Energy Savers Plus Program

targets significant energy savings with

Batteries

POTENTIAL SOLUTION

AVERAGE ENERGY SAVINGS N/A

Key facts

Farm / Industry

All

Location

Queensland

Solution

Technology

Case study focus

Install Solar and Batteries after site specific design considering payback and warranty periods

Summary

A number of solar and battery applications were identified in the Energy Savers Audits including grid connect, full standalone, increased storage, and installation on a Single Wire Earth Return (SWER), on different connection types across the Queensland Electrical Network. This case study provides some background for design considerations and comparisons to show if beneficial paybacks currently exist.

An energy audit is a great first step in moving farming industries towards a more efficient future by reducing energy use, costs, and carbon emissions onsite. Batteries can provide opportunities to better utilise solar power generated on site although site specific design is needed to prove if this is feasible.

This case study examines four systems recommended in the audit program, these are, a comparison of the four systems is also shown at Table 1 below.

1. Farm A- Solar only and Solar Battery Comparison, SWER line connection.
2. Farm B- Increased battery storage on existing system.
3. Farm C- Large scale full standalone
4. Farm D- Large scale full standalone

Table 1. Solar and Battery Comparison on Four Farms

Farm and Connection/ Battery Type	System Size (kW)	System Cost ($)	Energy Savings (kWh)	Demand Saving (kVA)	Cost Savings ($)	Payback Period (Years)
Farm A (SWER line)	10	$41,195	20,606	10	$5,565	7.5
Farm B (Increased Storage)	10	$19,500	7,300	14	$1,861	10
Farm C (Standalone)	500	$953,000	30,000	100	$52,723	18
Farm D (Standalone)	1,000	$1,549,000	522,000	270	$85,198	18

Farm A. Is connected to a SWER line in the Darling Downs region and demonstrates how a solar system would be supported by implementation of a battery system, as export limitations exist. The audit suggested the installation of two, five kW solar systems being sized to allow future potential to charge a battery system. By switching from obsolete tariff 62 to tariff 20 and shifting silo operating times to daylight hours, potential savings of 7,691kWh and $2,076 per annum could be achieved from this system.

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Due to the sites inability to export and the load shifting created by the silo control system, this property would be more likely to benefit from the addition of a battery-grid hybrid system. Assuming silo control has been shifted to daylight hours and an 85% Depth of Discharge from the battery system an additional investment of $19,300 would see a saving of 20,606kWh and $5565 per annum with an estimated 7.5year payback, an improvement on solar alone (Table 2).

Table 2. Comparison Between Standalone Solar and Solar/Battery Installation for Farm A

Recommendation	Cost ($)	Energy Savings (kWh)	Demand Savings (kVA)	Cost Savings ($)	Payback Period (Years)
Solar Only	$21,695	7,691	10	$2,076	10
Solar and Batteries	$41,195	20,606	10	$5,565	7.5

Farm B. The farm already implemented solar, and batteries that had not been optimised as excess generation from the solar system is lost with export to the grid not allowed. This was investigated and found that by increasing battery storage, with installation of additional 10kWh batteries , the site could increase energy and cost savings leading to a quicker payback.
At an approximate cost of $19,500 this upgrade has the potential to save 20kWh of power drawn from the grid per day, or 7,300kWh with a cost saving of $1,861.50 per annum with a payback of 10 years.

Farm C. At an approximate cost of $953,000 and an approximate payback period of 18 years. The farm would be completely reliant on self-generation by use of a 189kW roof mounted solar PV system, storing the energy produced in a 500kWh battery bank.

Farm D. A larger system on another intensive animal farm was considered with the audit modelling a new three phase 350kW roof mounted solar PV system coupled with a 1,000kWh battery bank, and power management system. The results indicate that although the battery systems differ in size and cost, energy saved, the paybacks are relative in terms of feasibility.

The results show that the paybacks for the standalone systems are outside battery life and warranty periods. Although, the case study proves that batteries require a specific site analysis to determine if paybacks are feasible.

Energy Efficiency for your Industry and Business

An energy audit is a great way for a business to identify the most effective way to cut costs, reduce emissions and boost productivity. To avoid over capitalising on Solar PV and battery technology it is recommended to become as efficient as possible with the implementation of new technologies in areas such as pumping, heating, and cooling then sizing a solar battery system to suit. Visit more of the Energy Savers Case studies to read more about energy efficiency opportunities.

Some quick wins to reduce consumption and costs to become more efficient include:

- Regularly dust electrical motors and lights.
- Turn of electrical equipment when not in use
- Minimise irrigation fittings and bends.
- Remove trash from pump inlets and clean filters.
- Utilise solar generation effectively by monitoring with a real time energy meter.

With a 2020 report to AEMO, click HERE, suggesting that the capital cost of battery systems may fall by 40 – 60% over the coming decade, the business cases for these projects may improve in the coming years.

See other case studies including sector case studies and technology case studies at the website:
www.qff.org.au/newsroom/case-studies/

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