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# "Lessons learnt developing big Australian batteries"

Shane Quinnell

WestWind ENERGY

# Simply the BESS.

"For the energy industry, batteries could be the most revolutionary technological catalyst of our time. They are key to integration of high-penetration renewables and the energy transition.

Its critical we all understand them..."

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# My perspective

## Batteries are a whole new beast.

"My foundation comes from nearly 15 years developing renewable energy generators – including wind and solar.

Today's 8 lessons reflect my personal journey from battery ignorance, through adolescence and to now having worked multiple Australian battery and hybrid sites, including reaching financial close."

Photo: In Kenya shortly before climbing Africa's second highest mountain... I used to be cool.

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# One Word, Many Meanings – shared language matters

**The terms “battery,” or “hybrid,” can mean multiple things. They are often used but not always understood by all stakeholders. Types can differ greatly in design, risks and benefits:**

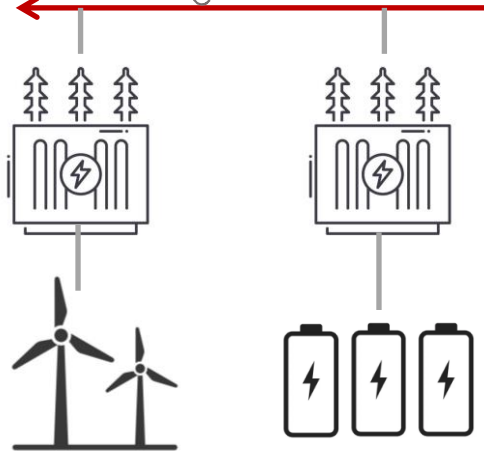
Standalone

*Two connections

Hybrid

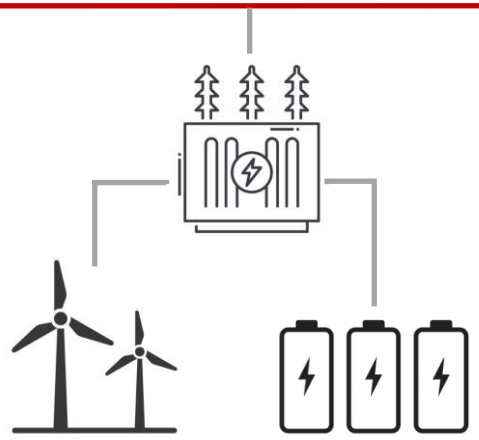
*One connection

National Electricity Market (NEM)



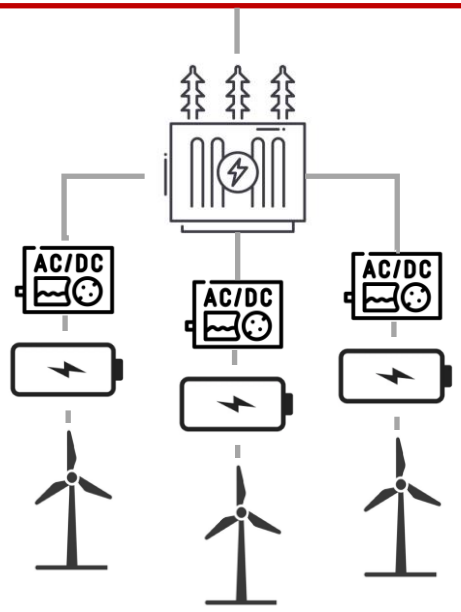
BESS is electrically independent. Can be geographically located on the same site.

DC Hybrid (De-Centralised)



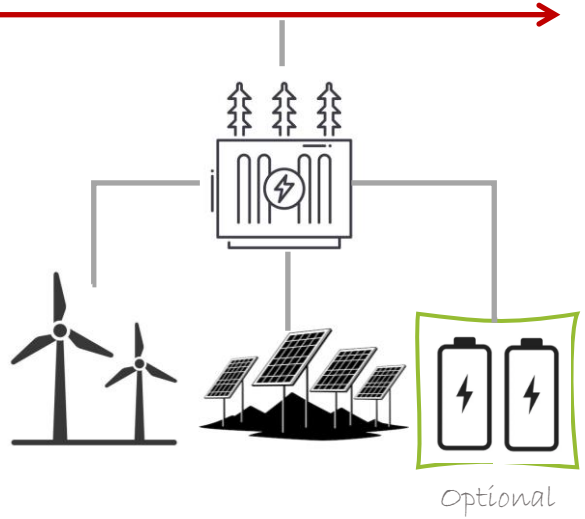
BESS and generator connected at the AC level. BESS are generally centralised.

AC Hybrid (Centralised)




BESS and generator connected at DC level. BESS located next to generators.

Mixed Generation



Optional

Multiple generation types with or without a BESS (in whatever configuration).



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# Many BESS, One Site – multiple types can co-exist

**Mixed project developments are becoming increasingly common. They can be simple - generator and a battery - or include multiple battery and generator types all on the same site.**

Standalone BESS – separate grid connection & project.

DC hybrid (de-centralised) BESS at each generator.

Note that the more heavily hybridized a site the more complicated. More noise sources, visual impacts, hazards and risks etc.

AC hybrid (centralized) BESS at site substation.

*Check planning allowances on staging construction of different project elements.

Image Credit: Google Gemini AI (super cool right?!)



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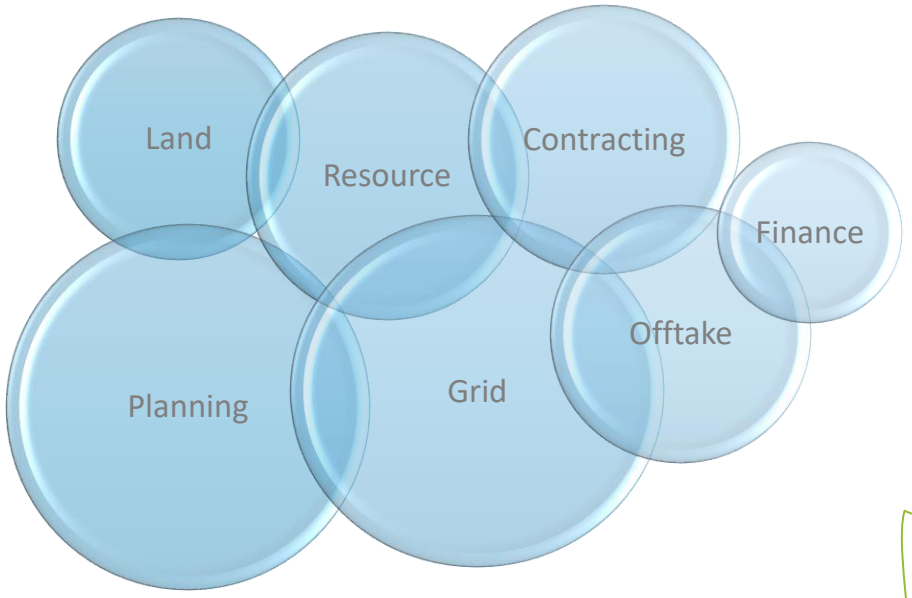
# Easy Start, Hard Finish – the BESS development paradox

**Developing different energy technologies has different challenges. BESS tend to be easier early in the developments – land, planning, grid – and harder later – contracting, markets etc.**

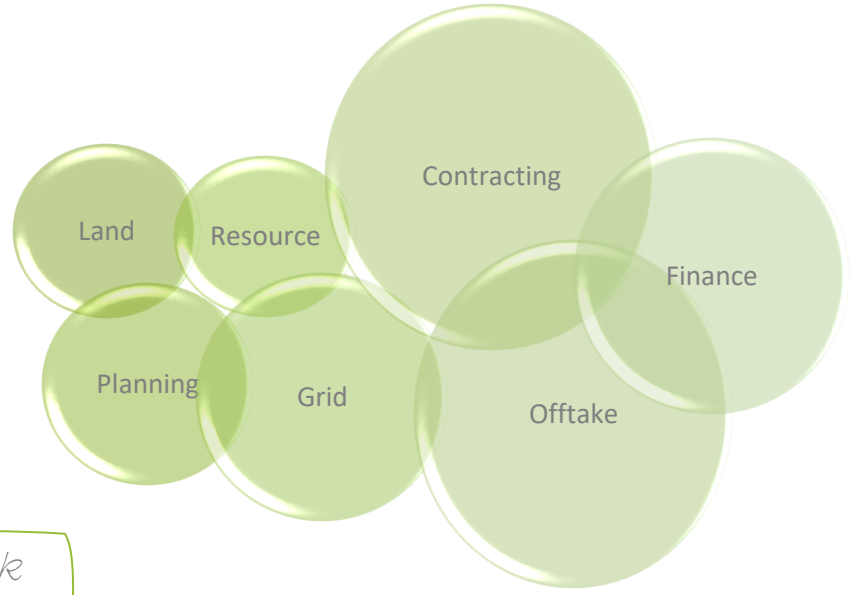
Wind Projects




Front-ended, more uniform challenges

Hybrids would look different due to the difficulty of interfacing technology.

Battery Projects




Back-ended, less uniform challenges



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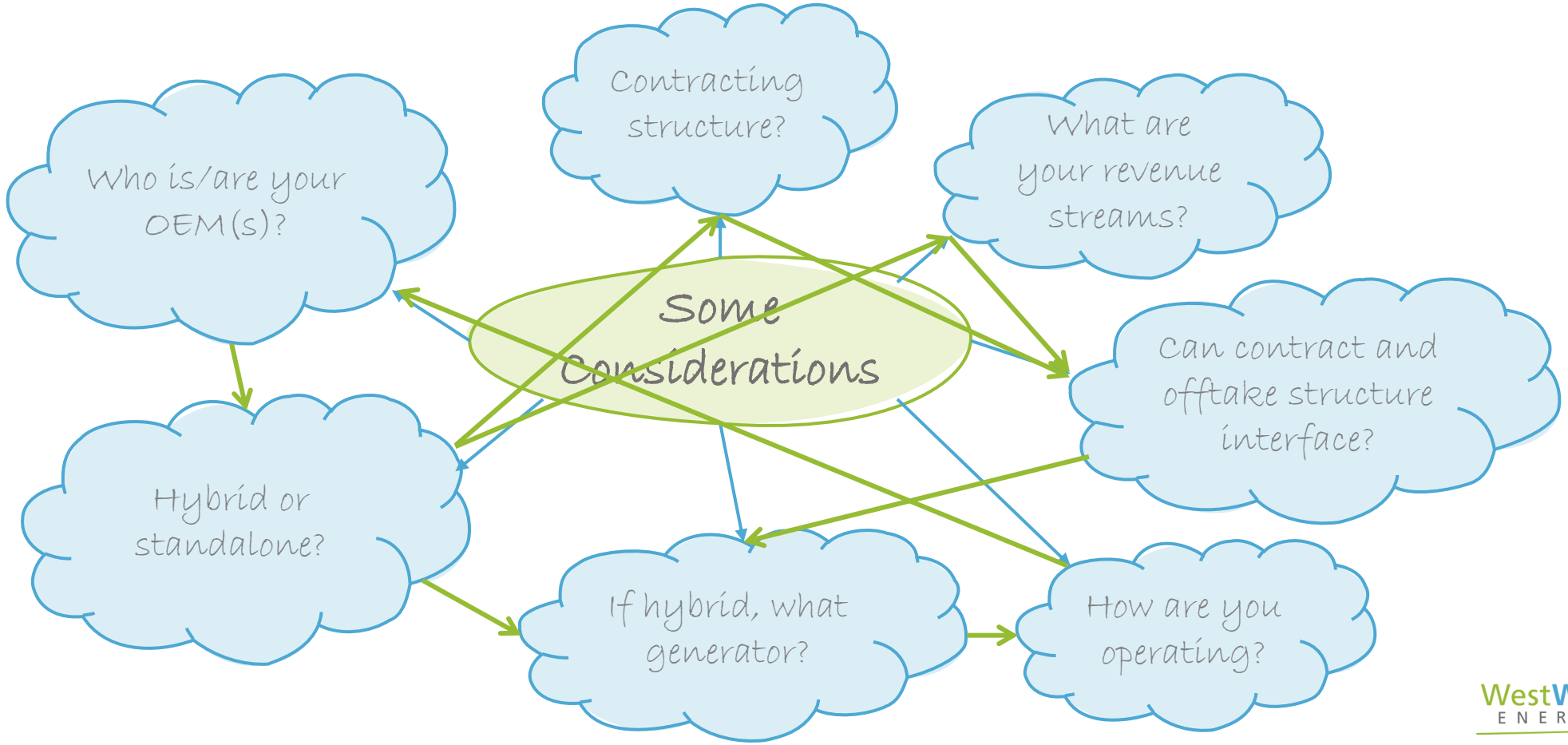
# Think Finish Line First – start with the end in mind

**Given BESS development depends heavily on the end use case for contracting, offtake etc, and gets harder later, its critical to start with the end use case in mind.**



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# Batteries Go BRRRR - louder than you think

**Not only are batteries holistically different to develop, they are also vary in specific studies like planning and grid. Specificities need to be understood to navigate development effectively.**

## Planning

- Batteries are noisier than you imagine. It's crucial to consider noise early from every type of BESS you are considering.
- Hazards and risk assessments look different – departments want to know *exactly* what battery you will be building (limits flexibility).
- All BESS/generator variations will need to be included on visual assessments.

## Grid

- Batteries are both a generator and a load.
- Use of systems charges –applicable to loads – need to be considered. Usually ok at transmission level.
- Offtake and ownership structures may be impacted by technical grid arrangements.
- The OEM and controller is critical to BESS grid success and operation.



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Image Credit: Google Gemini AI (super cool right?!)

# No Engineers, Bad BESS – tech talent makes it happen

**Batteries are very technical in nature. Having the right - technically minded people - is critical to good outcomes.**

- Assessment of different OEMs and technical interface discussions.
- Battery losses can be complicated with losses depending on:
  - Number of cycles per day – *this can vary throughout a project*
  - Whether the BESS is operating or standing.
  - Degradation and ageing, temperature, design etc.
- Design can impact other project elements like insurance and financing – i.e. separation distances between BESS.
- Performance has a big interface with offtake, contracting etc.

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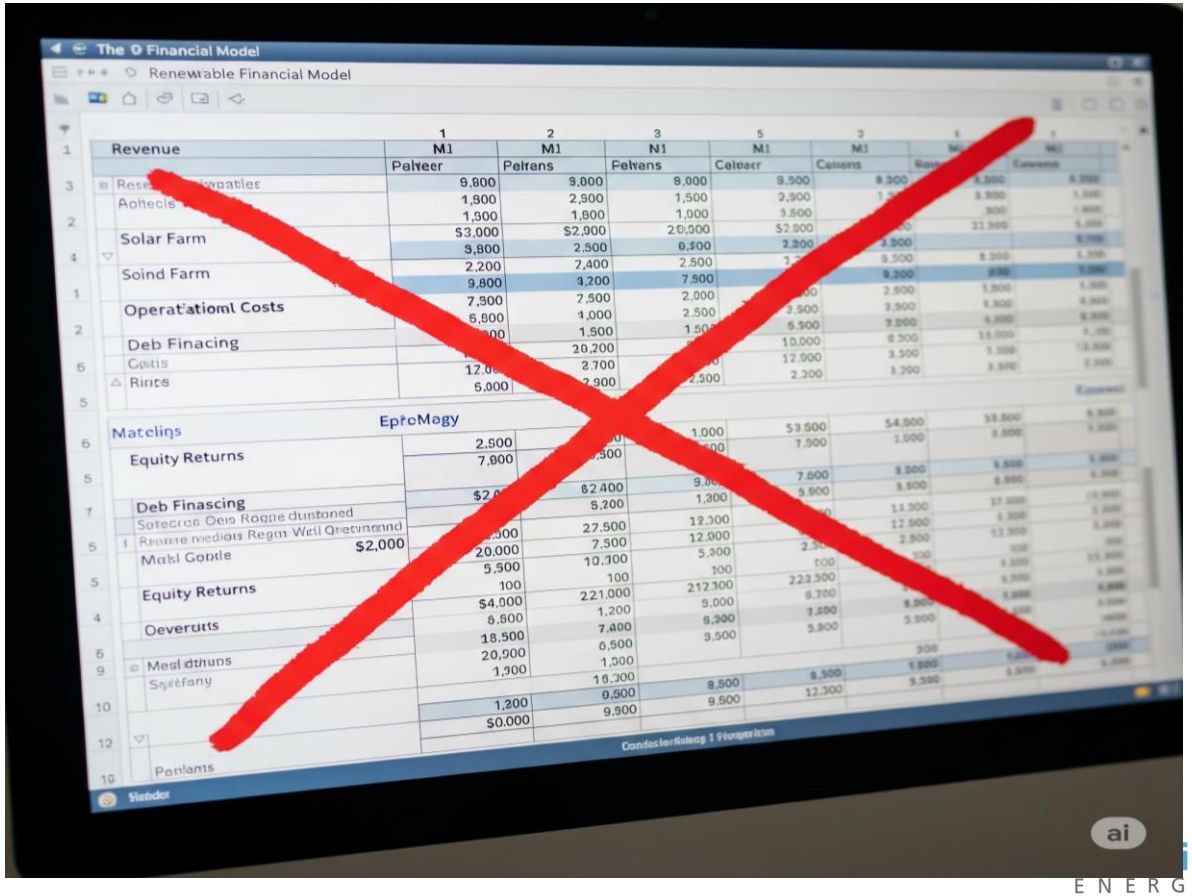
# Rip up the model – BESS don't fit the old rules

**Batteries are different to financially. Business cases, model design and philosophies will likely need to change.**

Some examples of key differences:

- Revenue is typically calculated via an optimizer – *often requires market consultants.*
- Inclusion of event revenue.
- Differences in CAPEX and OPEX breakdowns.
- Many different contracting structures.
- Different methods of financing.



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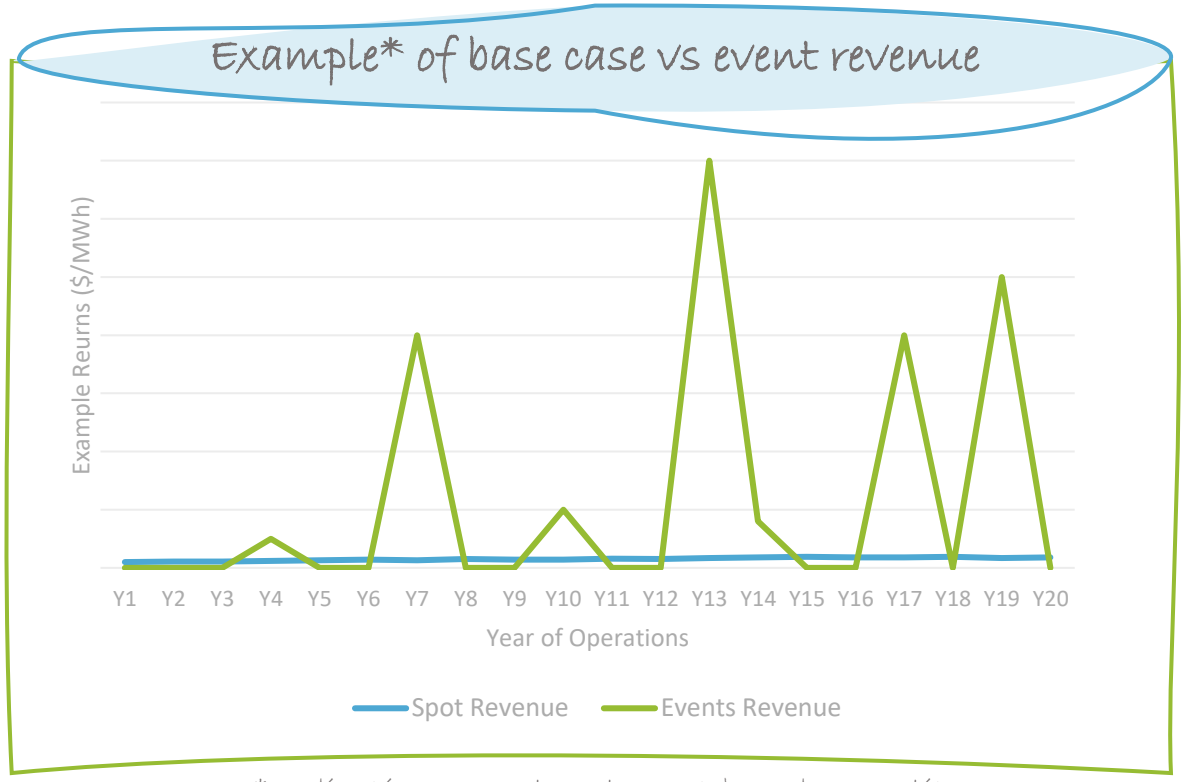
# Market events matter - events drive big BESS economics

**Market events play a huge role in battery business cases. Different forecasters model these differently. Investors need to determine how to value these.**

- Market events are anomalies in the spot market which cause price spikes.
- Examples include:
  - Unplanned shutdowns (i.e. Callide explosions)
  - Extreme weather (bushfires, heatwaves)
  - Global geopolitics (wars etc…)
- Events are typically add-ons to standard market forecasts cases.
- Will need to be discussed with debt parties.
- Critical BESS owners align on their own view of how to value events.




*Indicative example only, not based on reality…



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# Be the BESS.

"To unlock the power of the renewable energy transition, its important that as an industry we upskill on the technology.

Remember though, without generation, batteries don't make sense."

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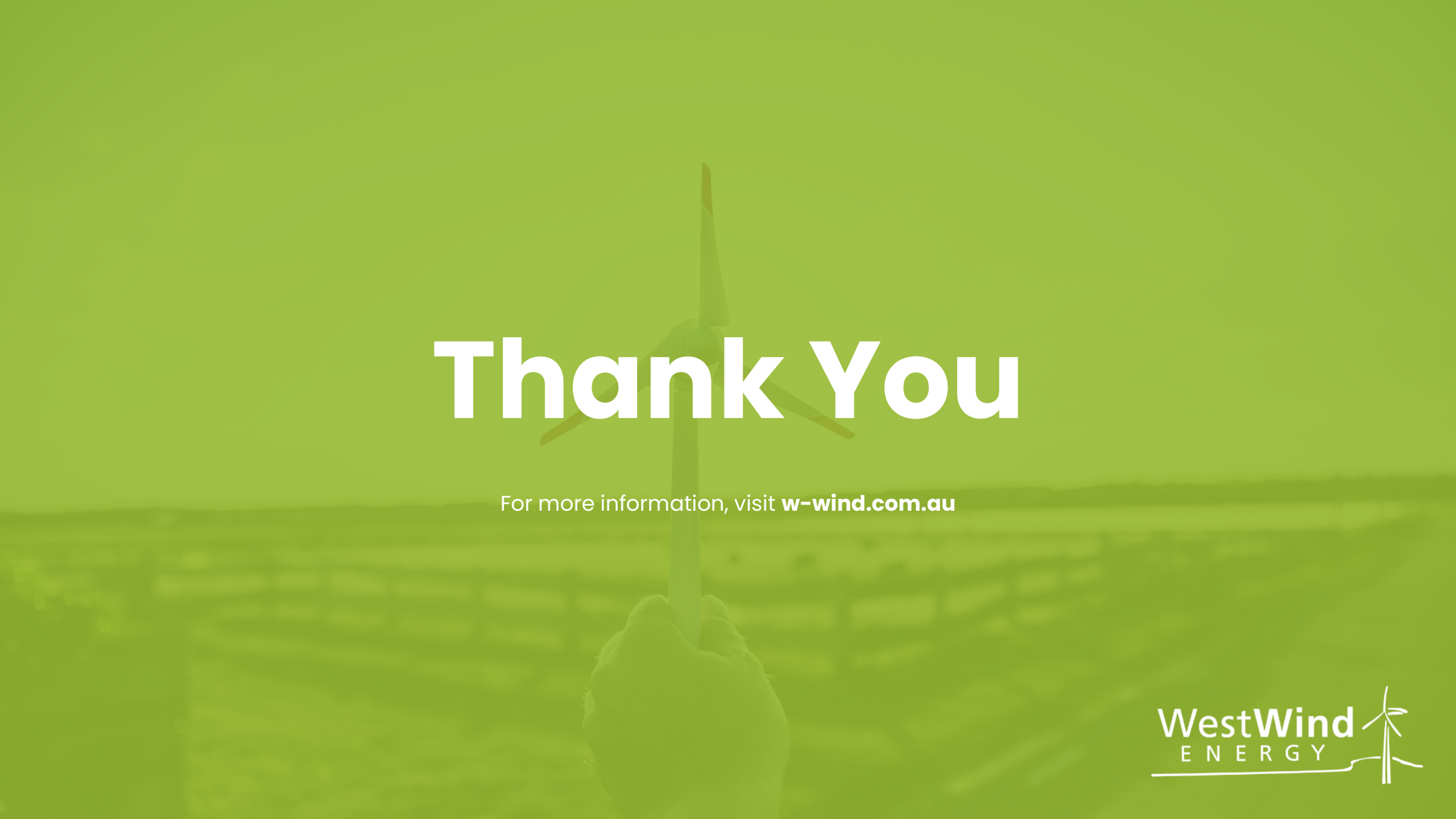

# Thank You

For more information, visit **w-wind.com.au**

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