changing another meter from Tariff 65 to Tariff 20.

To help manage consumption the audit recommended installing smart metering at the packing shed switchboard. At a cost of $11,000 with a potential saving of 8600kWh and $4,221 per year, this change would offer a payback period of just 2.6 years. In addition, a maintenance and monitoring program on the 100kW solar PV system costing $5,000 could optimise performance saving 9,264kWh and $4,000 with a payback period of 1.3 years This package would enable monitoring of the current inverter communications system to flag errors and minimise system downtime. Without this, a reduction in solar output of 10% could be expected.

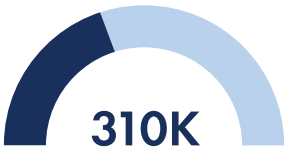
Further recommendations in the audit included:

- **No cost:** Air compressor pressure reduction from 10 bar to 9 bar to control air leaks saving 400kWh and $17 per year
- **Low Cost:** Installation of strip curtains costing $6,000 to reduce air losses and infiltration through the doorway saving 6000kWh, equating to $2596 with a quick payback of 2.3 years.

This site installed a Variable Speed Drive (VSD) on the cold room fan motors. VSDs work by reducing the motor speed and adding variability depending on the different load requirements at the time. By installing only the VSD, energy consumption has been reduced by 2% (17,951kWh) to 416,852kWh per year. Costs have been reduced by $3,448 with carbon emission savings of 8.5 t/CO_2e per year. Due to the seasonal fluctuations when conducting measurement and verification on the installation, the fans ran for only 53% of the available time suggesting there are even more savings on the way for this farm.

Site 2

Current Consumption (kWh)



Current Cost ($)

190.20K

Consumption Post Audit (kWh)

38.65

Energy Saving (%)

27.36

Cost Saving (%)

Table 1. Audit recommendations

Item	Cost $	Saving kWh	Payback years
30kW Solar PV on the packing shed	$45,000	40,000	7.1
20kW ground mount on the smaller pump shed	$34,000	17,300	9.9
30kW ground mount on the large pump shed	$51,000	35,000	4.8
Replacing existing condensing units with 4 new Variable Speed Drives (VSD) on the compressor and the condenser fan	$80,000	27,500	14

The second site harvests 1200 tons of strawberries over 30 hectares. The farm has two main pump houses, one with three 55kW pumps and the other with three 37kW pumps in series, all of which are centrifugal split out over two areas.

Water is supplied from a dam through a mix of solid set sprinklers and T-tape drippers, and this irrigation system operates for 9 months of the year. The pumps were recently installed and in good condition and thus were not the focus of the audit.

Additional infrastructure onsite includes a large packing shed with sorting equipment and cold rooms, air-conditioned worker accommodation with lighting and a kitchen, four large cold rooms with separate condensers which are roughly 20 years old.

On average, energy consumption is 310,000kWh per year at a cost of $95,000. The baseline consumption metric of 260kWh/T of strawberries is expected to drop by 40% to 158kWh/T from installation of the recommendations shown in Table 1.

One final recommendation was to replace cassette air conditioners in the workshop with a single Variable Refrigerant Flow (VRF) unit with multiple heads. These are approximately 25% more efficient than current split systems.

This site is yet to install all the recommendations although potential energy savings of 39%, cost savings of $26,000, and emission reductions of 97t could be achieved per year.

Support for NSW Blueberry growers in the Coffs Harbour region is funded by the Early Needs Recovery Program (ENRP) which seeks to support industry organisations impacted by the February 2022 flooding event in NSW.

The program provides an opportunity for each impacted industry to determine and facilitate tailored projects and activities to ensure the unique recovery needs of their primary producers are met.

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