



All Energy Pty Ltd
www.allenergypl.com.au

Fact Sheet 2: Hybrid Systems

Renewable Energy Hybrid Microgrid

Hybrid systems combine two or more modes of electricity generation using renewable energy technologies such as solar photovoltaic (PV), wind or grid biogas, with a storage system (battery, fuel cell, hydrogen). In addition, the system can be balanced with a fossil fuel generator or grid power to maximise supply reliability and security.

The advantage of a hybrid system is it allows flexibility, energy efficiency measures and options of generation and storage during the transition to renewable energy. With an overall goal of zero net carbon, a hybrid system can be used in stages while technologies become more cost effective over time.

A hybrid system can be improved with inverter technology to manage the rise and fall in PV solar power output, reducing the need for a battery for storage. Such systems provide Maximum Power Point Tracking (MPPT), DC to AC conversion and operating history.



A battery within the hybrid system allows energy to be stored during times of low demand and released (or dispatched) at times of peak demand. They can respond faster than other energy storage or generation technologies.

Microgrid Example:

1.8 year payback for PV-Battery-Diesel Hybrid vs Genset

1.0 MW @ 24/7: 36.7% less diesel
Additional CAPEX: \$2.9mil for 1.0 MW.
PV: 1.91 MWp; Battery: 1.2 MWh
LCoE: 42 c/kWh

1.0 MW @ 12/7: 65.5% less diesel
LCoE: 28 c/kWh

LCoE - indicative:

- Diesel gensets: 60 c/kWh
- PV solar + battery: 9 – 11 c/kWh (>10MW)
- PV solar: 3 c/kWh (first 10 years)
- Battery: ~20 to 30 c/kWh
- Grid – HV (66kV): 16.7 c/kWh
- Grid – HV (66kV) + \$11mil tie-in: 29.2 c/kWh (10 yrs)
- [Grid – residential: 24.349 c/kWh]

1: Collectors (where required: DC-DC converters)
 2: PV solar array.
 3a: Inverters (DC to AC; AC to DC to charge batteries from gensets)
 3b/c: Energy Management System
 4: Gensets
 5: Main Switch Board
 6: Battery bank
 7: Power load
 (Image Source: SMA Solar Technology).

A microgrid example for replacing diesel powered water pumping with a PV solar array, battery and genset hybrids could provide a 1.8 year payback period. This example indicates the flexibility of a hybrid system to adjust the mix of generation options to improve the operational output and cost outcome needed.

Regional and Remote Communities Reliability Fund

Microgrids for Balonne Shire

Collaborative project with Balonne Shire Council that received grant funding from the Australian Government



All Energy Pty Ltd
www.allenergypl.com.au



More information:

W: www.allenergypl.com.au

E: Max Barnes

(max@allenergypl.com.au)

Gareth Forde

(gareth@allenergypl.com.au)