

CASE STUDY:

Cutting costs and emissions with solar on a cotton and wheat farm

After installing one of Australia's largest solar–diesel irrigation pumps, **Karin Stark** and her family faced major challenges with reliability and sustainability. But they haven't given up. With plans to connect to the grid, they are more determined than ever to show how renewables can support productive farming and create practical pathways for emissions reduction in the agriculture sector.

Farm: 2500–hectare cotton and wheat farm
Location: Narromine, Central West NSW

The challenges

When Karin Stark and her late partner, Jon Elder, returned to his family farm in 2011, she “knew nothing” about agriculture. Taking on a major project – shifting the property towards renewables – added significant challenges to the everyday pressures of farming.

- High upfront costs: the solar–diesel pump and grid connection required major financial investment
- Technical challenges with using solar technology at scale
- Limited support and advice when problems arose, particularly as early adopters
- Drought and wet years affecting crop viability.

The turning point

As Karin settled into her new life on the farm, she wanted to put her experience in environmental science and sustainable development to good use.

“It really gave me that unique perspective on the challenges that farms are facing, the environment in which they live,” she said.

“I identified there was a huge gap in the market in terms of farmers understanding how renewables can help.”

While working in a renewable energy role for the state government, Karin took a close look at what her region needed.



Karin Stark is a passionate advocate for renewables in agriculture

She investigated how farmers could use solar to replace electricity or diesel, and held well-attended workshops and field days.

“We started to ask, how are we going to make the most of solar? How can we use that in our operations to start to reduce emissions and costs?”

“On our farm we were spending \$300,000 to pump water over summer to irrigate our cotton crops. If you look at the energy landscape now and the cost of diesel, that could have been closer to \$1 million.”



On-farm changes

Installed a 500KW solar-diesel pump in 2018

- Initial \$800,000 investment, with an estimated five-year payback period
- Pump was run with solar during the day, and then switched to diesel overnight
- Significant milestone for irrigated agriculture
- Reduced carbon emissions by 500 tonnes and saved \$180,000 in diesel costs in the first year.

But by 2019, as the drought hit hard, it became clear their set-up was unreliable.

Karin said it became a “massive R&D project for years”, and the five-year payback period came and went.

Started building a grid connection

- This \$600,000 project, which includes 4km of new poles and wires, will remove the need for diesel in the pump
- Expected payback period: 2–3 years from completion
- While this was a business decision first and foremost, the fact that it will also lower on-farm emissions is a “strong bonus”.

Impacts

Reduced on-farm energy costs

- Estimated 50 per cent reduction in energy costs compared to diesel-based systems, once the solar pump is fully connected to the grid.

Reduced on-farm emissions, new revenue streams

- Transition from diesel to solar-powered systems is projected to reduce emissions by up to 60 per cent.
- Solar-diesel pump was accredited as a power station with the Clean Energy Regulator, which enabled participation in the Large-scale Generation Certificate (LGC) scheme. This may provide an additional income stream through the sale of renewable energy certificates.

Enhanced knowledge sharing and advocacy for renewables in agriculture

- Public engagement activities, media, podcasts, field days and workshops, have raised awareness and provided practical pathways to adoption.
- National Renewables in Agriculture Conference and Expo was launched in 2019, bringing together farmers, agriculture and energy consultants, peak bodies and government representatives.

Where do you see the farm in 20 years?

Karin loves hearing about innovations in agriculture, from autonomous tractors that run on solar, hydrogen or batteries, to reducing chemical inputs by using lasers and hot water to kill weeds. In 20 years, she hopes to be producing most of their power using renewables and sharing that power with others in our region. Improving the farm's biodiversity is also high on the list.

“Jon and I planted over 2000 seedlings a few years ago, but we didn't have a very high success rate. The first year, I didn't irrigate enough, and then they (the seedlings) were in drought the second year. There was a lot of grazing pressure – a lot got nibbled down in the third year. Then they were underwater for three months.

“There are massive opportunities. I'd love to see farmers really redefining their roles in regional communities as producers of energy, food, and fibre, and carbon as well.”