(Below) Solar panels at Denis Pozzebon's farm, powering a high-use pump. (Bottom left) Janine Powell and Jon Welsh with AgEcon worked with Michael Pironne to analyse the economics of installing solar to reduce energy costs on his farm. (Bottom right) Denis Pozzebon, Jon Welsh and Janine Powell checking out one of the 10kW systems that Denis has installed on his property.

SOLAR INVESTMENT CUTTING COSTS

To see a video on Denis Pozzebon, Michael Pironne, Janine Powell and Jon Welsh talking about renewable energy options for sugarcane irrigators, visit the media section of *sugarresearch.com.au*

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Burdekin grower Denis Pozzebon has taken several steps in recent years to improve his irrigation efficiency and reduce costs.

This includes purchasing new pumping equipment and converting his farm to automated furrow irrigation via a network of end-of-row sensors, actuators, control equipment and computer software.

These investments have saved him time and money, but he also wanted to do more to improve efficiency and continue to reduce hefty electricity bills. In the last two years, this led him to a staggered investment in solar (photo-voltaic) electricity on his farm near Mount Kelly.

He said his first choice for investment was for a 10 kilowatt PV system attached to a 7.5kW water pump that recycles water to about 70 percent of his farm.

"This pump is used at least 250 days of the year, and I only lost minimal cane land by ground-mounting the panels in a straight line along the bank," Denis said. "By installing solar, I don't have a bill here anymore."

Since that investment, Denis has also installed a further two 10 kilowatt PV systems onto a shed roof, using this solar-generated power to supply irrigation pumps and his house. He said that using the shed roof for mounting was a cheaper option than the ground mounting at his other site.

These more recent investments have also helped add value to the automation on his farm.

Previously, he was on a night tariff, which meant that he still had to consider the time of day when changing irrigation shifts so that he was avoiding the peak rates of daytime electricity.

Now, with solar during the day when the sun is shining and a flat tariff, he can change shifts exactly when he needs to. "It is the icing on the cake for the automation."

Denis encouraged growers who were considering solar to do their research and seek advice.

"Solar is probably not for everyone, and it does take a lot of research and a bit of leap of faith, but it has reduced my energy costs," he said. "It is important to get good advice. I am looking at getting another system soon and I will be seeking advice from proper advisers to crunch the numbers. The sustainability side of things is also important, as consumers across all agricultural goods are becoming more aware of their carbon footprint."

Through an SRA project, AgEcon has looked at energy options and solutions in the Australian cane industry, and through this work they analysed another site in the Burdekin to assess options for improving energy efficiency.

This work was done with Michael Pironne, who farms across about 190 hectares near Ayr.

Michael said the research showed him that he had options for reducing energy costs.

"Our costs of irrigation are about $5 per tonne," he said. "We've learnt that solar can save us a lot of money. We just need to get it done."

AgEcon looked at one of Michael's sites with 15kW and 18kW well pumps and investigated the potential for installing solar.

Research economist Janine Powell, AgEcon, said the installation was estimated to cost about $63,000, with a reduction in energy costs of 26 percent and a payback period of year five of 25.

"The solar would deliver half of the load requirement, and in our case studies this site had the largest reduction in energy costs because the microgrid would cover the site's energy requirement while staying eligible for a feed-in-tariff," she said.

"We also modelled the shift from 100 percent night irrigation to 100 percent day irrigation to utilise the solar, in conjunction with a change in tariff from a time-of-use tariff to a flat tariff, which reduced the grid energy cost during cloudy periods when the solar didn't meet the site's energy requirements. Modelled emissions abated over 25 years were 1303 tonnes of carbon dioxide equivalent."

It is important to note that when sites are larger than 39kW they may lose eligibility for a feed-in-tariff, which has a significant impact on payback and the economics.

"For larger sites to have an economically feasible investment, they need to be pumping at least six months of the year," Janine said. "They need to have high utilisation rates to have the renewables sized to their load. However, if they are not using the pumps that much, with a sporadic load, they could start off with a 39kW system and build on that later."

Jon Welsh with AgEcon said there were good opportunities for irrigators to consider.

"If you can generate a kilowatt hour for 4-5 cents and sell it into the grid for 10c, then you are paying off the principal of the investment when you are not using that solar out of season," he said. "And when you are using the power, you are substituting 4-5c kW power compared to the 35-or-so cents you'd be paying from the grid.

"Ergon tariffs are undergoing a restructure in 2020, so some of the details of our analysis may change. The feed-in-tariff policy may change from year to year, but while the cost of installing solar remains low and there is a margin between what you can export it for and what you can produce it for, we think there are opportunities available." ■

KEY MESSAGES

- The economic feasibility of renewables depends on how much they are being used either by an electric load or export back into the grid.
- Loads that are only being used seasonally or sporadically will not be economically feasible without a FiT.
- The annualised cost of solar PV is 4-6c/kWh for grid-connected systems, so moving loads into daylight hours can avoid peak retail rates of 30-50c/kWh.
- Where irrigation is moved to daylight hours, a change in tariff may improve the project economics.
- The study found that even small quantities of export (circa 10 kW) and a 10c / kWh FiT can transition PV installations from high-cost systems to more acceptable economic solutions.
- Ergon's evolving tariff structures, FiT and export policies are critical to a microgrid investment.
- A diesel genset may be useful to avoid peak tariffs on seasonal loads, however as fuel prices increase, the feasibility is reduced.
- Renewable energy is currently incentivised through participation in the Renewable Energy Target, where up-front rebates contribute to a microgrid's, ability to reduce initial capital costs.