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1. Scope

1.1. Project objectives

Indigo Power is funded to prepare analysis for the delivery of community batteries, energy nodes and EV charging facilities at Alpine Shire Council sites. A focus of the project is to provide community sites with backup power to improve energy resilience.

1.2. Design Objectives

Recommend system design and costing based on the site Preliminary Modelling Report and existing site infrastructure. This Design Brief is intended to provide detailed information on system design and costing.

2. Technology

2.1.1. Battery Technology

Indigo Power has a preferred supplier list of battery manufacturers. For projects that have an energy resilience focus we prefer flow batteries as they are long duration and have an electrolyte that is not volatile and flammable. Redflow batteries are our current preferred supplier of flow battery technology.

Redflow battery is the world's smallest and most scalable, commercially available, zinc-bromine flow battery. Zinc and bromine are both readily available resources. Redflow are one of the most environmentally friendly energy storage solutions in the world, their batteries

are fully recyclable and manufactured from widely available, low-toxicity materials. Redflow energy storage technology is scalable, from tens of kilowatt hours to hundreds of megawatt hours to suit your energy storage needs. The batteries are ideally suited for extreme conditions and can operate without additional cooling or heating and with no degradation from 10 degrees Celsius to 45 degrees Celsius. For locations where the battery temperature will fall below 10 degrees Redflow provide an inbuilt heater pack for the battery. For a Redflow Pod200 (50kW/200kWh) battery the running power draw is around 1.4kW. The heater pads are thermostat controlled based on electrolyte temperature, so they build up heat until the electrolyte reaches the correct threshold and then switch off again. Redflow is an Australian company, and their battery is suited for Australian conditions. Redflow offer up to a 10 year / 36,500 kWh warranty via an optional long term service agreement.

2.1.2. Control Technology

Mondo's Ubi platform can implement its own stand-alone DER optimisation or connect to a third party for an integrated approach depending on the objective. The Ubi platform integrates with the local grid and the local grid operator, thereby supporting network support functions. For example, the Ubi follow instruction from a Distribution Network Service Provider (DNSP) to reduce or increase voltage in real time. Near real-time data can be pushed back to the DNSP for monitoring and adjusting voltage if required. We recommend Ubi technology for those interested in network support capability.

Mondo has proven, current capability in:

- Demand peak lopping
- Wholesale arbitrage – scheduled and unscheduled
- Behind the meter energy generation and use optimisation
- Distributed energy resource scheduling
- Implementing dynamic operating envelopes published by a DNSP
- Responding to high voltages by exporting reactive power
- Selecting and grouping assets to provide a service
- FCAS controller (monitoring and proportionally responding to frequency deviations when enabled)

Mondo's Energy Management Platform has a mature monitoring and control capability including forecasting of system operation and near real time monitoring.

2.1.3. Solar PV Specifications

There is a preference for 'tier one' products, companies with Australian presence and the use of Australian-made components that meet quality standards, where available. The selection of solar PV panels is required to have high human rights standards, excluding the use of forced labour, human trafficking, and slavery (including child labour) in their manufacture.

3. Health, Safety and compliance

If delivered by Indigo Power, delivery would follow our Health, Safety and Wellbeing Policy and all associated procedures for all work undertaken.

Indigo Power's typical project management approach includes:

- Employee and contractor induction
- Employee and contractor license and certification recording

- Site walk-through
- Safe Work Method Statement (SWMS)
- Job Safety Analysis (JSA)
- Daily toolbox meetings
- Site contractor check-in/out
- Traffic management plan and implementation, as required.

For delivery and operation of the system the following standards apply:

- AS4777: Grid connection of energy systems,
- AS5033: Install and safety of PV arrays,
- AS3000: Electrical installations,
- AS4086: Secondary Batteries for PV,
- AS5139: Electrical installations - Safety of battery systems for use with power conversion equipment
- AS1170 Wind loading PV mounting

4. Delivery Plan

Delivery of a project like this should take around 6 months.

5. Project Risks

Project risks are described in the Table below.

Risk	Likelihood	Impact	Impact Rating	Mitigation
<i>Details of potential occurrence</i>	<i>Rare, Possible, Very likely</i>	<i>Details of potential consequences</i>	<i>Mild, Moderate, Severe</i>	<i>Steps to reduce likelihood and/or impact of risk</i>
Complex site ownership or leasing agreements	Likely	Many community sites have complex ownership and/or leasing arrangements with many stakeholders involved. It may be impossible to secure the agreement of all parties. It may also be impossible to avoid complicated legal/commercial arrangements.	Moderate	Engagement of all site stakeholders early in the project, identifying any complexity or key concerns. Flexibility in legal drafting to accommodate different site ownership and leasing arrangements.
Adverse network tariffs	Possible	Battery would need to operate under the existing tariffs. Current tariffs typically prevent charging from grid. With generation on site this risk is controlled to a large degree.	Low	Installation of sufficient generation behind the meter (on site).
Site Suitability	Rare	The project uncovers problems with the site.	Severe	Full site assessment has been carried out. All important stakeholders have been consulted.

				This risk has been controlled to a large degree. However, in a worst case scenario, consideration can be given to other opportunities in the local region. Indigo Power can identify and assess alternative on site options and host sites quickly.
Connection application results in undersized import/export limit	Possible	The distribution network service provider may impose an export limit, preventing the optimal amount of export from the site. This would impact ongoing project revenue.	Mild	Inspection of existing infrastructure controls for this risk. Should the grid application impose export limits the system can be resized.
Health and safety and environmental impacts	Rare	OHS	Mild	The Project would adhere to all relevant regulations and to Indigo Power's Health and Safety Policy. Reputable firms will be selected from Indigo Power's preferred supplier list, all with appropriate qualifications and experience in the energy sector and with appropriate health and safety arrangements in place.
Integration with existing infrastructure	Possible	Existing electricity generation and storage infrastructure, switchboards, cabling etc can complicate a project and impact the delivery of the project through either increased cost or time delays.	Low	Site inspection has been carried out and largely controls this risk. Any upgrades or integrations have been costed.
Slippage in timelines	Possible	Time Delay	Mild	Regular updates to host site and stakeholders. Creation of a project specific timeline prior to project commencement.
Cost overruns	Possible	Budget Impact	Moderate	Identify cost risks early and throughout the project.
Changes to Project Management personnel	Possible	Human Resources		Indigo Power is a well-established business with stable staffing. All decisions made by project management personnel would be recorded to address the risk of staff changes.
Lack of community support & project understanding	Rare	Community or users of the site oppose the project.	Mild	Clear and regular communications through all channels. This is a very low risk given Indigo power's relationship with community energy partners. The Project would support a program of extensive stakeholder and community engagement during the project.

Contractor availability	Possible	Time Delay	Moderate	Early scheduling; tender release
Finalisation of commercial agreements	Possible	Community batteries are being delivered under new commercial models. It may take time to agree and sign the necessary commercial agreements. This can cause time delays.	Mild	Early engagement and discussion of the likely agreement terms. Indigo Power has developed standardised agreements to facilitate agreement between project proponents.
Community battery: stock availability	Possible	Time Delay	Moderate	Early scheduling; tender release and manufacturer engagement
Failure of battery technology	Possible	Unable to deliver project objectives.	Mild.	Maintenance schedule.

6. Decommissioning and disposal plan

Indigo Power is committed to ensuring that the impact of decommissioning end-of-life batteries is minimised. Once a battery is deemed end of life Indigo Power will ensure the use of Australian based recyclers to mitigate any contribution to landfill.

A battery is determined to be at its end of life if there is a failure of hardware or componentry that renders the battery unusable. If the battery is under warranty, it will be replaced under the manufacturer's warranty program at no cost to the customer. The faulty battery is then sent back to the manufacturer for refurbishment.

If the battery is out of warranty, there are several specialised battery recyclers that can be contacted on the Australian Battery Recycling Initiative website. Below are some examples of battery recyclers located in Australia (current as of January 2023):

- Ecoactiv (<https://www.ecoactiv.com.au>)
- Ecobatt (<https://www.ecobatt.net/>)
- TES-AMM (<https://www.tes-amm.com>)
- Envirostream (<https://envirostream.com.au/>)
- Renewable Metals (<https://www.renewable-metals.com/>)
- The Activ Group (<https://activgroup.io/>)

7. Maintenance

Indigo Power can include ongoing maintenance and inspections as part of any site lease or battery licence agreement.

A maintenance plan would have the following objectives:

- System reliability, especially across the summer months to ensure site power supply during an emergency.
- Optimised system efficiency and performance on a day-to-day basis and ensuring low downtime.
- Ensuring safety systems are functional.
- Maximising system lifespan.
- Maintenance of product and workmanship warranty, which requires maintenance on a regular basis.

Included in the maintenance of the community batteries and solar PV systems would be the following:

- Inspection of the solar panels annually to determine whether cleaning is required.
- Desk-based monitoring of battery system functioning and performance. This includes checking solar generation, adequate charging of batteries, and battery state of charge.
- Standard testing of system operation including shutdown, voltage, current and general operation in line with Clean Energy Council (CEC) guidelines.
- Onsite inspection of electrical components annually including battery inverters, switches, isolators, earthing and inspection associated safety and fire suppression alert equipment.
- Identifying any worn or damaged components including cabling, solar panel mounting gear, switches. Repair and replace accordingly.