Case Study

# Wee Waa – mixed farming

## Archetype

The **Anchor/Hybrid** archetype is defined as either:

a) a microgrid that can operate as a dispatchable anchor load to external network, or;
b) a combination of ther other project archetypes.

## Commodity

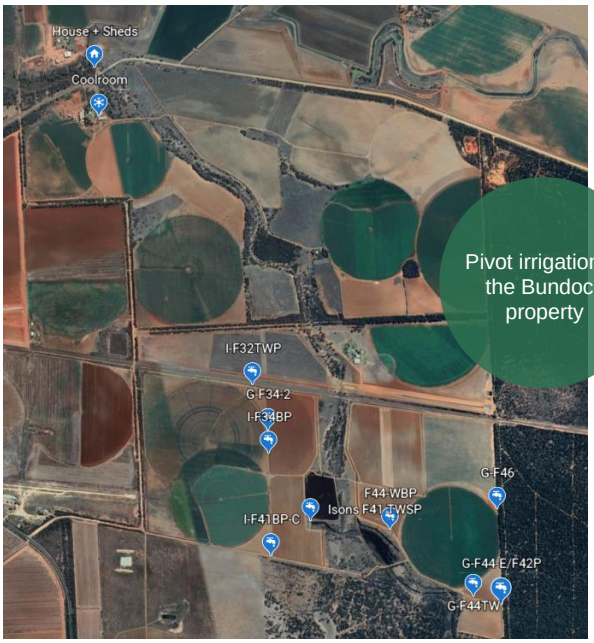
Mixed commodity; grain, fibre (cotton), and horticulture (potatoes, peanuts).

## Background

Bundock Farms produces on average, 70 million potatoes, 1 million kgs of peanuts, and enough wheat for 3.5 million loaves of bread per year. The farm relies entirely on groundwater for irrigation, with a license of 1,800 ML/yr. The farm spends $150,000 on electricity and approximately $350,000 on diesel/yr.

The farm is exposed to several challenges, including climate and disaster risk. During the recent drought, the level of the aquifer used by the farm started falling, impacting the farm's ability to pump water. The landholders had to forgo growing crops over summer, consequently reducing their income and profits during this time. The farm has also experienced severe flooding over the last two years. Reducing energy costs and generating energy on farm is seen as one way to build resilience.

The local community is interested in establishing a community VPP of which an on farm microgrid could provide an anchor load.




Pivot irrigation at the Bundock property

## Feasibility findings

Seasonality of irrigation means there are peaks of energy use for some months, but low power demand for the rest of the year. This makes sizing a standalone system for financial viability difficult.

The best or 'lowest cost' solution depends entirely on the farm's particular value drivers. The ability to decarbonise, optimise on farm assets, and improve energy reliability and independence bolsters resilience and productivity. The landholders therefore have an appetite for a Bundock microgrid.

Despite being a brownfield development on two feeder lines that captures an external network customer, a grid connected microgrid solution was identified. A virtual control component is required to solve co-ordination across the feeder lines.

## Challenges

- Water – energy – productivity nexus
- Black outs and other edge of grid reliability issues
- Limited modern products and services from electricity retailers
- Rising costs of production and business resilience

## Motivators

- Local mining risk (CSG) and local appetite for regional renewables
- Climate resilience
- Pressure to decarbonise from the market and direct purchasers of farm produce
- Affordable energy and productivity inputs

## Recommendations

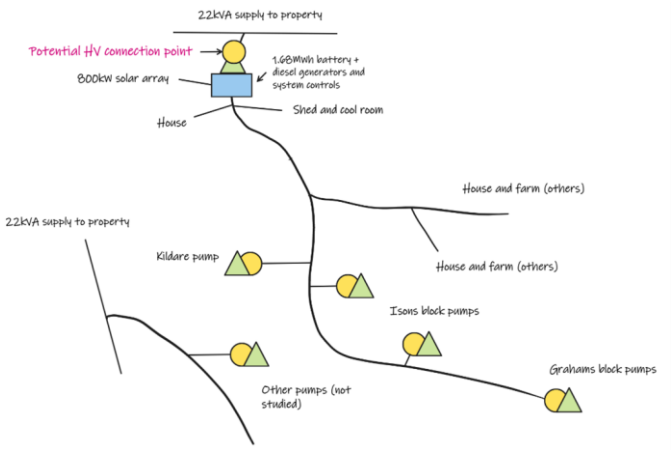
Grid connected microgrid with virtual microgrid management.

System components and costs:

- 800kW solar PV
- 1.68MW lithium battery
- Controls, monitoring, integration
- Grid meter + connect/disconnect
- HV & LV electrical works
- Equipment supply + installation

Financials:

- Capex $2,012,500 (batt $932,500@$500/kWh, PV $1.35/W)
- ~$230K annual revenue, sell to market @$80/MWh




## Opportunities to reduce barriers

- Trial tariffs that reflect local generation's use of network (e.g. LUOs) are necessary to fairly value the service and financial benefit of microgrid investments
- Bolster the case for a Narrabri community Virtual Power Plant (VPP) by including the Bundock farm microgrid as a participant

## Additional value streams

- Additional onsite consumption
- Ease network constraints and power quality issues for DNSP (e.g. Essential Energy)
- Supply to community VPP
- Access to emerging ancillary markets for mid-scale consumer generators ie. FCAS/SRAS

## What's not possible?

- A discrete embedded network would require consent from a neighbouring farmer who shares grid access, presenting a considerable investment risk
- Ownership and management of grid assets is possible but not recommended due to high cost
- A Stand-Alone Power system (disconnected from the grid) is difficult due to the variability in loads during irrigating and non-irrigating months, leading to generation that can't be valued via the grid, and likely to mean more expensive energy in the short to medium term

## What makes the most economic sense?

Remaining grid connected is useful for the avoidance of requiring back-up generation and thus a higher capex. A dispatchable system makes economic sense provided additional benefits can be realised.

These might include:

- Valuing of time-based generation or load in the market,
- Additional on-site consumption such as EVs or hydrogen loads,
- Easing of network constraints or power quality issues to the DNSP.

Small behind the meter solar systems make sense if pumping more than 5 or 6 months per year.

## Ownership and financing options

- Farmer investment with grant support
- Project developer owner operator equity investment

## More information

For further information please visit qff.org.au/projects/microgrids or email Madie Sturgess, madison@qff.org.au.