The Solar Energy Transformation Program (SETuP) – lessons and opportunities for high renewables mini-grids

ARENA Insights Forum
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We provide essential services to 244,300 People. Servicing 72 remote communities, 79 Outstations, 5 Major Centres & 13 minor centres across 1.3 million square kilometres.

2990km of water pipes

28 Billion litres of wastewater treated annually

65 Billion litres of drinking water sourced.

10 000km of regulated electricity transmission, including to 5600km of overhead powerlines.

Gas supply | Electricity distribution | Water and sewerage services

$700 MILLION REVENUE

$4B GAS SUPPLIES MANAGED

$2.8B TOTAL ASSETS

$153M PROJECTS 2019/20

65 Billion litres of drinking water sourced.

powerwater.com.au
Indigenous Essential Services Program

- NTG subsidised service delivery
- Not for profit subsidiary
- End-to-end electricity services
- 72 remote Aboriginal communities and 79 outstations
- 36,000 residents
- Majority public housing, NTG services
- >50 isolated diesel grids, $30M p.a. diesel spend
Remote Diesel Transport
- Barge to island communities
- Long distances on unsealed roads
Solar Energy Transformation Program (SETuP)

- 10MW of utility solar PV, 25 IES communities
- ARENA funding and NTG loans $59M
- Transformative scale
- Mass rollout to achieve 15% diesel saving
- Pilot of solar plus storage for 50% savings
- Evaluation and knowledge sharing
Medium Penetration Rollout

- 24 communities, 9MW
- Integrate max solar without batteries
- 15% fuel savings target
Maintain diesel engine minimum loading level by constraining solar output when required.

At times solar is servicing up to 60% of the instantaneous electricity demand.

Source: Solar/Diesel Mini-grid Handbook
www.powerwater.com.au

Over the year, solar services approx. 15% of total electricity demand.
Program Status
10MW constructed and online
3.5 million litres diesel saved to date
10% to 20+% savings at medium sites
50% at Daly River
Rollout Learnings

- Lead time to obtain land leases
- Remote community cost and time premium
- Logistics and remoteness challenges
- Latent conditions
- Weather and climate impacts
- Investment in community engagement
Local Engagement and Employment

- Importance of community engagement
- Maximise opportunities for local enterprises
- Facilitate local employment
- 13% Aboriginal labour during EPC works

Nauiyu residents working on Daly River solar compound
Operational Learnings
- Managing single points of failure
- Importance of Lightning Surge Protection
- Transformative effect of curtailment and loans
Low Load Diesel Generators

Set 2 online
920kW rated
40% min load

85% peak solar

Set 4 online
1500kW
10%/150kW min load rated.
Managing high solar variability with solar at p.f. = 1
Daly River Project – 50% fuel savings
Control system augmented to coordinate additional modes and differing characteristics of BESS.

Battery discharges at end of day.

Battery smooths solar intermittency by rapidly switching between charging and discharging while maintaining grid.

PV constrained once battery (ESS) full.

System Operation - mild sunny day

PV meeting all load and excess charges the battery.

System Operation - cloudy day

Diesel operation overnight.

Diesel remains on while excess PV charges battery at start of day.
Energy Storage System

Integrated in a 40 foot container

2 MWh Li-Ion batteries

800kVa Inverter
  • Grid forming
  • Fault current provision

12 months operation:
  retained capacity, no failures

Essential Services Operator inspecting battery modules inside the ESS
What’s Next?
- Increasing use of low load rated gensets
- Improving genset configurations
- Modelling of economic options
What’s Next?
- Pre-fab solar arrays
- Expanding battery role
- Facilitation of customer solar PV
- NTG Roadmap to Renewables

Pre-fabricated solar array being installed at Timber Creek
Thank You

Sam Latz
Manager - Solar SETuP
Sam.Latz@powerwater.com.au