Transgrid | Lumea

Commercial Model Report

Wallgrove Grid Battery Funded by NSW Government, ARENA, Transgrid and Lumea

October 2022

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The purpose of this document (Report) is to provide a summary of the commercial model of the Wallgrove Grid Battery.

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Acknowledgements.

This Project received funding from ARENA as part of ARENA's Advancing Renewables Program and was proudly supported by the NSW Government, Emerging Energy program.

Australian Government
Australian Renewable Energy Agency

ARENA

NSW GOVERNMENT

Acknowledgement of Country.

In the spirit of reconciliation Lumea acknowledges the Traditional Custodians of the lands where we work, the lands we travel through and the places in which we live.

We pay respects to the people and the Elders past, present and emerging and celebrate the diversity of Aboriginal peoples and their ongoing cultures and connections to the lands and waters of NSW.

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1. Acronyms

AEMC	Australian Energy Market Commission
AEMO	Australian Energy Market Operator
AER	Australian Energy Regulator
ARENA	Australian Renewable Energy Agency
BESS	Battery energy storage system
BoP	Balance of plant
COVID-19	Coronavirus disease
D&C	Design and construct
EPC	Engineering procurement construction
FCAS	Frequency control ancillary services
FFR	Fast frequency response
HV	High voltage
MW	Megawatt
MWh	Megawatt hours
MBAS	Market benefit ancillary service
NER	National electricity rules
NEM	National electricity market
NSCAS	Network support and control ancillary service
O&M	Operations and maintenance
RAB	Regulatory Asset Base
RSCAS	Reliability and security ancillary service
SRAS	System restart ancillary service
TNSP	Transmission network service provider
TUOS	Transmission use of system (charges)
VMM	Virtual machine mode
WGB	Wallgrove Grid Battery

This Report details the commercial model of the Wallgrove Grid Battery (WGB) and discusses the nature of the innovative funding and delivery structure used to facilitate the project. It provides information to support the ongoing development of batteries in the market to deliver cost-effective outcomes to consumers and the NSW community.

The WGB is a 50MW/75MWh (1.5-hour duration) Battery Energy Storage System (BESS) located adjacent to the Transgrid Sydney West 330/132kV substation (Wallgrove) in Eastern Creek, NSW.

The WGB tests how well a battery can deliver services that will be needed to stabilise the grid through Australia's energy transition to a low-carbon market. There were a number of commercial models to consider. The model selected was chosen to minimise costs to consumers. It utilises the battery for both regulatory and commercial purposes. The regulatory component (network services) of the battery is funded through the NSW Government Emerging Energy Program, ARENA, and Transgrid's Regulatory Asset Base (RAB). The commercial component is based on a contract for use with renewable energy generator and retailer Iberdrola Australia to trade the spare battery capacity that is not required for network services, with equity capital provided by Lumea's security holders.

The commercial framework and contract structure is complex but has formed the basis for further development as batteries and markets evolve through the energy transition.

The project began construction in February 2021 and commenced Commercial Operations on 22 December 2021. The Virtual Machine Mode (VMM) capability is currently undergoing final technical assessments and will be brought online once complete.

3.1. Purpose of Report

The aim of this Report is to share commercial model findings with the market.

This Report discusses:

- the commercial model
- findings from applying this model in practice
- observed limitations
- extent of complementarity of network and market services
- alignment with the regulatory framework requirements under the regulatory rules

3.2. Distribution of Report

This Report is intended for the public domain and has no distribution restrictions.

The intended audience of this document includes:

- Network Service Providers (NSPs)
- generators
- renewable energy industry participants
- prospective battery investors
- AER
- AEMC

Photo 1 – Wallgrove Grid Battery looking towards Sydney West 330/132kV Substation

4.1. Overview

The WGB is a 50MW/75MWh (1.5-hour duration) grid-scale lithium-ion Tesla battery. It is the first large-scale grid battery in NSW and the third[1] large-scale grid battery demonstration of synthetic inertia in the National Electricity Market (NEM). Located at Wallgrove, the WGB is a pilot demonstration of the viability of synthetic inertia from a battery to maintain frequency stability on the network. The WGB is also enabling Iberdrola Australia to control dispatch and participate commercially in the frequency control ancillary services (FCAS) and wholesale energy markets. It is different to other batteries in the market currently because it is located close to a major load centre (Wallgrove is a node for supply to Sydney's load). Other batteries that are in development or planning are located on the generator side.

The WGB was undertaken as an innovation pilot, to build battery expertise, and to support the development of more efficient synthetic inertia technologies in different locations on the grid. The commercial model combines funding to maximise battery utilisation for network and commercial purposes.

Photo 2 – Wallgrove Grid Battery

1. Wallgrove is the third BESS in the NEM to demonstrate synthetic inertia. ESCRI (30MW) and Hornsdale Expansion (150MW) are the first and second.

The WGB can provide both network services (including inertia and fast frequency response) and market services (including energy and FCAS), and accesses corresponding regulated and unregulated revenue streams in a hybrid commercial model. Less than 5% of energy storage capacity is reserved for the provision of network services. The project enables the TNSP, Transgrid, to explore this approach as a credible option to address the forecast inertia shortfall in NSW/ACT following the retirements of numerous coal-fired generation plants, including Liddell, Eraring and Vales Point Power Stations, and enable the NSW Government's plan for a reliable, affordable and sustainable electricity future that supports a growing economy.

Information is being shared as part of the trial. This information sharing will support future projects and improve understanding of battery technology as a low-cost and technically viable solution to the emerging challenges created by the transformation of the generation sector. The project also demonstrates a revenue stack and commercial arrangements that provide grid benefits cost-effectively for consumers.

The trial will provide valuable technical information about the actual operation of the WGB, including how often it will be needed for fast frequency response and how much electricity it is able to store and dispatch under different conditions, relative to commercial demands.

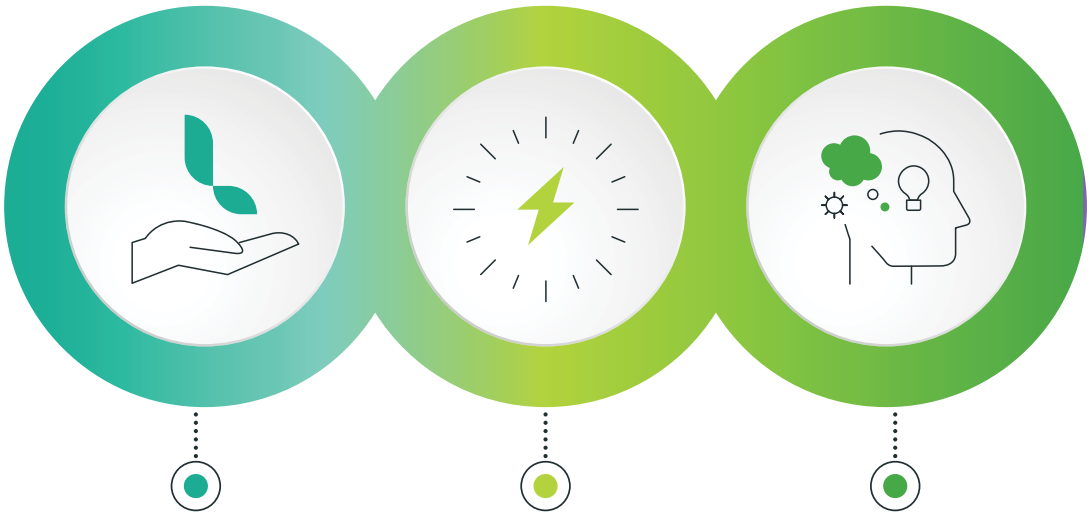
As more wind and solar energy sources replace fossil fuel generation, less mechanical inertia is available on the grid, removing a natural stability buffer in the case of a grid disturbance. As these fossil fuel generators retire from the NEM, alternative solutions are needed to ensure this stability remains. The WGB will demonstrate the use of Tesla's Virtual Machine Mode (VMM) to address these stability challenges by virtually emulating mechanical inertia. While commercial operations continue, the WGB is currently undergoing final technical assessments in conjunction with AEMO prior to enabling VMM.

The WGB received funding from ARENA's Advancing Renewables Program and the NSW Government as part of the Emerging Energy Program. The WGB has been constructed, registered, tested and commissioned successfully, and commenced Commercial Operations in December 2021. To 1 September 2022 it has exported 18.4GWh[2] of energy, supplying the energy needs of 4,850 NSW households[3].

2. https://www.transgrid.com.au/media/i25ndg0l/2022-08-02-operations-data-2021-12-23-to-2022-07-13.csv and https://www.transgrid.com.au/media/hfbcd3s4/07092022-operations-data-14072022-to-01092022.csv

3. https://cdn.ausgrid.com.au/-/media/Documents/Data-to-share/Average-electricity-use/Ausgrid-average-electricity-consumption-by-LGA-2021-pdf

Project benefits



Enhanced reliability

The battery will provide a new source of system stability services.

More affordable power

Finding lowest-cost ways to maintain frequency, while also increasing the supply of dispatchable power to the market, puts downward pressure on energy bills.

New knowledge

The trial will provide valuable technical and commercial insights which will be shared across the energy industry – helping to identify the lowest cost technology for future network needs.

4.2. Key project objectives

The WGB project's objectives are to:

- Enhance system reliability and security in NSW by operating in the NEM markets for wholesale energy and frequency control ancillary services, as well as providing inertia support activities such as fast frequency response and virtual inertia
- Promote competition through its contracting arrangement with Iberdrola Australia, which will operate the WGB project to firm variable renewable energy generation in NSW and supply retail customers
- Promote diversification of electricity supply in the NSW region of the NEM by deploying a lithium-ion battery system that is dispatchable and capable of firming variable renewable energy generation
- Assist in the operation of a low-emissions electricity system for NSW by firming Iberdrola Australia's variable renewable energy output from their portfolio
- Deliver the Knowledge Sharing Plan to provide value to NSW and the NEM by sharing key learnings to reduce the risk and encourage further investment in utility-scale battery energy storage systems in NSW

5.1. Overview

The WGB commercial model provides a hybrid approach to funding and revenue. It is designed to minimise cost to consumers through use for both regulatory and commercial purposes. The regulatory component (network services) of the battery is funded through the NSW Government Emerging Energy Program, ARENA, and Transgrid's RAB. The commercial component is based on a contract for use with Iberdrola Australia to trade the spare battery capacity that is not required for network services, with capital provided by Lumea security holders. Optimising capacity not required for network services avoids funding 100% through the regulatory processes.

The project is an innovative model of private and public funding working in unison to drive greater benefits at lower costs for NSW electricity consumers. As a result, NSW energy consumers receive:

- A more reliable grid from the pilot of synthetic inertia
- Reduced network service charges through the support of State and Federal funding agencies
- Lower energy costs from increased competition and diversity in the supply of electricity
- Firming to support increased renewable energy generation
- Long-term benefits through the transition to cleaner energy systems

5.2. Funding model

Figure 1 below shows the key funding arrangements of the WGB.

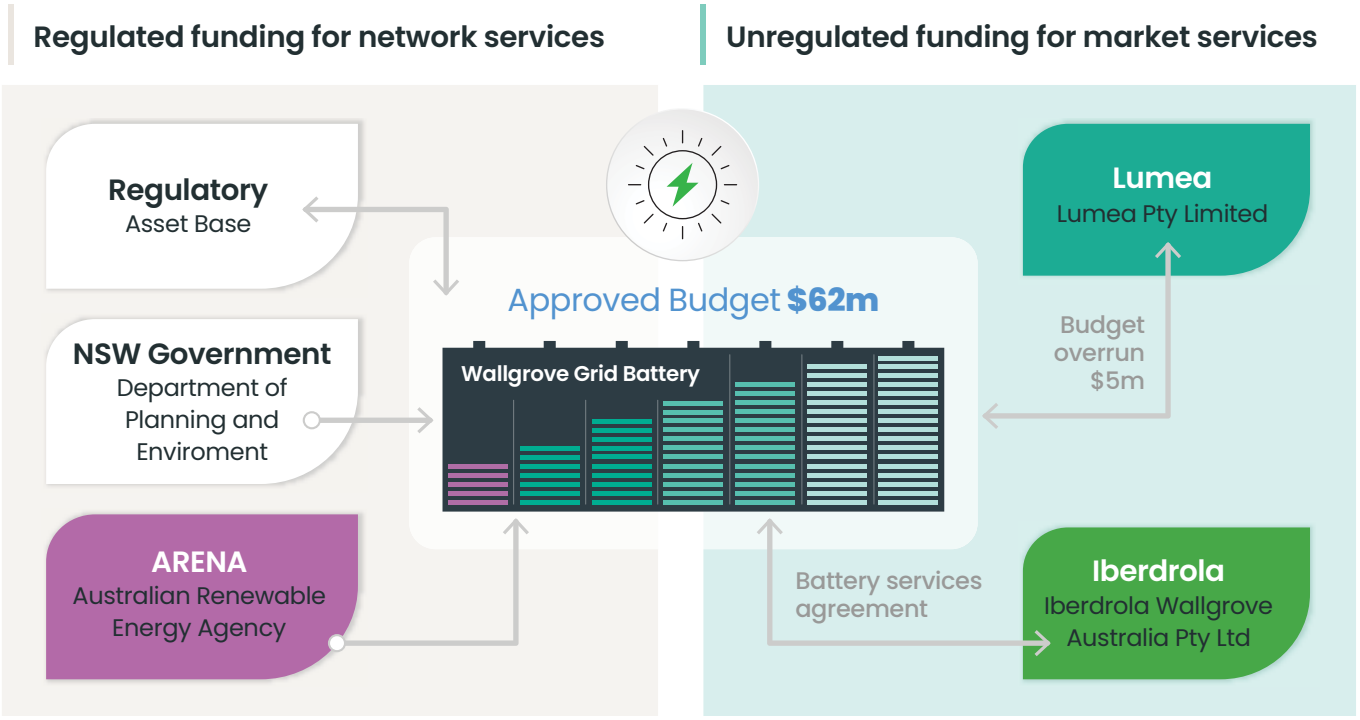


Figure 1 Funding model

The split between agencies and across regulated and unregulated elements is outlined in the following table.

Source	Network Services Funding	Market Services Funding
Regulated – Transgrid – Regulatory Asset Base (RAB)	$5.9m	
Grant – ARENA*	$10.2m	
Grant – NSW Government	$10.0m	
Unregulated – Lumea –Security holders		$40.6
TOTAL		**$66.7m**

Table 1 Funding sources

* Repayments are distributed to ARENA (up to an agreed cap) if the battery's net NEM revenue exceeds an agreed threshold.

5.3. Responsibility model

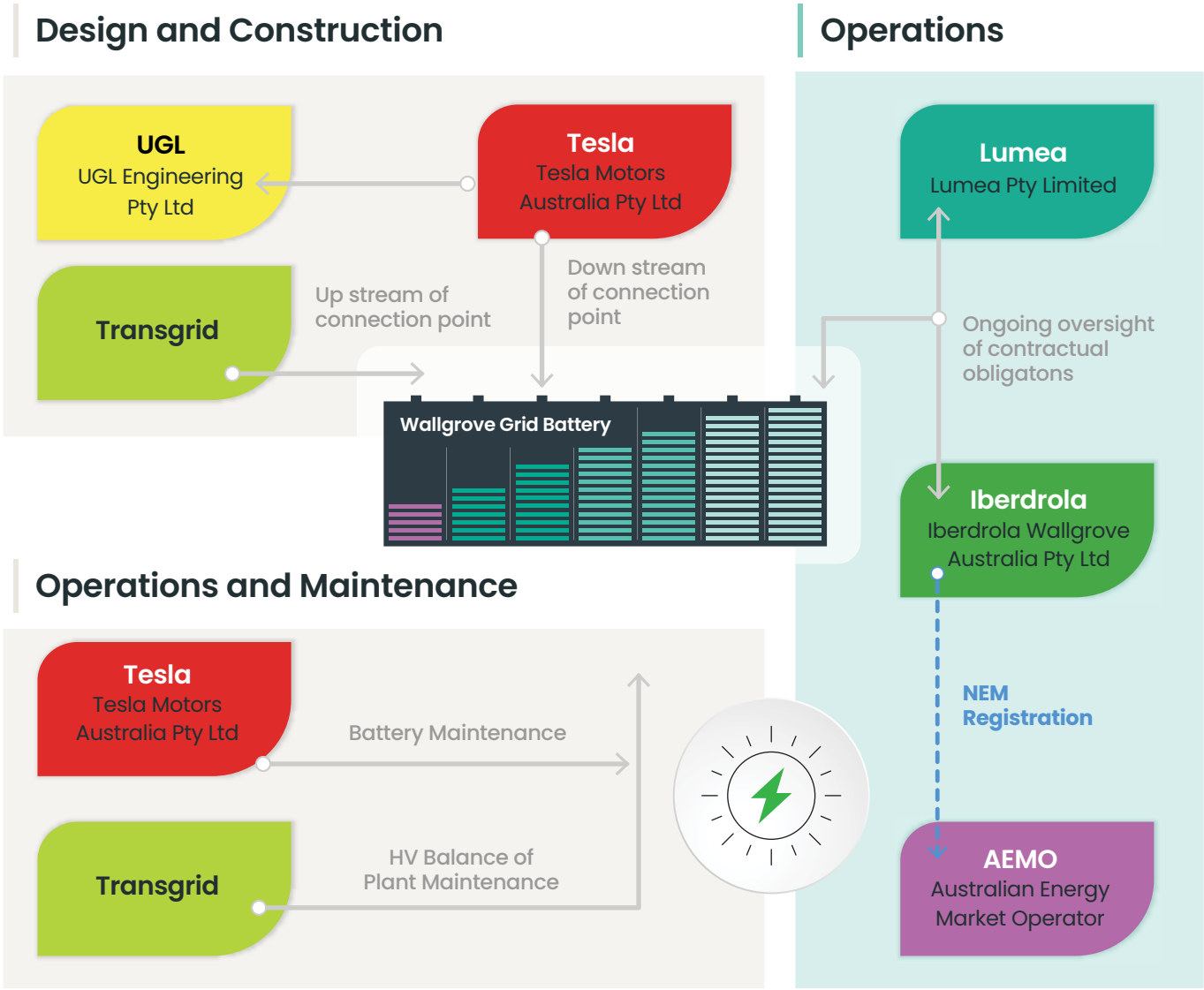


Figure 2 Responsibility model

The WGB initially aimed to manage project risk through a full wrap of EPC and O&M. However, Lumea ultimately engaged Transgrid to provide O&M on the Balance of Plant (BoP). Tesla was responsible for all EPC works downstream of the connection point, including the high voltage transformer.

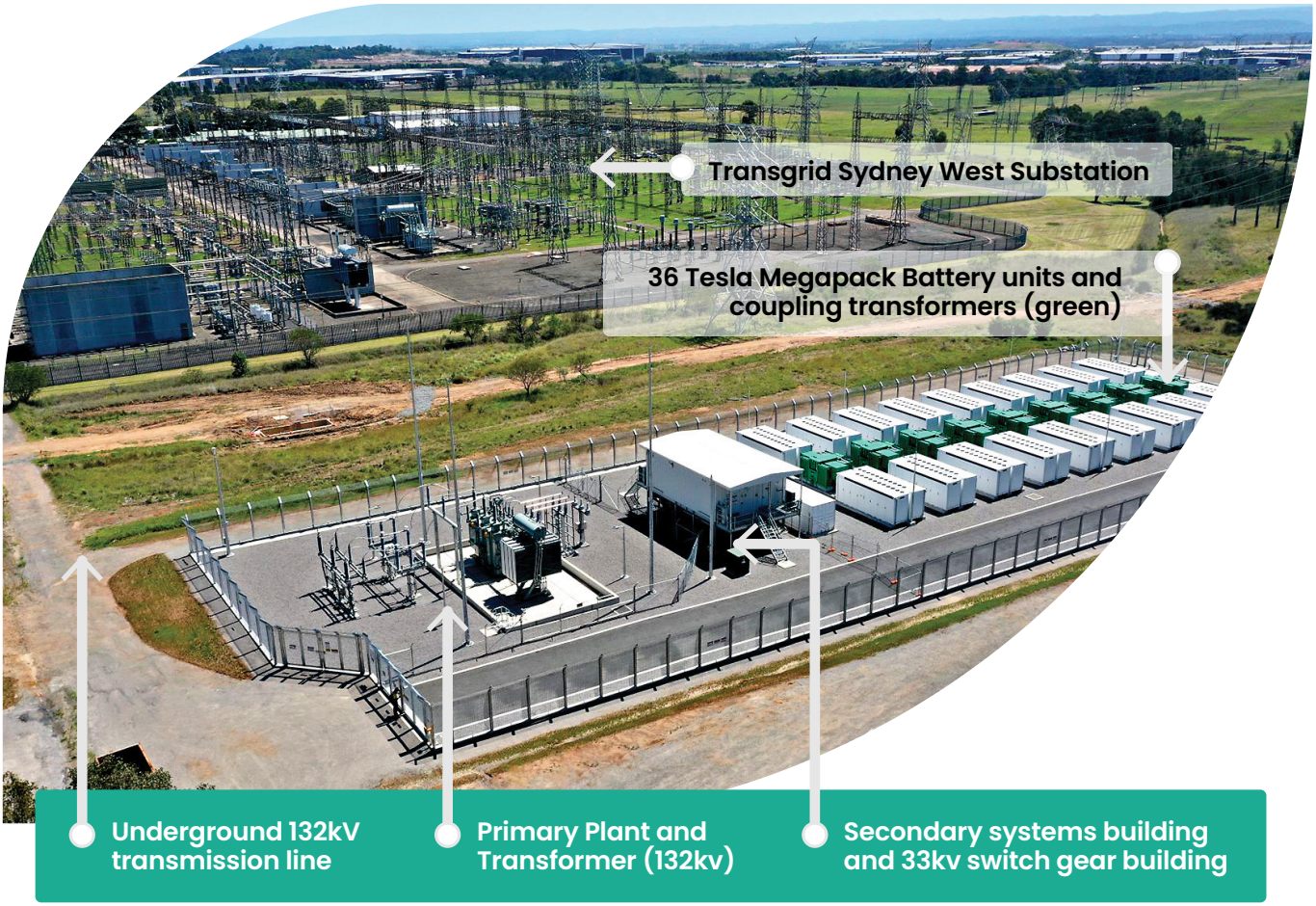


Photo 3 – Wallgrove Grid Battery and Sydney West 330/132kV Substation aerial view

Photo 3 labels key physical assets. With the exception of the battery packs, all the assets which were delivered by Tesla are now the O&M commercial responsibility of Lumea, as outlined in *Table 2*, below. A 132kV switchbay was required to connect the transmission line from the WGB within the Transgrid Sydney West Substation. These works occurred in the area at the upper left edge shown in Photo 3 and were performed by Transgrid. They continue to the maintained by Transgrid.

Asset	Responsibility in D&C	Commercial liability and management	Service delivery Partner
Underground 132kV transmission line	Tesla	Lumea	Transgrid
Primary plant and transformer	Tesla	Lumea	Transgrid
Secondary systems building and 33kV switch gear	Tesla	Lumea	Transgrid
Tesla Megapack battery units	Tesla	Tesla	Tesla
Coupling transformers	Tesla	Lumea	Transgrid
132kV switchbay inside Sydney West Substation	Transgrid	Transgrid	Transgrid

All land access and approvals were undertaken by Transgrid as the asset is located on Transgrid landholdings that form part of the 99-year State Network lease with the NSW Government. A Battery Service Agreement is in place to meet the requirements of the National Electricity Rules (NER) for network connections.

5.4. Revenue model

The WGB project receives both regulated and unregulated revenue. The regulated revenue is derived from Transgrid's Transmission Use of System (TUOS) charges and comprises a regulated return on the $5.9m capex allocated to Transgrid's RAB. The AER makes a determination on this return and revenue at five-year intervals in accordance with the NER.

The unregulated portion is associated with Iberdrola Australia's use of the WGB. That component of the project was capitally funded by Lumea's security holders and earns revenue from the fees paid by Iberdrola Australia to Lumea for battery capacity. The ongoing management of contracts is performed by Lumea.

The Battery Services Agreement with Iberdrola Australia Wallgrove Pty Ltd (a subsidiary of Iberdrola Australia Limited) gives Iberdrola Australia the rights and responsibilities to:

- Dispatch control of the WGB in the NEM
- Retain all commercial revenues (and pay all costs) related to the WGB's operation in the NEM (excluding repayments to ARENA if revenue thresholds are exceeded)
- Be the Registered Participant (as an intermediary) for the WGB in the NEM
- Pay Lumea a fee for the right to use the WGB
- Retain energy storage capacity for network services as a priority

The unregulated revenue comprises the fees paid by Iberdrola Australia under their battery services agreement. The term of the battery service agreement is 10 years from the services commencement date of 22 December 2021, at which point a decision will be made regarding revenue streams, based on market conditions at the time.

6.1. Shared funding model

The commercial model demonstrates that regulated and non-regulated revenues can co-exist in the same revenue stack for the benefit of consumers and the network. A network service provider solving the network need alone would have passed higher costs to consumers through increased allocation to the RAB and may not have met the regulatory investment tests in place at the time of investment. By offsetting the costs with a complementary role for private funding and competitive market revenues, the hybrid commercial model creates a stronger network and provides the technology that supports the increasing penetration of renewable generation, while creating more competition that reduces costs to consumers. The additional support of ARENA and the NSW Government directly reduced the burden on bills for NSW energy consumers and provided innovation to support future projects for the transition to renewables.

6.2. Lesson Learnt: alignment of financial and physical responsibility for assets

Tesla was the head contractor for project delivery, with design and construction works subcontracted to UGL. One approach to manage risk for projects of this nature is to have a single delivery partner provide a fully wrapped EPC and O&M solution, helping to minimise the risk of gaps in the technical solution. However, for this project the scope of the O&M services and ongoing performance guarantees for the supplier were limited to the battery units, leaving a gap between the assets required for a fully operational BESS and those where performance is guaranteed by the supplier.

Such a model was considered by Lumea to be suboptimal. Lumea assumed commercial responsibility for operation and maintenance of more of the BoP to ensure the financial and physical responsibility of assets were closely aligned, and risk was allocated to the party best able to manage BoP failure. The service partner for these services is Transgrid. Lumea and Transgrid are part of the Transgrid Group.

The WGB experience on the full wrap resulted in changes to contract structure in relation to risk allocation and is emerging as a market standard, allowing delivery partners to focus on core product. Future BESS projects should seek to ensure that financial and physical responsibilities are aligned.

6.3. The challenge of navigating ownership

The commercial transaction needed to ensure the split of investment-protected regulatory and commercial requirements through complex agreements between funding agencies, Iberdrola Australia, Transgrid and Lumea. Identifying and negotiating partnering strategies was a significant component of the complexity, along with RAB components that are captured under Transgrid's Transmission Operator's Licence. In an outcome quite specific to Transgrid, this introduced limitations in how the WGB project could be financed.

For the WGB, the complexity in commercial model and contracting was unavoidable, however a lesson from the WGB project is to consider the consequences of different ownership approaches at the inception of future projects, in particular the allocation of risk, and financiers' risk appetites. We expect to see both commercial models and financiers' risk appetites evolve in future as the technology matures.

6.4. Changes in costs of components and technologies

At the commencement of the delivery of the WGB project, Transgrid and Tesla worked collaboratively to identify cost-savings opportunities, whilst not compromising safety, reliability, or security of the asset. The outcome was that minor savings were achieved on equipment, e.g. deviations to Transgrid's transformer specifications were accepted at a commercial advantage without compromise.

As the D&C contract was a fixed price after contract award, there were no observed additional expenses due to components or technological changes during the project delivery. The only minor change was the result of a slight exchange rate movement between tender and award. While the project encountered some cost overrun as a result of COVID-19 and connection complexity, this strategy helped Transgrid manage exposure to cost increases.

7.1. Lesson Learnt: complexity of commercial model

The commercial model to fund the WGB project was complex, given the pilot nature and the four different revenue sources (ARENA, NSW Government, regulated revenue and unregulated revenue from Iberdrola Australia). Twelve separate contracts were negotiated with four counterparties with varying contract terms and risk profiles. The project also undertook parallel discussions with the AER and AEMO given the intended network use of the WGB.

All contracts had to be finalised in parallel and drafted to align across separate companies' commercial interests, as well as the priorities and expectations of two separate grant funding bodies. The lesson learnt is that pilot projects involving multiple revenue sources and stakeholders will involve complex contracting and commercial models. Each additional counterparty adds a significant layer of costs and complexity to a project and should be minimised to the extent possible.

There were complexities associated with defining and allocating risks. They were identified and managed during the negotiations and, in some cases, execution. This was largely unavoidable due to the novelty and complexity of the technologies and commercial model deployed for the WGB project. Other proponents of complex/novel projects should expect such "unknown unknowns" and allow additional time and cost in the project development schedule to deal with them or consider strategies to discover them sooner so they can be dealt with earlier and more efficiently.

8.1. Services that Wallgrove Grid Battery can provide

The WGB can provide:

- Market Services – i.e. energy and ancillary services that are traded via the NEM spot market
- Network Services – i.e. services that are procured solely by TNSPs
- Non-Market Ancillary Services – i.e. other non-energy services that AEMO and/or TNSPs procure via bilateralcontracts

Service	Classification	Procured / traded via	Status
Energy, including the following services which are delivered via the energy spot market: • energy charge • energy discharge • time shifting • firming	Market service	NEM spot market (Iberdrola)	Provided from December 2021
Frequency control ancillary services (FCAS), comprising: • Regulation FCAS – regulating raise service – regulating lower service • Contingency FCAS – fast (6-second) raise service – fast (6-second) lower service – slow (60-second) raise service – slow (60-second) lower service – delayed (5-minute) raise service – delayed (5-minute) lower service	Market ancillary service	NEM spot market (Iberdrola)	Provided from December 2021
Fast frequency response (FFR), comprising: • **very fast raise service** • **very fast lower service**	Network service (*Market ancillary service from October 2023*)	TNSPs (Transgrid) (*NEM spot market from October 2023*)	Provided from December 2021
Inertia	Network service	TNSPs (Transgrid)	Pending
Network support and control ancillary service (NSCAS), comprising: • Reliability and security ancillary service (RSAS) • Market benefit ancillary service (MBAS)	Non-market ancillary service	TNSPs (Transgrid) and/or AEMO	Not currently provided
System restart ancillary service (SRAS) aka Black Start	Non-market ancillary service	TNSPs (Transgrid) and/or AEMO	Not currently provided

8.2. Why the network services are needed

Australia's power systems, including the interconnected NEM power system, operate at a frequency range as close to 50 Hertz (Hz) as possible. AEMO is required to keep frequency in the range 49.85 Hz and 50.15 Hz.

If the frequency goes too far outside this range, the system doesn't operate as it should. If the system has more power than it needs at any instant, its frequency will increase. If there is not enough power to meet demand at any time, the system frequency falls.

When the frequency is outside the optimal range, large motors that draw power from the network, and generators, can start disconnecting to protect themselves against damage. If these disconnections are uncontrolled, they create more imbalance between demand and supply in the system, further affecting frequency. Consumers can experience a full or partial blackout.

A battery can help manage system frequency by injecting more power into the system when frequency is too high and absorbing excess power from the system when the frequency is too low.

8.3. How the network services interact with market services

The WGB is trialling two specific network services that help maintain stable frequency in the NEM power system:

- Inertia delivered via Tesla's "Virtual Machine Mode", which is an advanced inverter capability that emulates a synchronous generator's characteristics, including its mechanical inertia (i.e. the ability to rapidly change its power output to resist sudden changes in grid frequency).
- FFR is delivered by a "droop response", which adjusts the WGB's real power output in direct proportion to the local grid frequency. For example, a 50MW battery may be configured to adjust its power output by approximately 0.6MW for every 0.01Hz change in frequency above 50.15Hz or below 49.85Hz. The same mechanism is used to deliver Contingency FCAS, however Contingency FCAS requires this adjustment to be made within 6 seconds, 60 seconds, or 5 minutes (depending on the specific service), whereas FFR requires this adjustment to be made much more quickly, within 0.5-2 seconds.

The FFR change in power output can be in either direction, i.e. the battery can either:

- Export more (or import less) power to help raise the grid frequency (called a "raise" service)
- Export less (or import more) power to help lower the grid frequency (called a "lower" service)
- Inertia, FFR, and Contingency FCAS all require the battery to change its power output in direct response to a frequency disturbance, but they are provided over consecutive timeframes, and hence do not conflict with each other, i.e.
- Inertia is provided within the first ~0.5 seconds
- FFR is provided within the first 0.5-2 seconds (taking over from inertia)
- Contingency FCAS is provided as a continuation of the FFR response.
- However, the battery's ability to deliver inertia, FFR, and Contingency FCAS does interact with the provision of market services, depending on:
- The battery's state of charge: the battery needs to be not completely empty (to deliver a raise service) and not completely full (to deliver a lower service).
- The battery's power output at the moment the frequency disturbance occurs: if a 50MW battery is idle, it can deliver 50MW of raise or lower, but if it is already exporting at 40MW, it can only deliver 10MW of raise (but 90MW of lower).

8.4. State of charge required for network services

A portion of the WGB's energy storage capacity is reserved to ensure there is always sufficient energy available to deliver inertia and FFR, in the event of a significant frequency disturbance. Iberdrola Australia is required to maintain an agreed margin from the minimum and maximum states of charge, to ensure the WGB is always able to deliver frequency response in either direction at a time of significant frequency disturbance. These margins are agreed in terms of MWh (not in terms of %) and will always comprise less than 5% of the battery's usable energy storage capacity. The amount of energy reserved is significantly more than required to deliver inertia (delivered within the first 0.5 seconds) and FFR (delivered within the first 2 seconds).

This additional capacity ensures the WGB will be able to continue providing frequency response after the inertia and FFR has been delivered, i.e. it will also be able to provide contingency FCAS for at least 60 seconds (and probably for several minutes). It also allows some safety margin in case of multiple disturbances, inaccurate state of charge measurement, or extended periods during which it is undesirable or impossible to import energy from the grid to maintain the required minimum state of charge.

The agreed margin already allows for the provision of inertia via (VMM) and hence there is no need to change to the margin once VMM is enabled. The agreed margin slightly reduces the effective size of the battery but otherwise does not have any impact on Iberdrola Australia's use of the battery to deliver market services.

The successful commercial operation of the battery in the context of this constraint demonstrates market appetite for this type of structure.

8.5. Power capacity required for network services

The Battery Services Agreement with Iberdrola Australia does not include any requirement to reserve power capacity for network services, as distinct from energy storage capacity, discussed above. This means that the amount of inertia and FFR that the WGB can provide at any point in time is not guaranteed and will depend on the dispatch behaviour of the battery in the NEM.

Figure 3 below shows a summary of the WGB's dispatch behaviour in the NEM since it commenced commercial operations. The battery is idle for approximately 30% of the time, and hence its full nameplate capacity is available to provide inertia and FFR in both directions, for approximately 30% of the time.

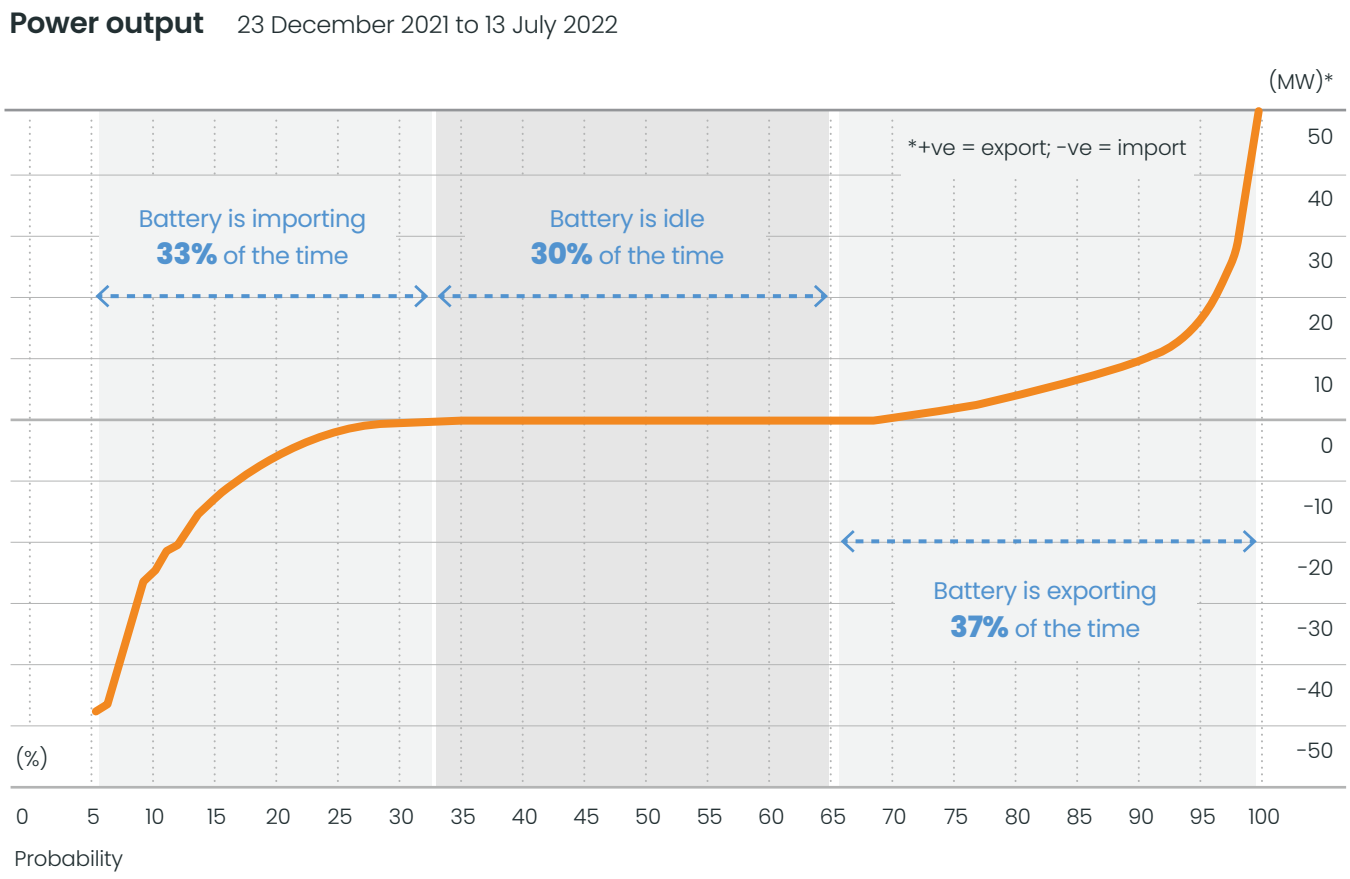


Figure 3 - Wallgrove Grid Battery power output

Figure 4 below shows the WGB's availability to delivery inertia and FFR (raise) based on its behaviour since it commenced commercial operations:

- *The WGB's full nameplate capacity is available to provide raise services approximately 67% of the time.*
- *For 95% of the time, at least 68% of the WGB's nameplate capacity is available to provide raise services.*

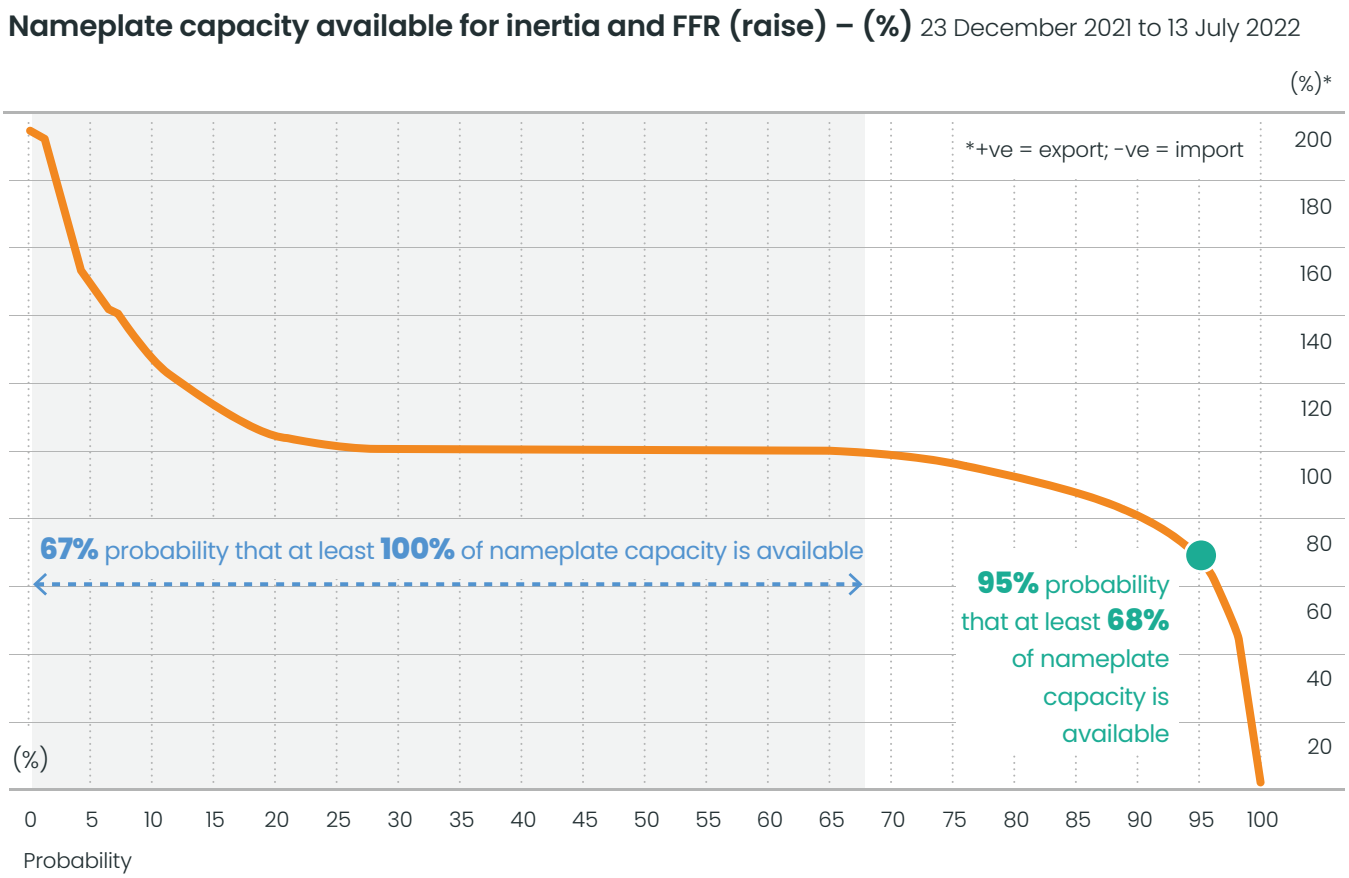


Figure 4 - % of nameplate capacity available for inertia and FFR (raise)

Figure 5 below shows the WGB's availability to delivery inertia and FFR (lower) based on its behaviour since it commenced commercial operations:

- The WGB's full nameplate capacity is available to provide lower services approximately 71% of the time.
- For 95% of the time, at least 49% of the WGB's nameplate capacity is available to provide lower services.

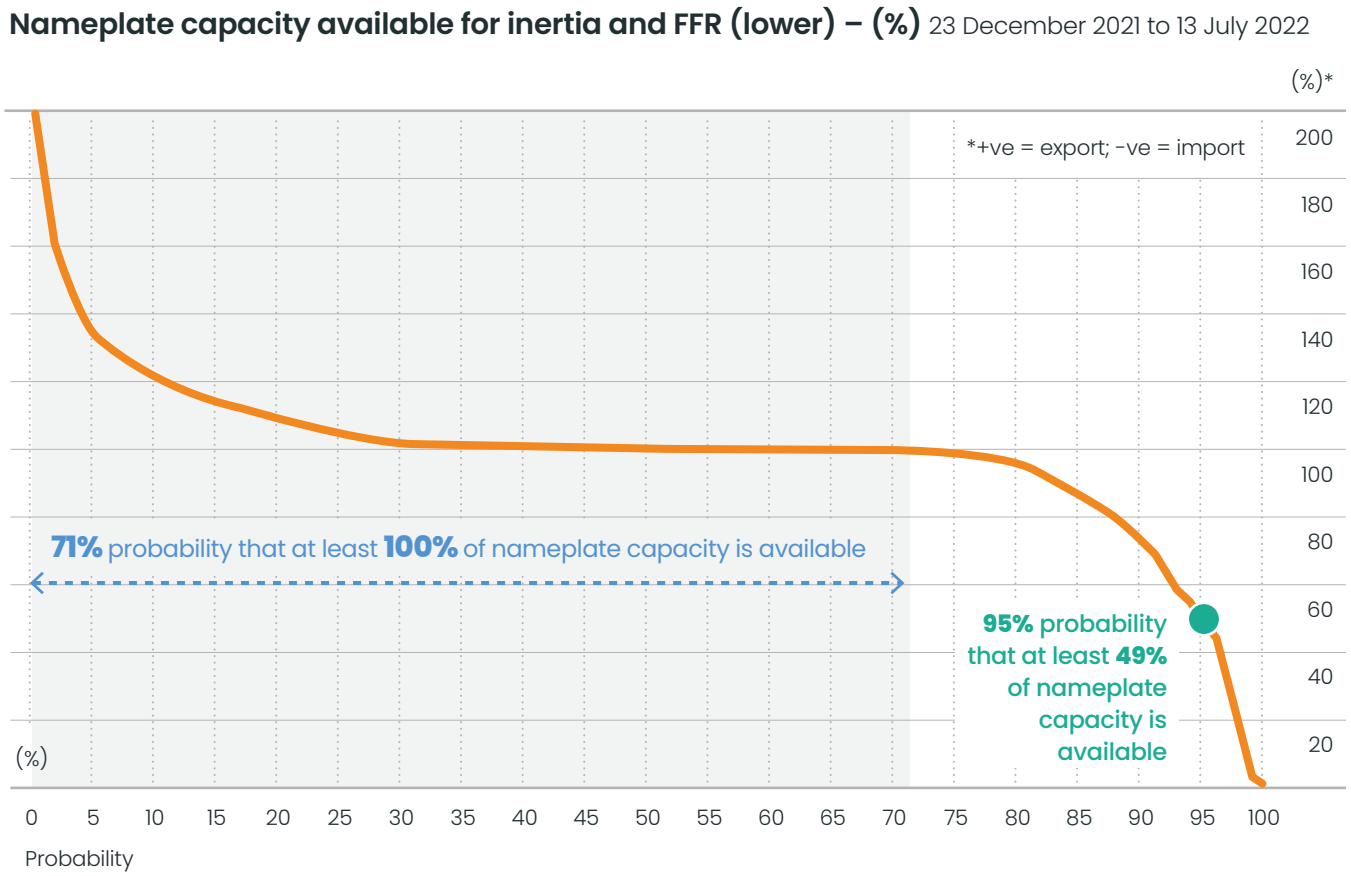


Figure 5 - % of nameplate capacity available for inertia and FFR (lower)

These figures show that without imposing any restrictions on Iberdrola Australia's use of the WGB for market services, the WGB has good availability to provide inertia and FFR most of the time, i.e. the market and network services complement each other well.

It should be noted AEMO is currently able to co-optimise the provision of energy and FCAS via the NEM dispatch engine. When FFR becomes a market service in October 2023, AEMO will gain the ability to co-optimise the provision of FFR. In simple terms, this means Iberdrola Australia (via the bidding process) and AEMO (via the dispatch process) will be able to choose the combination of energy, FCAS, and FFR services that is most complementary and optimal for the network and market conditions at that time.

Under the current NER, a battery that has been contracted to provide inertia only needs to guarantee the provision of inertia if/when "enabled" by AEMO, and this would only occur when there is a credible contingency event that could result in a region of the NEM being islanded. At all other times, there is no need to guarantee the provision of inertia, and therefore no need to restrict the use of the WGB for market services. If in future inertia also becomes a market service (as proposed by a current rule change request), inertia would be dispatched via the NEM spot market (rather than "enabled" by AEMO) and will also be able to be co-optimised with other services in the same way.

The WGB project complied with all regulatory requirements as detailed under each specific regulatory requirement, as below.

9.1. Transgrid's Transmission Operator's Licence (NSW)

The WGB is captured by Transgrid's Transmission Operator's Licence (Licence) issued under the NSW Electricity Supply Act 1995. This is because the battery forms part of the Transgrid transmission network. As a requirement of the Licence, the WGB is part of Transgrid's ISO 55001 certified Asset Management System and aligns with all other conditions of the Licence, including cyber security and data protection.

Under the contractual arrangements, Iberdrola Australia and Tesla are also required to comply with Transgrid's Licence conditions in respect of their activities relating to the WGB. For example, they are not allowed to remotely access, operate, control, or maintain the battery from outside Australia without Transgrid's prior written approval.

The project included a highly specialised networking solution that would allow for continuous monitoring of the Megapack batteries and export of operational and bidding data via the internet to remote servers, without exposing network infrastructure to the risk of a cyber attack. The process has heightened the ability to meet the ever-increasing cyber security demands and will enable smoother connection for future assets.

9.2. Transmission ring-fencing guidelines and competition laws

The WGB commercial model was designed to comply with the Electricity Transmission Ring-fencing Guidelines Version 2 (August 2005), which were in force at the time.

The AER has since published the Electricity Transmission Ring-fencing Guidelines Version 3 (July 2022)[4], which for the purpose of this project, are identical to Version 2, and so for simplicity, in this document we will refer to the Ring-fencing Guidelines Version 3 despite this version not being in force at the time.

9.2.1. Related businesses

Under Clause 7.1 of the Ring-fencing Guidelines Version 3, a TNSP must not carry on a "related business", which means "the activities of generation, distribution and electricity retail supply", unless it carries on related businesses that, in total, attract revenue of less than or equal to 5 per cent of the TNSP's total annual revenue.

- As defined in the NER, "generation" means "the production of electrical power by converting another form of energy in a generating unit". Transgrid owns and maintains the "generating unit" (i.e. the WGB), but Iberdrola Australia (not Transgrid as the TNSP) has dispatch control of the WGB in the NEM and hence controls "the production of electrical power".
- Iberdrola Australia retains all revenue earned from carrying on the activity of "generation". Transgrid does not earn any revenue from the activity of "generation", and Transgrid's revenues (which comprise fees paid by Iberdrola Australia) are fixed in advance and do not depend on Iberdrola Australia's performance of the activity of "generation".

4. https://www.aer.gov.au/system/files/AER%20-%20Electricity%20Transmission%20Ring-fencing%20Guideline%20%28interim%29%20-Version%203%20-%20July%202022.pdf

- Iberdrola Australia[5] (not Transgrid) is registered as the Generator in respect of the WGB. Transgrid owns and maintains the WGB but is exempt from the requirement to register as a Generator and Customer because Iberdrola Australia is appointed as Transgrid's Intermediary, and hence Iberdrola Australia is registered as the Generator, Customer, and Financially Responsible Market Participant.
- The total revenue from all of Transgrid's "related businesses" (regardless of whether the WGB is considered a "related business") is less than 5% of its total annual revenue.

9.2.2. Provision of connection services

As part of the connection process, Transgrid (as the TNSP) had to provide connection services. Under clause 7.2(b) of the Ring-fencing Guidelines Version 3, a TNSP providing connection services must offer those services to its customers on terms and conditions no less favourable than it provides to itself or its associates.

Transgrid complied with this requirement as follows:

- Transgrid (as the connection proponent) followed the same connection process that would apply to any other customer. This included Transgrid (proponent) submitting a connection application to Transgrid (TNSP) via the connections mailbox (connections@transgrid.com.au).
- Separate teams within Transgrid acted for the proponent vs the TNSP to mitigate any conflicts of interest.
- The battery services agreement with Iberdrola Australia is deemed to be a connection agreement for purposes of the NER and satisfies all requirements for a connection agreement under the Rules.

9.2.3. Cross-subsidisation and discriminatory behaviour

The aim of the Ring-fencing Guidelines Version 3 is to prevent cross-subsidisation and discriminatory behaviour, by preventing TNSPs from using their monopoly position in regulated markets to the disadvantage of competition in other markets. In its ongoing review of the Electricity Transmission Ring-fencing Guidelines[6], the AER notes three specific concerns about the ability of TNSPs to cross-subsidise contestable services via a battery. Transgrid designed the WGB commercial model in anticipation of these concerns as follows:

The ability of TNSPs to install a battery using regulated revenue and subsequently use it to provide other, contestable services, cross-subsidised by consumers of regulated services and providing the TNSP with an advantage in contestable markets:

- The costs of the WGB are apportioned to the RAB in accordance with Transgrid's approved Cost Allocation Methodology.
- The WGB is funded by regulated revenue only to the extent that it provides regulated services.
- The share of the WGB that provides contestable services is fully funded by contestable revenue.

The incentive for TNSPs to oversize a battery at a cost to consumers, with the intention of obtaining additional revenue from supplying contestable services or a leasing fee:

- The WGB was sized to satisfy the network need, at the lowest cost to consumers.
- The power capacity was sized at 50MW, as this was the minimum required to satisfy the network need (i.e. to demonstrate the provision of inertia and fast frequency response at grid-scale).
- The energy storage capacity was sized at 75MWh, with capacity exceeding the network need funded by unregulated investment. The benefit of the additional energy storage capacity outweighs the cost of building it on a standalone basis.
- Through engagement with prospective battery suppliers and Market Participants, it was determined that an energy storage capacity of 75MWh would satisfy the network need at the lowest overall cost to consumers.

5. Iberdrola Australia has registered the WGB under a separate legal entity, Iberdrola Australia Wallgrove Pty Ltd, but for the purpose of this discussion, Iberdrola Australia is the responsible entity.

6. https://www.aer.gov.au/system/files/AER%20-%20Transmission%20Ring-Fencing%20Issues%20Paper%20-%20May%202022.pdf p17

- Cost overruns were borne by the commercial investment reducing risk to consumers on a standalone installation.

The ability for TNSPs to operate their network in a way that favours a third party that leases a TNSP-owned battery:

- Transgrid's non-prescribed revenues in respect of the WGB depend only on the performance of the non-prescribed assets (i.e. the battery and connection assets).
- Transgrid's non-prescribed revenues (i.e. the fees paid by Iberdrola Australia) are not affected by the performance of Transgrid's prescribed transmission network, or any market conditions that may be affected by the performance of Transgrid's prescribed transmission network.
- Transgrid (as TNSP) does not have any incentive to operate its transmission network in a way that favours Iberdrola Australia, or otherwise increases Transgrid's non-prescribed revenues.

9.3. Cost allocation methodology

All costs associated with the WGB allocate to "prescribed transmission services" or "non-regulated services" in accordance with Transgrid's Cost Allocation Methodology as approved by the AER.

9.4. Electricity Supply Act 1995 (NSW)

The WGB project is managed under Transgrid's NSW Electricity Network Safety Management System as a requirement under the NSW Electricity Supply Act 1995 and Transgrid's Transmission Operator's Licence.

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