ACEN | Australia

EEP - New England BESS

Project Completion Report on Battery

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1 Executive Summary

The New England Battery Energy Storage System (NEBESS) is a 200 MW/400 MWh (2 hour) battery energy storage system (BESS) developed and owned by ACEN Australia, co-located with the New England Solar Farm approximately 6 km east of Uralla, NSW. The NEBESS connects to TransGrid's 330 kV network at the Uralla Switchyard.

This Project Completion Report outlines the project specification and key learnings through the procurement, construction and commissioning of the NEBESS. It covers:

1. General project information and technical characteristics;
2. Overview of the procurement process, supplier selection and contract structure;
3. Description of construction activities and key milestones; and
4. Description of commissioning activities and key lessons learned.

The NEBESS was constructed using an Energy Vault B-VAULT battery system with Siemens SINAMICS grid forming inverters, making it the first project approved with advanced grid forming inverters in NSW. The project was delivered under the NSW Government's Emerging Energy Program (EEP) with support in capital grant funding.

2 Introduction

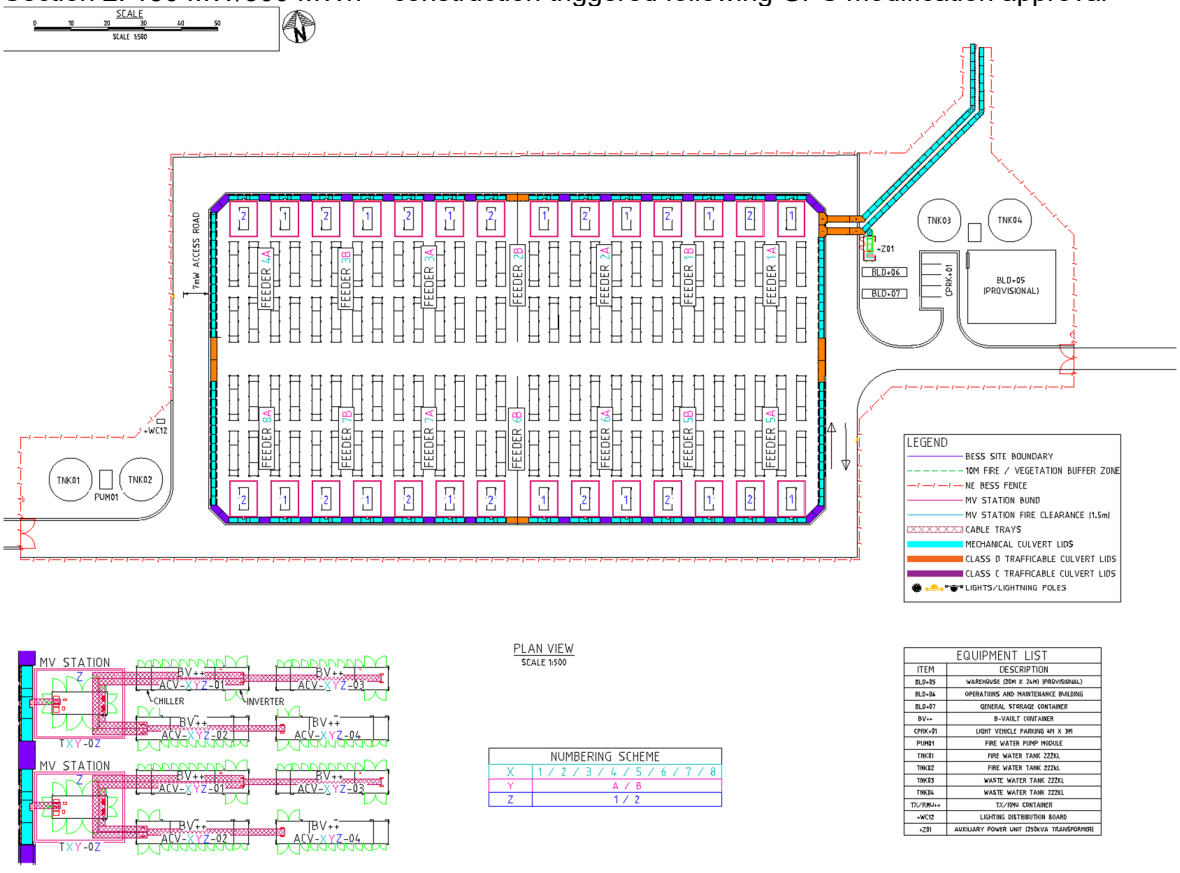
2.1 Project Overview

ACEN Australia developed the New England Battery Energy Storage System (NEBESS or the Project), a 200 MW/400 MWh (2 hour) BESS located approximately 6 km east of Uralla, NSW, within the New England Solar (NES) project site. The NEBESS connects to TransGrid's 330 kV network at the Uralla Switchyard via a new dedicated 330 kV bay and a 330 kV to 33 kV substation.

The NEBESS was developed and constructed concurrently with the New England Solar Stage 2 (NES2) project. The projects share use of the existing NES substation compound and TransGrid Uralla Switchyard infrastructure, with the NEBESS substation constructed as a new dedicated bay within the NES substation.

The full NEBESS facility comprises two separately triggerable sections under the BESS Works EPC Contract:

1. Section 1: 50 MW/100 MWh (the EEP-funded portion); and
2. Section 2: 150 MW/300 MWh – construction triggered following GPS modification approval



2.2 Alignment with the Emerging Energy Program

In 2018, the NSW Government's Department of Planning, Industry and Environment launched the Emerging Energy Program (EEP) Capital Grants program. ACEN's application was

successful and in July 2020 ACEN was awarded support in capital funding under the EEP Program.

The objectives for NEBESS under the EEP include enhancing system reliability and security in NSW, promoting diversification of electricity supply, reducing greenhouse gas emissions, and delivering the Knowledge Sharing Plan to provide value to NSW and the NEM.

3 Project Information

3.1 Technical Characteristics

NEBESS is a 200 MW/400 MWh (2 hour) battery facility based on Energy Vault B-VAULT units. The facility is registered in the NEM as a Integrated Resource Provider (IRP) with two Dispatchable Unit Identifiers (DUIDs).

Characteristic	Description
Nominal Capacity	200 MW/400 MWh (2 hours)
EEP-Supported Capacity (Section 1)	50 MW/100 MWh (2 hours)
Location	New England Solar Farm site, approximately 6 km north-east of Uralla, NSW
Grid Connection	TransGrid 330 kV Uralla Switchyard (new dedicated 330 kV bay)
Battery Technology	Energy Vault B-VAULT units
Inverter Type	Siemens SINAMICS (Grid Forming)
NEM Registration	Integrated Resource Provider (IRP) - two DUIDs
Section 1 Practical Completion	Ongoing
Section 2 Practical Completion	Ongoing

3.1.1 Battery System

The NEBESS utilises Energy Vault B-VAULT battery containers. The B-VAULT is an integrated battery energy storage unit combining battery cells, power conversion and thermal management systems within a single containerised solution. The battery modules were manufactured by REPT, with the B-VAULTs housing 42 or 45 battery modules, split 50/50 throughout the overall site.

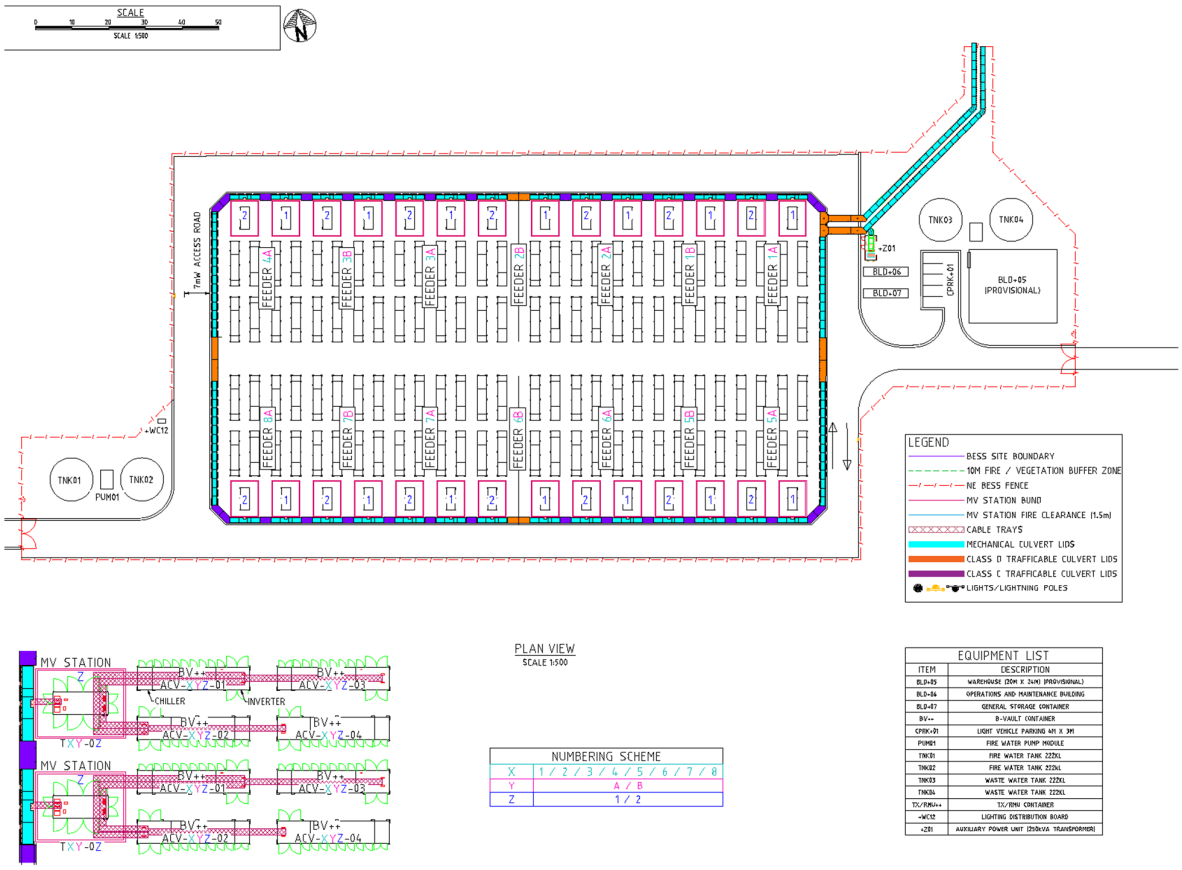
3.1.2 Grid Forming Inverters

The NEBESS uses Siemens SINAMICS S120 grid forming inverters operating in Virtual Synchronous Generator (VSG) mode. Grid forming inverters provide advanced system strength and synthetic inertia services to the network, offering frequency and voltage stabilisation with faster response times than conventional grid following technologies.

NEBESS was the first project in NSW to be approved with advanced grid forming inverters through the NEM connection process, establishing important precedents for the assessment of Generator Performance Standards (GPS) for future grid forming projects across Australia.

3.2 Project Layout and Arrangement

The NEBESS is located within the New England Solar Farm site near Uralla, NSW. The NEBESS works comprise three interconnected components: grid connection infrastructure, substation, and BESS Works.



PLAN VIEW
SCALE 1:500

NUMBERING SCHEME	
X	1 / 2 / 3 / 4 / 5 / 6 / 7 / 8
Y	A / B
Z	1 / 2

EQUIPMENT LIST	
ITEM	DESCRIPTION
BLD+05	WAREHOUSE (30M X 24M) (PROVISIONAL)
BLD+06	OPERATIONS AND MAINTENANCE BUILDING
BLD+07	GENERAL STORAGE CONTAINER
BV++	B-VAULT CONTAINER
CPRK+01	LIGHT VEHICLE PARKING 4M X 3M
PUM01	FIRE WATER PUMP MODULE
TNK01	FIRE WATER TANK 222KL
TNK02	FIRE WATER TANK 222KL
TNK03	WASTE WATER TANK 222KL
TNK04	WASTE WATER TANK 222KL
TX/RMU++	TX/RMU CONTAINER
+WC12	LIGHTING DISTRIBUTION BOARD
+Z01	AUXILIARY POWER UNIT (2500kVA TRANSFORMER)

3.3 Project Delivery Model

The NEBESS construction works were structured as three separate work packages under three contracts, reflecting the different parties and regulatory frameworks involved.

Work Package	Contractor
Grid connection infrastructure (new 330 kV bay at TransGrid Uralla Switchyard)	TransGrid/Lumea
Substation (new 330 kV to 33 kV bay in NES substation)	EPEC Projects
BESS Works – Section 1 (50 MW/2 hr) and Section 2 (150 MW/2 hr)	Energy Vault

3.4 Project Partners

Project Partner	Project Role
ACEN Australia	Project Developer/Construction Manager /Owner/EEP Recipient
Energy Vault Pty Ltd	BESS Works EPC Contractor
EPEC Projects Pty Ltd	HV Works EPC Contractor (Substation)

Project Partner	Project Role
TransGrid/Lumea	Grid Connection Infrastructure (330 kV Switchyard Bay)

4 Procurement

4.1 Procurement Strategy

ACEN's procurement strategy for NEBESS was structured around separate EPC contracts for each work package. The BESS works were procured under an EPC contract with Energy Vault, with substation works separately procured from EPEC. The BESS works EPC contract was structured with two separately triggerable sections (Section 1 at 50 MW/100 MWh and Section 2 at 150 MW/300 MWh), enabling the EEP-funded Section 1 to proceed to completion independently of Section 2.

Date	Item
6 September 2023	HV Works EPC Request for Tender issued
15 September 2023	BESS Works EPC Request for Tender issued
21 March 2024	HV Works EPC Contract signed
31 May 2024	BESS Works EPC Contract Signed
12 April 2024	HV Works NTP issued
31 May 2024	BESS Works Section 1 NTP issued
17 March 2025	BESS Works Section 2 NTP issued
12 December 2025	HV Works PC issued
Ongoing	BESS Works Section 1 (50MW) PC issued
Ongoing	BESS Works Section 2 (150MW) PC issued

4.2 Supplier Selection

Energy Vault was selected as the BESS Works EPC contractor following a competitive tender process. Key factors in the selection included track record, battery management software, long-term performance guarantees, performance characteristics, and competitive pricing. The initial tender went to a variety of tenderers, from which each tender was evaluated and 2 tenderers were shortlisted. ACEN entered negotiations with each shortlisted tenderer and selected Energy Vault.

EPEC was selected in a similar manner, with a competitive tender process and equivalent evaluation factors for the HV Works.

5 Construction

5.1 Construction Overview

Construction of the NEBESS commenced following Notice to Proceed issued to Energy Vault on 31 May 2024. The works were undertaken concurrently with the NES2 operations and HV Works construction, requiring close coordination between contractors and ACEN's construction management team.

5.2 Civil and Balance of Plant Works

The civil construction phase of the project delivered the foundational infrastructure required to receive and support the primary project equipment, comprising the B-VAULT battery units and associated Medium Voltage (MV) Stations.

Site access was established through the formation of an unsealed road connecting Big Ridge Road to the BESS site entrance, providing a dedicated haulage corridor. Within the site boundary fence, an unsealed loop road was constructed to facilitate safe and efficient internal vehicle movement and equipment access across the installation. A cut and fill earthworks methodology was employed to form the battery bench, achieving a near zero net fill balance. This outcome eliminated the need for general fill import minimising construction traffic, reducing environmental disturbance, and demonstrating efficient use of on-site materials.

Where challenging ground conditions were encountered, targeted subgrade improvement works were carried out, including lime stabilisation and the installation of rock mattress in applicable sections, ensuring long-term foundation performance. A steel fibre reinforced concrete slab was then poured across 12 sections over a six-week programme, providing a high-strength, durable platform suited to the load requirements of the BESS equipment and cranage machinery. Encircling the slab is a Glass Reinforced Concrete (GRC) culvert system under the concrete slab design, which performs the dual function of managing stormwater runoff and housing electrical cable reticulation, reducing civil complexity and improving the long-term maintainability of the installation.

Supporting site operations and personnel, civil works also encompassed the construction of pier and shallow footing foundations for both the Auxiliary Power Unit (APU) building and the Operations & Maintenance (O&M) building, alongside a bituminised car park area providing all-weather vehicle access. The civil scope was further completed by the installation of foundations and infrastructure for CCTV, site lighting, and lightning protection poles, ensuring the facility meets operational, safety, and security requirements from the point of energisation.

5.3 BESS Works

The BESS Works package, delivered by Energy Vault, comprised the supply, installation and testing of the B-VAULT battery units, MV Stations, and associated control equipment. The construction was staged such that all B-VAULTs were landed and MV stations landed after.

B-VAULTs were delivered to site directly from a dangerous goods yard at the arrival port and landed directly at the install location on steel footings. No temporary laydown for B-VAULTs was utilised on site. A container straddle carrier was used to site each B-VAULT with approximately 4 B-VAULTs landed per day. Associated balance of plant works such as LVAC and MV cables were installed prior to each B-VAULT being landed.

MV stations were landed using a standard boom crane on steel footings. Associated balance of plant works such as LV and MV cables were installed in cable trays prior to each MV station

being landed. Once the B-VAULTs and MV stations were landed LVAC and MV cables were terminated.

5.4 HV and Substation Works

The HV Works EPC Contract, delivered by EPEC Projects, comprised the design and construction of the new dedicated 330 kV to 33 kV substation bay within the existing NES substation compound, including the 330 kV to 33 kV power transformer rated to 200 MW. The HV Works comprised of the following major equipment:

- 250 MVA 33/330 kV transformer
- 33 kV Earthing transformer
- 33 kV earthing/auxiliary transformer
- SPEL tank for oil/water storage and separation
- Integrated switchroom and control room

The substation works were completed ahead of the BESS works to avoid scheduling issues. The HV transformer and 33 kV incomers were energised prior to registration by utilising an auxiliary load agreement with the TNSP.

5.5 Key Construction Learnings

A key risk identified during the pre-construction phase of the project was the integration works required between the two EPC contractors. This was generally managed well throughout the construction phase however there were some learnings.

A fire safety study (FSS) was required to be submitted prior to commencing any construction works on the site. This created substantial risk of delays due to how involved approval of the FSS was. ACEN sought an exception to the requirements allowing construction activities to commence prior to approval of the FSS providing B-VAULTs were not delivered to site until the FSS was approved. This allowed construction of the substation to commence prior to notice to proceed for the BESS Works EPC Contract. A full scale burn test of battery containers has generally been required for all BESS projects in NSW in order to achieve approval of the FSS. Extensive testing of the battery modules allowed approval of the NEBESS FSS to be the first FSS approved without requiring a full scale burn test.

Some of the interfaces required additional preliminary design prior to EPC contract executions to ensure risks were adequately identified. In particular, the MV cable interface between the BESS and the substation required additional scoping.

This project consisted of a 2 DUID/1 POC network connection arrangement, which created some unique design requirements that EPC contractors were unfamiliar with. In retrospect these requirements needed additional preliminary design by ACEN and better communication to EPC contractors prior to their design.

6 Commissioning

6.1 Commissioning Overview

Commissioning of the BESS commenced in December 2025 with cold commissioning (commissioning activities not requiring energisation to the grid) of the B-VAULTs. Hot commissioning of the B-VAULTs began in January 2026 once MV cable terminations to the substation were complete. A 'notifiable exemption' was sought from the TNSP to enable a +/- 5 MW dispatch/load limit.

Registration to the NEM was achieved on 14 February 2026, with hold point testing starting on 26 February 2026.

6.2 Key Commissioning Learnings

NEBESS was Energy Vault's first project that use the Siemens SIMANICS inverter and associated control equipment. Additional testing of plant control prior to hold point testing would have reduced the risk for delays during hold point testing. Additionally, reconfiguration for power plant control should ideally be performed prior to hold point testing, to reduce the risk of meaningful differences between the plant model submitted for testing to TNSPs and the actual installed power plant control settings.

Early Hardware in Loop (HIL) testing of an individual B-VAULT was performed which allowed adjustment of settings prior to on site commissioning. In future, HIL testing should incorporate multiple B-VAULTs to ensure B-VAULTs can operate together effectively.

Stakeholder management is key to hold point testing. Ensuring that the relevant TNSP and AEMO are comfortable with testing procedures allows for a smoother transition between hold points tests.

7 Project Completion Summary

7.1 Schedule Performance

Section	Tender Program Completion Date	Baseline Program Completion
Stage 1 - 50MW/ 100MWh	12 February 2026	14 February 2026
Stage 2 - 200MW/ 400MWh (facility)	6 August 2026	20 June 2026

7.2 Key Lessons Learned

The following key lessons were identified across the procurement, construction and commissioning phases of the NEBESS project:

1. Structuring the BESS works contract into two independently triggerable sections was critical to managing the EEP milestone program while the GPS modification for Section 2 was processed.
2. Early and sustained engagement with fire safety authorities is essential - the FSS approval process required more time than initially anticipated.
3. Early engagement with TransGrid and AEMO technical teams on grid forming inverter models and controls built familiarity that enabled efficient resolution of GPS assessment questions.

Appendix A – Glossary of Terms & Abbreviations

Term/Abbreviation	Description
AEMO	Australian Energy Market Operator
BESS	Battery Energy Storage System
DUID	Dispatchable Unit Identifier
EEP	Emerging Energy Program
EMS	Energy Management System
EPC	Engineering, Procurement and Construction
FCAS	Frequency Control Ancillary Services
FSS	Fire Safety Study
GPS	Generator Performance Standards
GFL	Grid Following (inverter)
GFM	Grid Forming (inverter)
HV	High Voltage
kV	Kilovolt
MV	Medium Voltage
MW	Megawatt
MWh	Megawatt-hour
NEM	National Electricity Market
NEBESS	New England Battery Energy Storage System
NES	New England Solar
NER	National Electricity Rules
PCU	Power Conditioning Unit
POC	Point of Connection
SCADA	Supervisory Control and Data Acquisition
SPV	Special Purpose Vehicle
VSG	Virtual Synchronous Generator
TNSP	Transmission Network Service Provider