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**14 July 2026**

2:00 pm – 3:00 pm | AEST, Sydney  
4:00 pm – 5:00 pm | NZST, Auckland  
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# Optimizing co-located BESS design to overcome Australia's grid constraints



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**Lodewyk Esterhuizen**

Senior Consultant  
**DNV**

# Welcome!

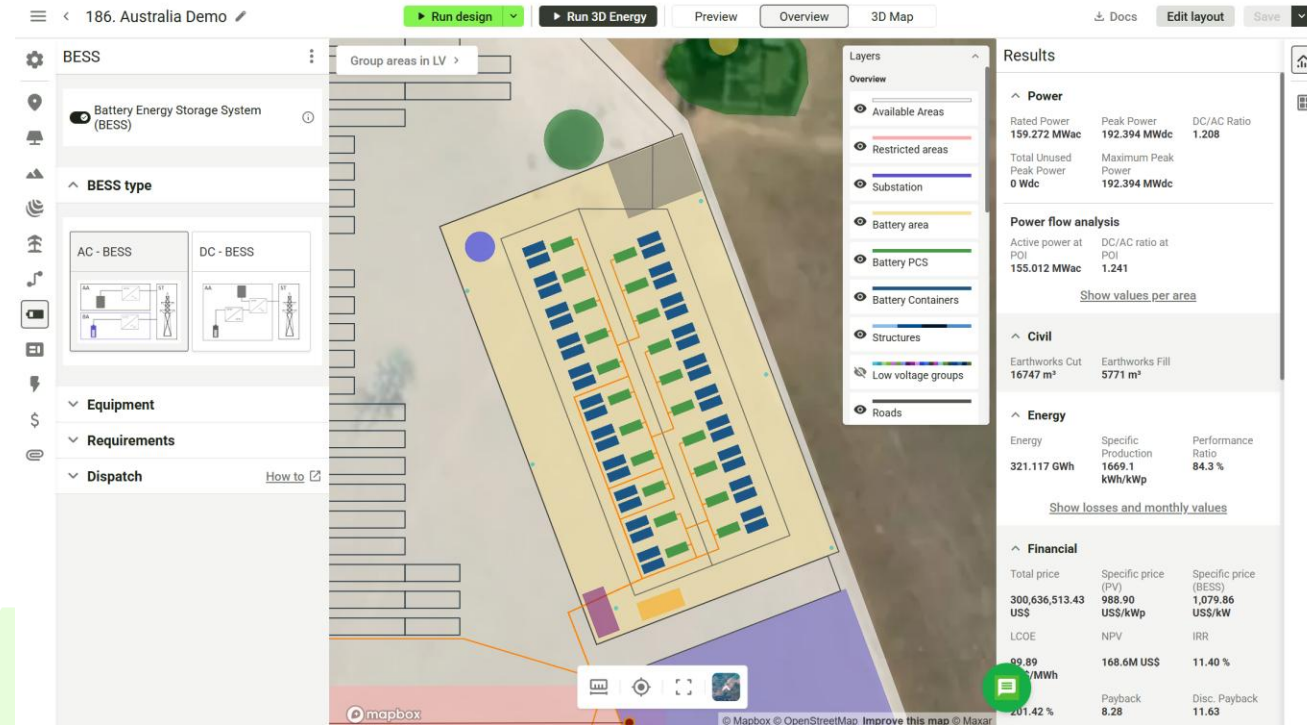
Do you have any questions?  

Send them in via the Q&A tab.  We aim to answer as many as we can today!

You can also let us know of any tech problems there.

We are recording this webinar today. 

We'll let you know by email where to find it and the slide deck, so you can re-watch it at your convenience.  



# Hybrid PV & BESS Modeling *Under Grid Constraints*

## Your speakers today



**Michael Panagiotou**  
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- 01. Hybrid & Standalone BESS
- 02. Design Challenges
- 03. Live Demonstration

# 01. Hybrid & Standalone BESS

## Growth in Oceania

- Australia is one of the leading countries for renewable development
- Government targets and Renewable Energy Zones are driving new projects
- Greater demand for flexible, dispatchable energy sources
- **5.9 GW** of new renewable generation capacity was added to Australia’s energy system in 2025
- **42.7%** of Australia's electricity was generated from renewable energy in 2025, up from **39%** in 2024
- Around **one in every three** new utility-scale solar projects now includes **battery storage**.

Clean Energy Council

Which are the 5 top countries you think have the most potential for renewable growth in 2026?



RatedPower 2026 Trends Report

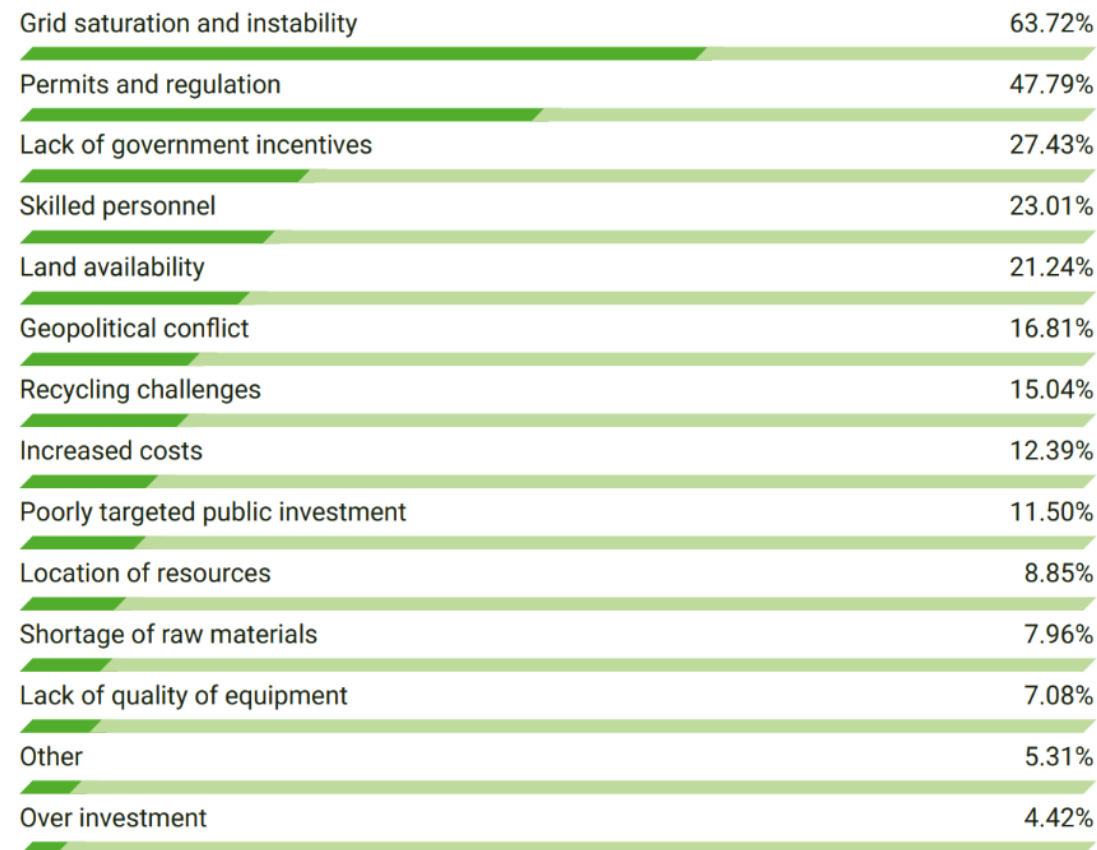
## 02. Design Challenges

# What makes new projects difficult?

The challenge is no longer just designing the plant, it's ensuring it can successfully connect to and support the grid.

- One of the biggest challenges to new renewables projects is Grid Saturation & Instability.
- BESS flexible outputs based on grid requirements.
- Cable routing and cable length optimisation
- Access roads & maintenance
- Optimising PV and BESS together

## What are the biggest challenges for the renewable sector for the coming year?



RatedPower 2026 Trends Report

# Land Availability for BESS, what needs to fit?

A big challenge for BESS is securing suitable land and planning out the necessary components.

- Available Land.
- Exclusion Zones.
- Buildable areas.
- Asset Protection Zones.
- Fire Protection.
- Container / MV Skid locations & spacing
- Road planning.
- Proximity to Grid



Bungama BESS Facility Online 30/06/26 - Wärtsilä

## Active Power Capacity & Curtailment

- Grid approval not just based on capacity, but controllable behaviour at the export point.
- Export allowance could be less than the site rated power.
- Active power limits influence both the commercial case and the physical plant design.
- Modelling active power output is important to understand curtailment losses.
- BESS Sizing factor, how much curtailment losses can BESS absorb?



## Power Factor / Reactive Power Capability

- PV, BESS and hybrid plants must be able to export reactive power according to AEMO Requirements
- For hybrid PV & BESS projects, reactive power may come from PV inverters, BESS PCS, or capacitor banks
- Affects inverter sizing, rated capacity, and layout
- For example, AEMO requires reactive power =  $0.395 \times \text{rated power available}$ , equivalent to an 0.93 power factor.
- Initially demonstrated through plant modelling
- Grid approval dependant on what plants can safely export



# What Grid Compliance Actually Involves



Grid Compliance

RatedPower

Project  
Concept



Connection  
Enquiry



R0 Studies



GPS Negotiation



Connection  
Agreement



Can it connect?



R2 Validation



Commissioning



R1 Studies

Did it perform as expected?

Will this design comply?

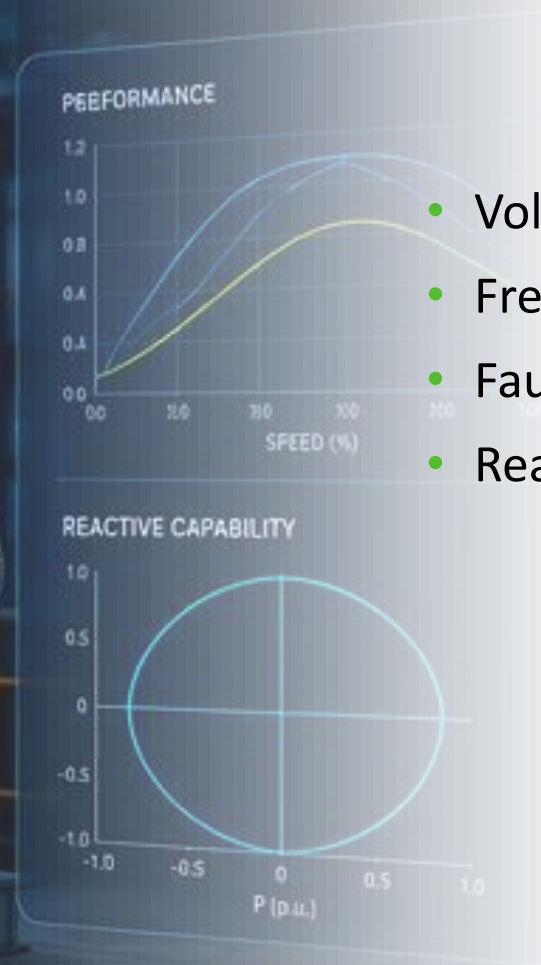


Commercial Operation

# Load Flow Studies

- Voltage compliance
- Reactive power capability
- Initial power factor assessment
- Connection point performance

# Preliminary Generator performance standard (GPS) Assessment



- Voltage control capability
- Frequency response capability
- Fault ride-through requirements
- Reactive power capability

# Short Circuit Studies

- Fault level contribution
- Protection implications

# Preliminary System Strength Assessment

- 
- SCR/SCR-equivalent assessment
  - Identification of potential system-strength risks
  - Preliminary Harmonic Assessment
  - Harmonic emission screening

## How RatedPower Helps at R0

### Key benefits:

- Accurate inverter numbers
- Transformer sizing
- MV collector design
- Cable schedules and lengths
- Electrical single line concepts
- Rapid assessment of design alternatives
- Reactive power capability
- Initial power factor assessment
- Connection point performance

### Traditional Approach

Concept

Assumptions

Studies

Design Changes

Repeat Studies

## How RatedPower Helps at R0

### Key benefits:

- Accurate inverter numbers
- Transformer sizing
- MV collector design
- Cable schedules and lengths
- Electrical single line concepts
- Rapid assessment of design alternatives
- Reactive power capability
- Initial power factor assessment
- Connection point performance

Improved Approach

Concept

RatedPower Design

Better Inputs

Better Studies

Fewer Iterations

# 03. RatedPower Live Demonstration

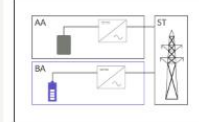


## BESS

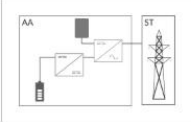
Battery Energy Storage System (BESS)

### BESS type

AC - BESS



DC - BESS



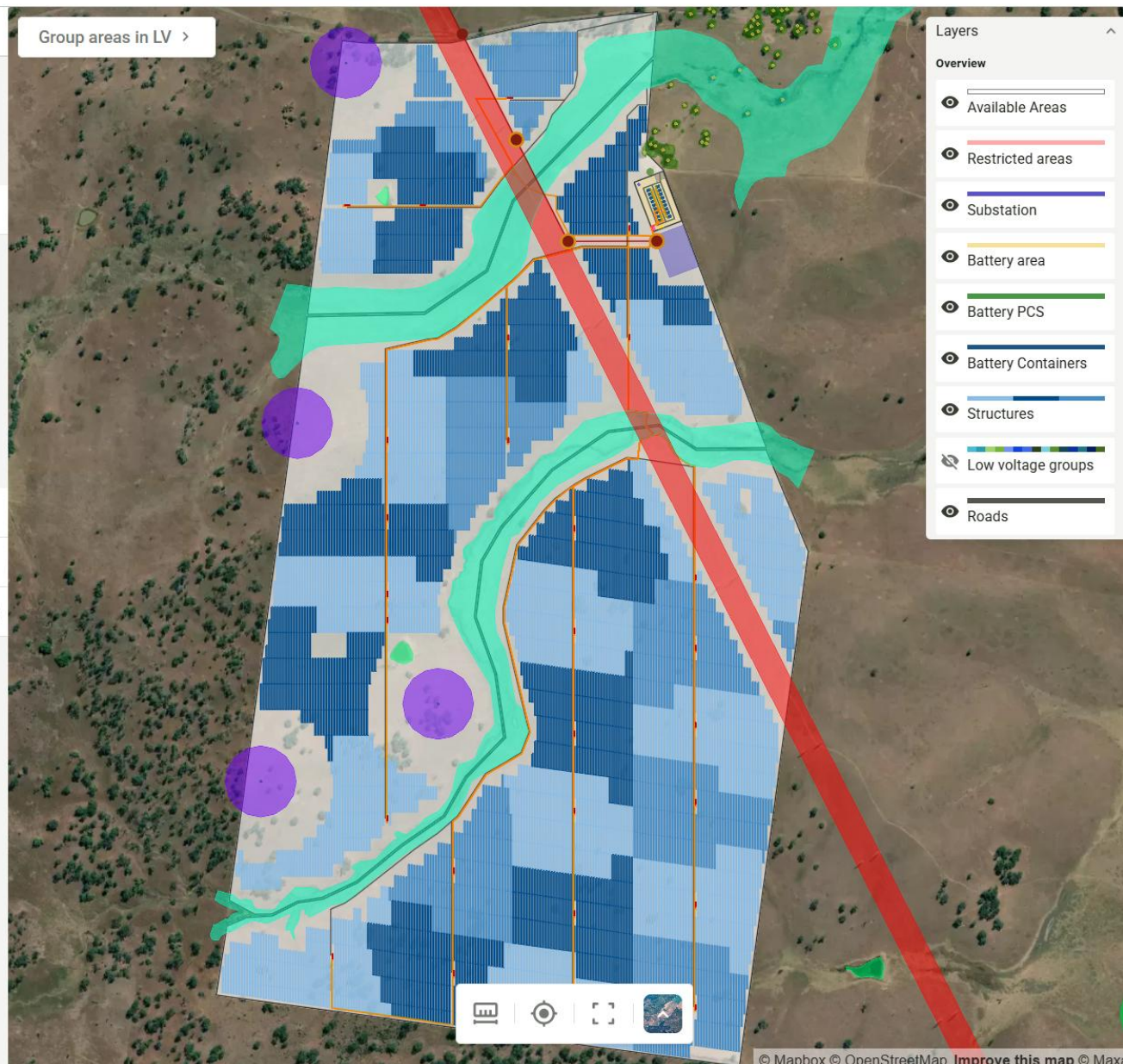
Equipment

Requirements

Dispatch

[How to](#)

Group areas in LV



- Layers
- Overview
- Available Areas
  - Restricted areas
  - Substation
  - Battery area
  - Battery PCS
  - Battery Containers
  - Structures
  - Low voltage groups
  - Roads

## Results

### Power

|                         |                    |             |
|-------------------------|--------------------|-------------|
| Rated Power             | Peak Power         | DC/AC Ratio |
| 106.523 MWac            | 127.597 MWdc       | 1.198       |
| Total Unused Peak Power | Maximum Peak Power |             |
| 0 Wdc                   | 127.597 MWdc       |             |

### Power flow analysis

|                     |                    |
|---------------------|--------------------|
| Active power at POI | DC/AC ratio at POI |
| 104.16 MWac         | 1.225              |

[Show values per area](#)

### Civil

### Energy

### Financial

### Substation (ST)

### Overhead line (OHL)

### AC Battery Energy Storage System (BESS)

|                  |               |                 |
|------------------|---------------|-----------------|
| BESS Rated Power | BESS Capacity | Supply duration |
| 45.137 MW        | 180.54 MWh    | 4 Hours         |

### Battery Energy

|                        |                           |                           |
|------------------------|---------------------------|---------------------------|
| Energy charged from PV | Energy consumed from grid | Energy discharged to grid |
| 70.97 GWh              | 0 Wh                      | 58.3 GWh                  |

|                              |                   |                  |
|------------------------------|-------------------|------------------|
| Energy charged over lifespan | Avg. daily cycles | Battery lifespan |
| 1.04 TWh                     | 0.00              | 0.00             |

## Your speakers today



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## Q&A



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## [Who maintains Europe's orphaned rooftop solar?](#)

by Ben Hayden



# Coming up next...

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**Wednesday, 7 October 2026**

11:00 am – 12:00 pm CEST, Berlin, Madrid, Paris

**Many more to come!**

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energy storage  
solutions for AI data  
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**Thank you for  
joining today!**