Westside Group

Beerenberg Pty Ltd
Compliance Monitoring Plan (CMP)

Westside Energy (SA) Pty Ltd
ABN 15 617 819 271

6 October 2021

1. Table of Contents

2. Document Revision

Revision	Date	Description	Issued by	Approved
0	2021-10-05	First issue Draft	PS	JG
1	2021-10-07	Issued to SAPN	PS	JG

3. Definition of Terms

Owner	-	Owner of the hybrid energy system – Beerenberg Pty Ltd
Operator	-	Operator of the hybrid energy system – Westside Energy (SA) Pty Ltd
BESS	-	Battery Energy Storage System
BHES	-	Beerenberg Hybrid Energy System
ESCOSA	-	Essential Services Commission of South Australia
HESB	-	Hybrid Energy System Board
GCB	-	Grid Circuit Breaker
GPCB	-	Grid Protection Control Board
MSB	-	Main switchboard including extension to the main switchboard
OTR	-	Office of the Technical Regulator
SAPN	-	South Australian Power Networks – operator of the grid connection
TOL	-	Test on Load

4. Reference Documents

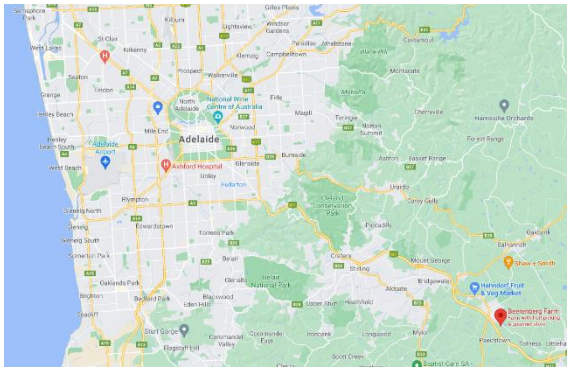
SAPN Engineering Report	NC015175 Beerenberg Farm 0.55MW PV+BESS - ER Rev B
SAPN Approved Protection Settings -	NC15175 Customer Settings Approval - 210923 RevB
Single Line Diagram -	AUS-DWG-20-0110-0301 RevD Protection SLD
Beerenberg HES Operating Philosophy (ComAp) -	AUS-ENG-OP-20-0110-0001 Rev C
AS 4777.1:2016:	Australian/New Zealand Standard Grid connection of energy systems via inverters Part 1: Installation requirements
AS 4777.2:2015:	Australian/New Zealand Standard Grid connection of energy systems via inverters Part 2: Inverter requirements

5. Introduction

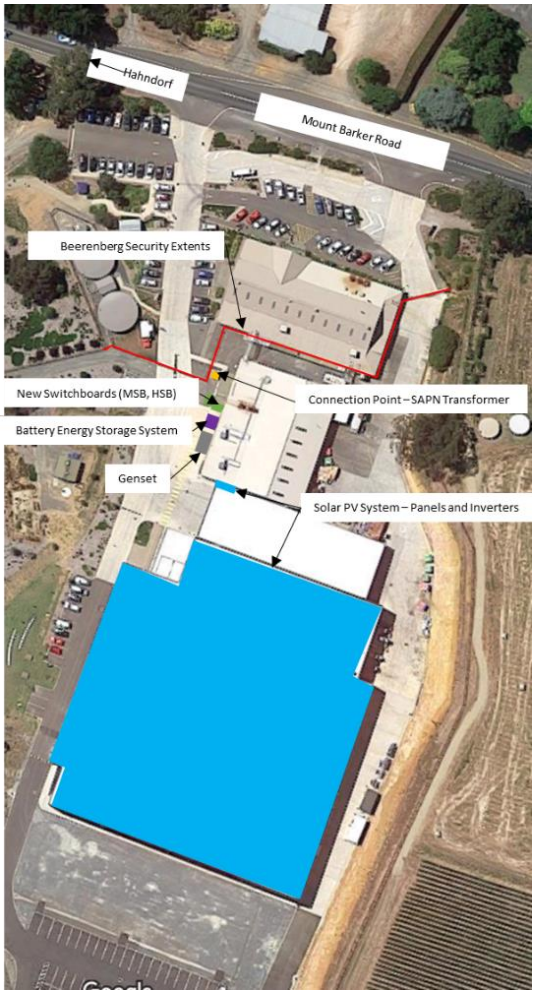
The Beerenberg Hybrid Energy System (BHES) consists of the following components:

- Roof mounted solar PV system connected to the system via 3 x string inverters;
- Battery Energy Storage System (BESS) consisting of two cabinets (1 for the battery modules, 1 for the inverters and control systems);
- Diesel genset; and,
- Electrical and control switchboards including an extension to the Main Switchboard (MSB) which the Grid Connection Control Board (GPCB) which controls the Hybrid System connection to the Grid, and a new Hybrid Switchboard (HESB) to control the Hybrid Energy System components (Generator, BES, PV).

The system is connected to the grid via a SAPN pad-mounted transformed located on-site. All components of the hybrid energy system (including the connection point) are behind Beerenberg security meaning that access is only granted to authorized visitors to the site.



The following provides directions to Hahndorf (located approx. 26 kms SE of Adelaide) and the location of the key system components at the Beerenberg site.



The generation capacity of the system is as follows:

- Solar PV System –
  - 349.92 kW DC: 864 x 405 w Trina Tallmax TSM-DE15M(II) roof-mounted solar panels
  - 300 kW AC: 3 x 100 kVa FIMER-ABB PVS-100-TL Solar PV Inverters
- Battery Energy Storage System –
  - 273 kWh storage: 3 x 91 kWh LG-Chem battery cabinets (Rak Model R800, cell model JH3)
  - 250 kVa capacity: 1 x PowerTech 250 kVA VACON NXA04605 inverter)
- Diesel Genset – (Islanded Operation Only)
  - 560 kVa Pramac standby diesel generator

6. Operating Philosophy.

The system is designed to operate in the following manner:

The Beerenberg Hybrid Energy System (BHES) is designed to run autonomously 24 hours/7 days a week with minimal operator interaction. The BHES will operate both islanded and paralleled to the grid, predominately running off mains supply.

When available, PV generation will be used to reduce the loading on mains supply and diesel generators, thereby reducing utility costs and fuel consumption.

A BESS is used in the BHES as a part of this project. Parallel operation of the BESS with diesel gensets, solar PV and mains supply is supported.

Parallel operation with the grid is also possible, with import/export control functions available for solar PV and BESS energy sources.

In addition to the generation sources utilized in parallel connection with the Grid a diesel generator is also provided to supply the site load in islanded operation with a the 1 second maximum parallel time between the utility and diesel generator during changeover between Grid Connected and Islanded operation.

- **During Normal Grid Conditions**
  Demand is met by a combination of the solar PV system and the grid to a maximum grid demand. If site requirements exceed the maximum grid demand, the additional demand is absorbed by discharging the BESS. If the site demand is greater than the solar + BESS + maximum grid demand, the site is islanded and the site demand will be met a combination of the Solar PV, BESS and genset.
  The BESS will be charged by a combination of excess Solar PV and from the grid during off-peak energy times.
  The import control actively manages solar PV, battery, and diesel generation sources to:
    - Prevent the maximum allowable import to be exceeded; and
    - Limit utility supply costs.

  Maximum import limits are possible with two levels of control. Level 1 prioritises the usage of stored energy from the BESS in parallel to the grid and level 2 triggers a Test On-Load (TOL) event transferring the system to Island Operation.

- **Grid Outage**
  The system will sense a grid outage and site demand will be initially by the solar PV and the BESS (acting as a UPS). The site will be islanded and the genset will start. Once the genset is running, the site demand will be met by the Solar PV, BESS and genset. Once the grid returns, the genset will stop and operation will return to the Normal Grid Operations.

7. Compliance Program

Performance Standard/Rules/Code Provision	Testing and Monitoring Methodology	Compliance Criteria	Testing Frequency	Resp Person	Notes
Steady State Voltage Rise % (Section 8.1 of Engineering Report)	In-service monitoring and direct measurement Power Quality Meter	230/400V +10% to -6%	Every 3 Years or after any internal disturbance event and any plant change	Electrical Engineer	Access standard values allocated by service provider SAPN. Recorded at point of supply.
Power Factor Requirements (Under 8.2 of Engineering Report)	Direct measurement and calculation of power factor at connection point	Power factor to be in permissible range at the connection point 0.95 pf absorbing VArs from the Network	Every 3 Years or after any internal disturbance event and any plant change	Electrical Engineer	Fixed PF from Engineering Report
Voltage Fluctuation and Flicker (Under 8.3 in Engineering Report.	In-service monitoring and direct measurement Power Quality Meter	Voltage disturbances not to be greater than those prescribed in AS61000 Voltage supply shall not vary by +/- 10% of the normal voltage continuously	Every 3 Years or after any internal disturbance event and any plant change	Electrical Engineer	Access standard values allocated by service provider SAPN. Recorded at point of supply.
Harmonics (Under 8.4 in Engineering Report.)	Direct measurement and calculation using Power Quality Meter	Voltage Distortion Limits NOT to exceed Individual Odd Harmonics 1.33% Individual Even Harmonics 0.67% Total Harmonic Distortion 1.67%	Every 3 Years or after any internal disturbance event and any plant change	Electrical Engineer	Access standard values allocated by service provider SAPN. Recorded at point of supply.
Voltage Unbalance (Under 8.5 in Engineering Report.)	Direct measurement and calculation using Power Quality Meter	The Voltage Unbalance values must NOT exceed 30 minute average period 2.0% 10 minute average period 2.5% 1 minute average period 3.0%	Every 3 Years or after any internal disturbance event and any plant change	Electrical Engineer	Access standard values allocated by service provider SAPN. Recorded at point of supply.

Protection Requirements (Under 6.1 of Engineering Report	Testing and / or calibration of protection systems including; i) CB Opening times ii) Protection relay injection testing to trip iii) Sub-system testing by secondary injection testing	All protection relays covering Over Current, ROCOF, Under/Over Frequency, Under/Over Voltages and Directional Power to operate satisfactorily and to within tolerance of settings	Every 3 Years or after any internal disturbance event and any plant change	Electrical Engineer	Directly measurable, Check against approved setting sheet provided by SAPN
Protection Equipment (Protection relays, Circuit Breakers & Earth Grid) As per AS2467	Performance monitored as part of in-service condition monitoring, inspection and maintenance schedules	Meets performance requirements and completed against recomended maintenance schedule	Every 12 months	Electrical Engineer/Site Electrician	Thermal Imaging, Terminal torques etc
Synchronising Checks (Under 7.6 of Engineering Report)	Via synchronising check facilities at the main switch	Performance confirmed by the generator prevented from synchronising when internal network is de-energised or from forced fault event	Every 3 Years or after any internal disturbance event and any plant change	Electrical Engineer	Performance confirmed by the generator prevented from synchronising when internal network is de-energised or from forced fault event
Metering (Under S5.8 of Engineering Report. Under S7.8 & 7.9 of the Rules)	Meter tested in accordance with regulations	Appointed Metering Provider inspects and tests meter installation on site is compliant and secure to regulations	Every 10 years	Authorised Metering Agent	Completed by Authorised Metering Agent
Inverter System Protection Requirements (Under 7.3 of the Engineering Report. In accordance with AS4777)	Routine testing and / or calibration of protection systems including; i) CB Opening times ii) Protection relay injection testing to trip iii) Sub-system testing by secondary injection testing	All protection relays covering Backup Under/Over Frequency and Under/Over Voltages to operate satisfactorily and to within tolerance of settings	Every 3 Years or after any internal disturbance event and any plant change	Electrical Engineer	Directly measurable, Check against approved setting sheet provided by SAPN
Ramp Rate (Under S7.1.1 of the Engineering Report)	Load and unload system to confirm ramp	Demonstrate ramp rate requirements do NOT exceed 16.67% rated kW per minute both loading and unloading cases	Every 3 Years or after any internal disturbance event and any plant change	Electrical Engineer	Demonstrated and timing recorded on site.

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