Australian VANADIUM LIMITED

Unlocking competitive advantage: AVL's energy storage investment platform

Macquarie WA Forum

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ASX:**AVL**

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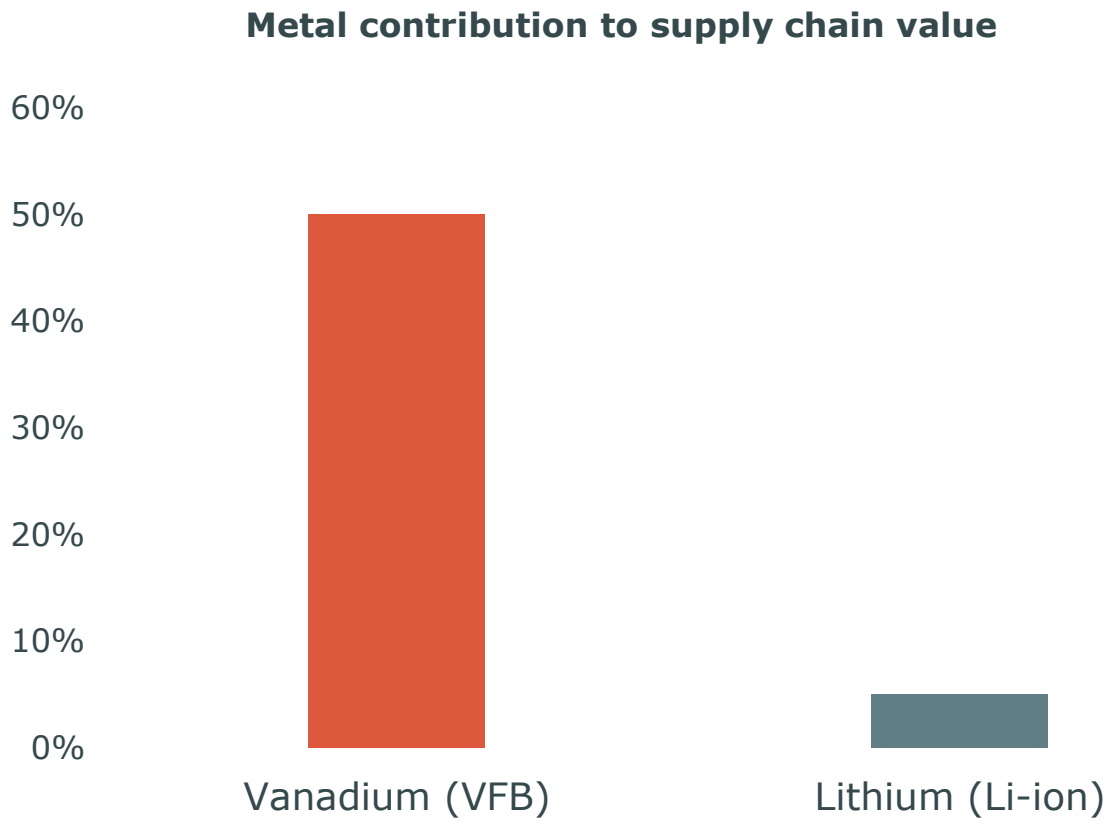
A renewables-based energy transition requires both electricity generation AND matched energy storage

- There is enormous effort and spend on electricity generation – **too little on energy storage despite ambitious decarbonisation targets from State and Federal Governments**
- Vanadium flow batteries provide a **proven, economic solution** for utility scale energy storage
- The value of vanadium in a flow battery provides AVL with an **unparalleled opportunity for value creation**



Indicative only. Based on installed capex of total battery deployment
Source: FBICRC Li-ion battery cathode manufacturing in Australia: A Scene Setting Project and AVL analysis

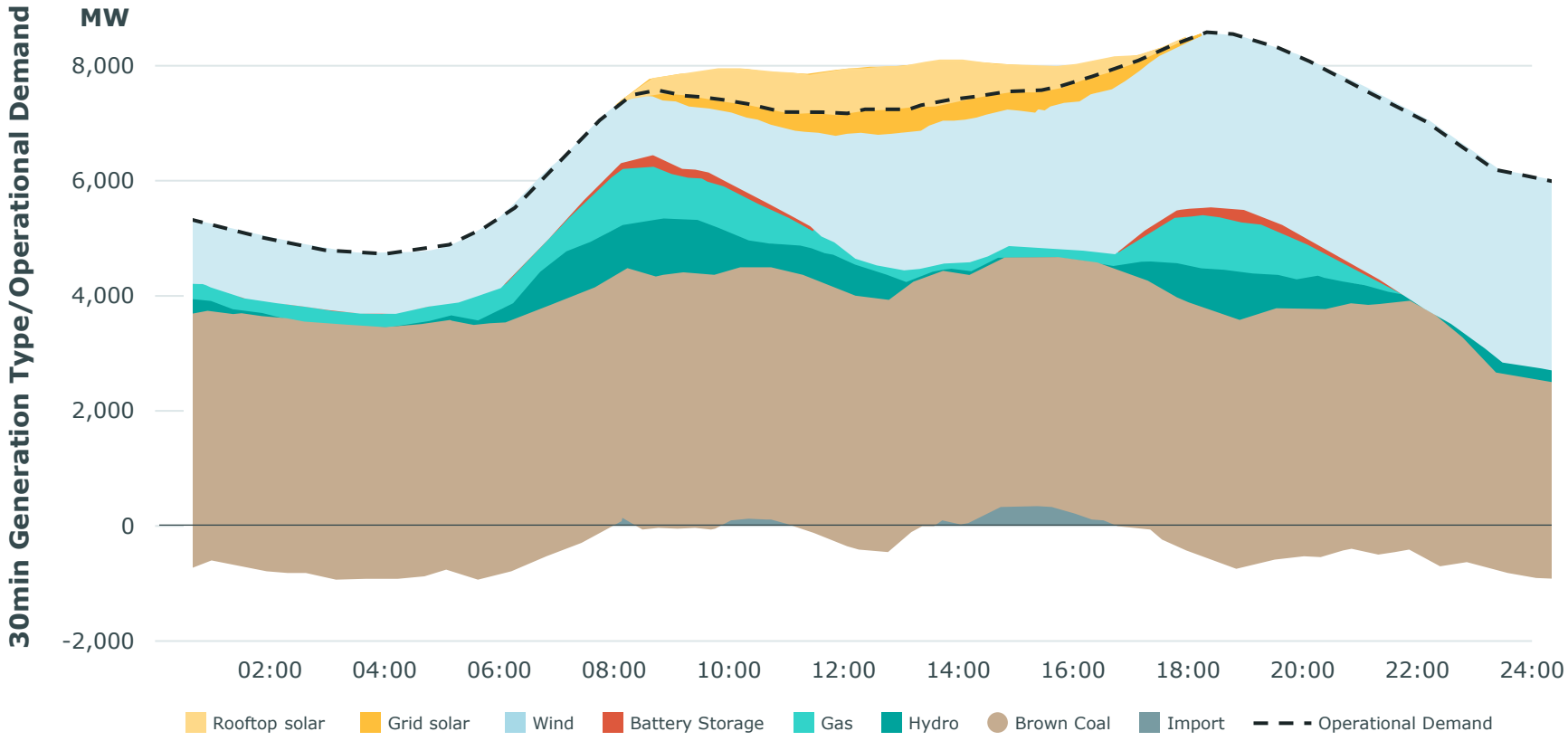
Utility scale energy storage required – Victoria case study

Victoria recently set a new peak power demand record of 8.6GW

Brown coal and wind provided the majority of supply

Victoria needs long duration energy storage to **reduce the reliance on brown coal** and **achieve emission reduction targets**

Winter operational demand – Victoria 15 July 2024



Source: Australian Energy Market Operator (AEMO)

The VFB is a proven and commercialised technology at scale

VFBs are operational across 20+ countries

Japan

Sumitomo Electric Industries

15MW x 4 hour and 17MW x 3 hour VFB in Hokkaido, Japan

First operational since 2015, second since 2022

Services: frequency regulation, renewable generation smoothing

China

Rongke Power

100MW x 4 hour VFB in Dalian, China

Operational since 2022

Services: support grid stability, peak shaving, frequency regulation, renewable integration, black start, auxiliary power supply

USA

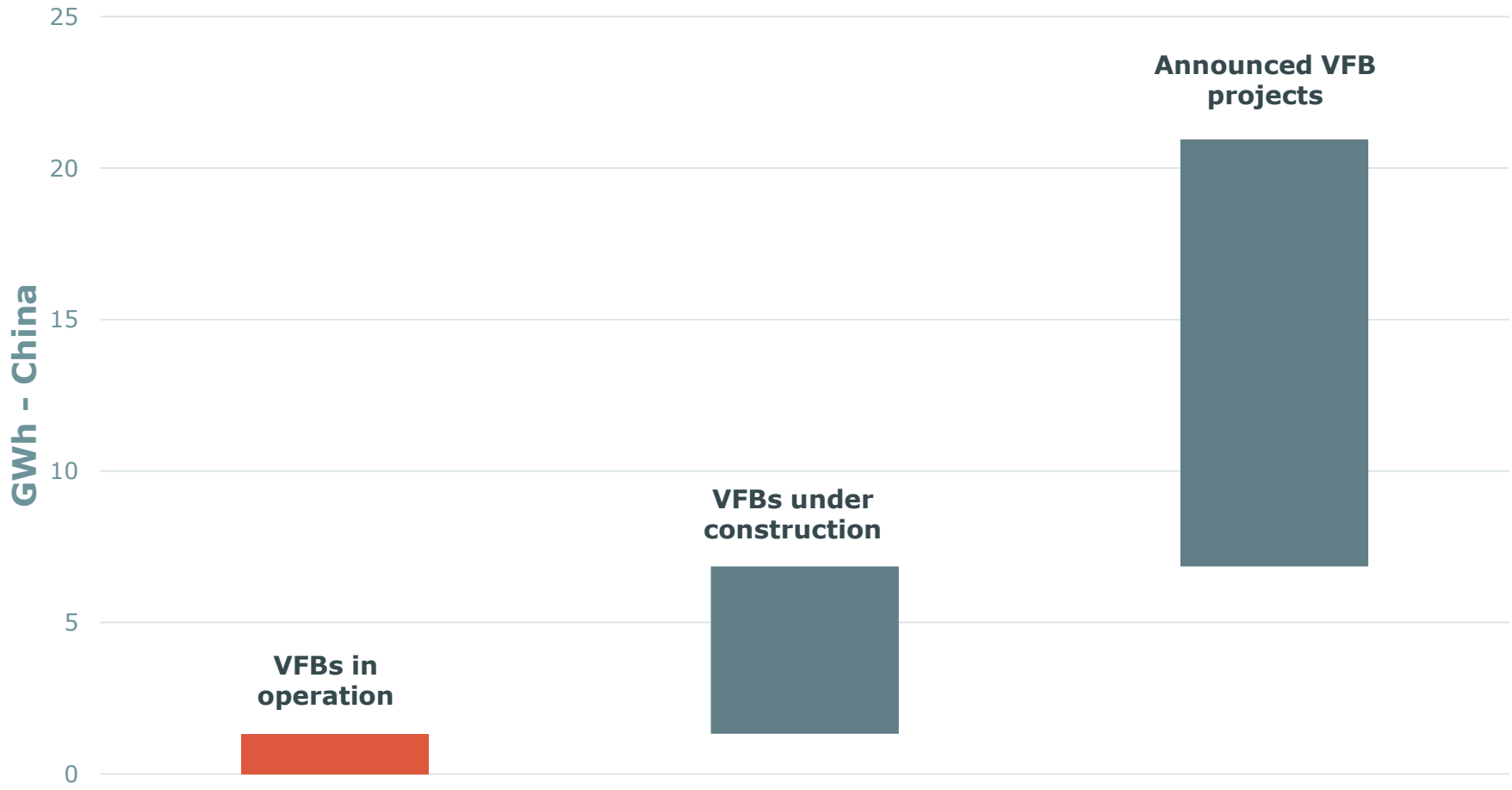
Sumitomo Electric Industries

2MW x 4 hour VFB in San Diego, USA

Operational since 2017

Services: microgrid operation, peak shaving, renewable firming, market participation in energy and ancillary services

VFB adoption in China is already at GWh scale
Australia has all the right ingredients to be a fast follower



Source: Vanitec and FerroAlloyNet

Project Lumina[1] – modular, turnkey, utility scale VFB

Project Lumina - targeting deployment ready energy storage solution for utility scale long duration storage

- Project Lumina is the detailed design of a modular, scalable, turnkey, utility-scale 100MW battery energy storage system using a vanadium flow battery (VFB BESS) on a 4-hour (100MW/400MWh) or 8-hour (100MW/800MWh) duration
- Potential to achieve a levelised cost of storage **(LCOS) for a 4-hour 100MW VFB BESS of A$274/MWh (± 30%)** which is anticipated to be competitive with the LCOS of a similar lithium-ion BESS
- The intention of Phase 2 is for the Company and potential third-party investors to be able to make a final investment decision on utility scale VFB BESS solutions by VSUN Energy by Q3 CY2025
- Project Lumina will utilise well-established vanadium flow battery technology, optimised for local conditions, to de-risk the energy storage system
- AVL is considering a range of funding options, which are expected to include debt supported by strategic equity or cornerstone equity funding, including from Australian Government agencies

Opportunity for vertical integration of AVL's business to capture margin across the supply chain

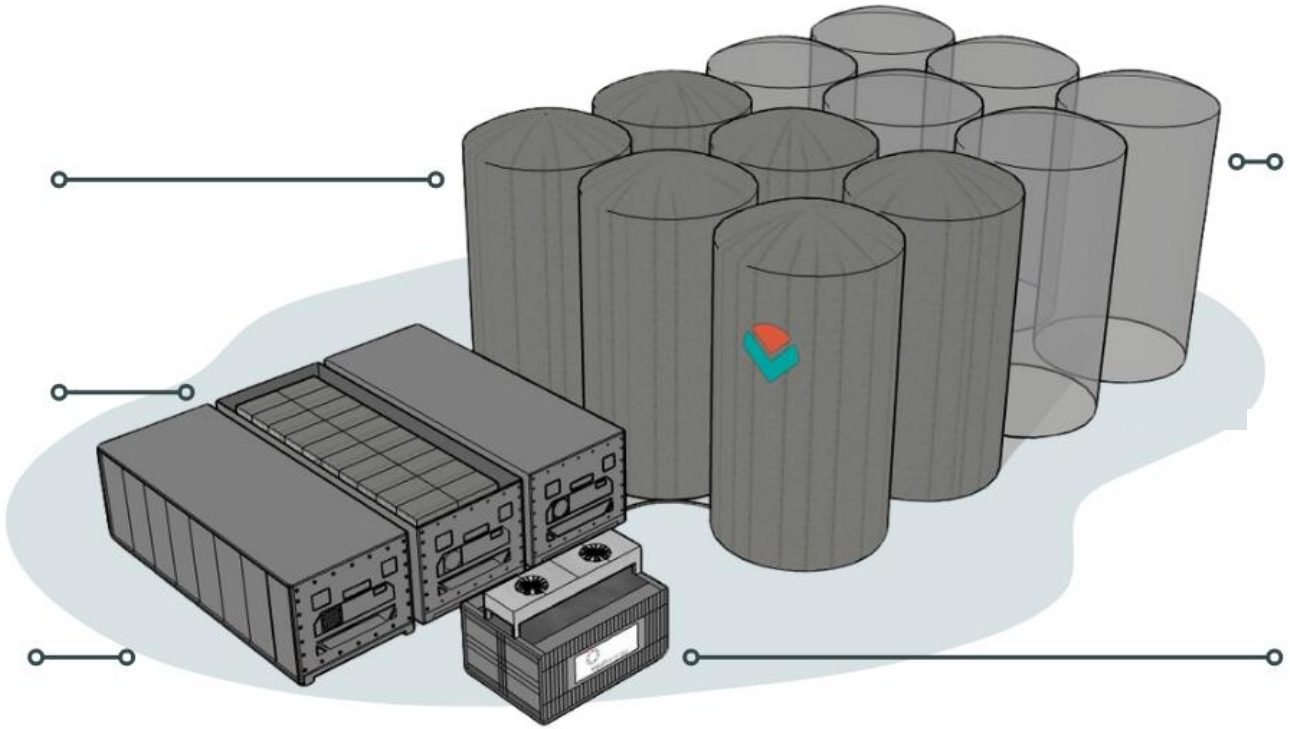
Align with proven VFB OEMs to reduce technical risk

Ability to scale business model in a market with growing demand for long duration energy storage

Potential to deploy in Build Own Operate business model

[1]Refer ASX announcement 'Realising AVL's utility scale vanadium flow battery strategy' dated 6 November 2024

Project Lumina - Leveraging proven technology and specialist EPC and OEM partners to minimise technical risk



Vanadium electrolyte

Sourced from an AVL electrolyte manufacturing facility

Battery Technology

Utilise proven VFB technology from global suppliers

Project Management

VSUN Energy or third-party provider

Forward Planning

Ensuring additional units can be installed as required to allow capital efficient augmentation to longer duration

Power Conversion System (PCS)

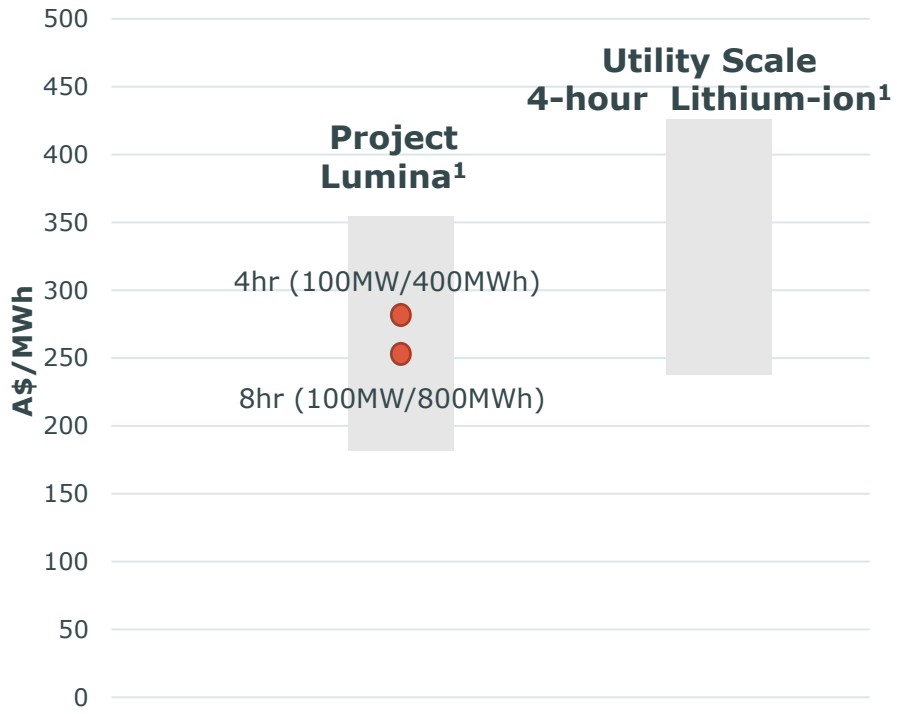
Proven solutions from established manufacturers

Site Infrastructure

Utilise local specialist EPC partners

Project Lumina – competitive LCOS unlocks benefits of VFB

Levelised Cost of Storage (LCOS)



Benefits of Vanadium Flow Batteries

With a competitive LCOS, the focus should shift to the competitive advantages of VFBs which include:

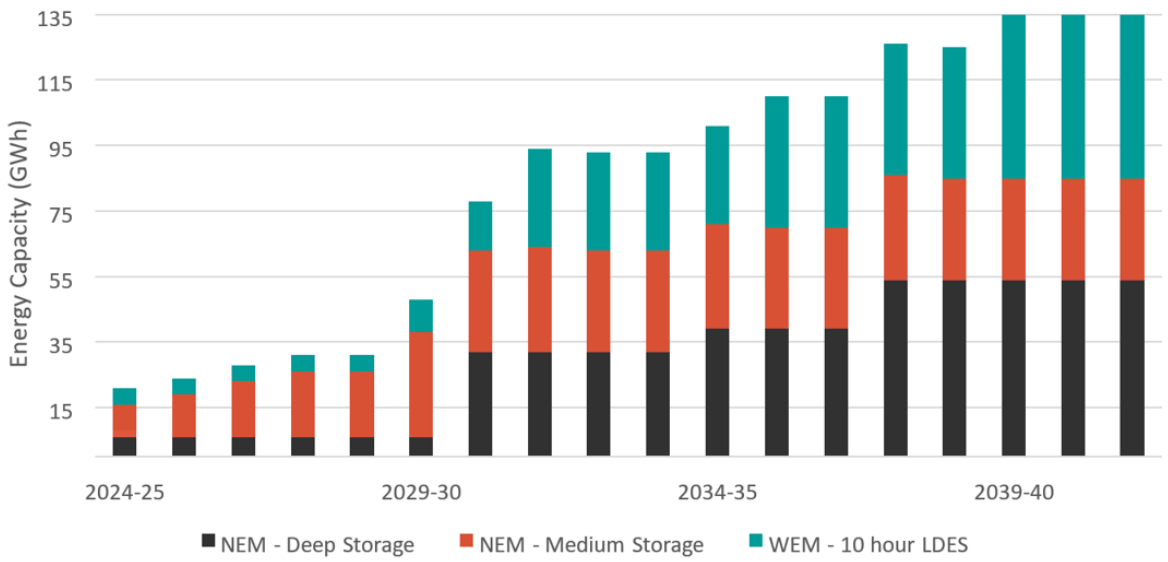
- ✓ Proven technology with a history of nearly 20 years of grid-connection
- ✓ Ability for multiple discharge cycles per day
- ✓ Operating life of a conventional VFB is estimated at 30+ years, exploring options to extend to 40+ years
- ✓ Ability to expand discharge duration to meet growing market requirements
- ✓ Non-degrading, ensuring installed capacity is available over the life of the BESS
- ✓ Non-flammable technology
- ✓ Capability for positive end of life environmental impact with over 99% of commercial end-of-life reuse and recyclability

1) See ASX announcement 'Realising AVL's utility scale vanadium flow battery strategy' dated 6 November 2024
2) Based on utility-scale battery without subsidies (100MW, 4-hour / 400MWh and 100MW, 8-hour / 800MWh compared to a 100MW, 4-hour / 400MWh lithium-ion battery).

Positive outlook for longer duration energy storage

- The Australian Energy Market Operator (AEMO) projects medium to long-duration energy storage capacity (excluding pumped hydro) to grow to 120 GWh by 2040
- Annual increase of around 7 GWh over the next ~25 years
- Implied average duration for AEMO's forecast storage capacity, excluding pumped hydro, is approximately 11 hours.
- Vanadium flow batteries are a proven solution to address this growing demand

NEM and WEM Deep and Medium Storage Forecasts 2024 to 2042



See ASX announcement 'Realising AVL's utility scale vanadium flow battery strategy' dated 6 November 2024

VSUN Energy – leveraging partners to accelerate deployment

Technology and Deployment

- Progressing partnering opportunities with EPC/EPCM contractors to perform installation
- Advancing discussions with VFB technology partners to secure strategic alliances with key manufacturers[1]

VFB Funding

- Long asset life provides multiple funding opportunities, including strategic or cornerstone equity
- Advancing government grant, asset infrastructure and JV partner funding models

Energy Offtake

- Currently in discussions with several sophisticated energy offtakers for potential deployment of VFB BESS solutions in Australia[1]

Land Access

- Advancing discussions to secure land access with partners for long duration energy storage projects[1]
- Competitive advantage in ability to use locations unsuitable for other technologies

Clear and focussed strategy allows for rapid deployment of VFBs to meet demand

1) These discussions remain confidential and preliminary in nature and should not be taken to be indications that any discussions will result in a binding agreement
2) See ASX announcement 'Realising AVL's utility scale vanadium flow battery strategy' dated 6 November 2024

Vertically integrated to generate value across the supply chain

	Upstream	Midstream	Downstream
	 **Vanadium Mining and Processing**	 **Electrolyte Manufacture**	 **Utility scale BESS Solutions**
Asset	Australian Vanadium Project	Electrolyte manufacturing facility	VSUN Energy
AVL advantage	High-grade project in Tier-1 jurisdiction	Established facility	Vertically integrated to deliver cost competitive VFB storage solutions
Status	Optimised Feasibility Study progressing	Producing battery grade electrolyte	Project Lumina Targeting Deployment Readiness –Q3 CY2025 Establishing key partnerships for accelerated growth

UPSTREAM

The world class Australian Vanadium Project unlocks our vertically integrated strategy

- A world class asset located in Western Australia, a Tier-1 mining jurisdiction
- Simple open pit mining with standard magnetite concentrator process
- Proven processing technology that reduces project risk
- Optimised Feasibility Study (OFS) underway, aimed at creating project with superior economics
- Current focus on finalising remaining approvals, while securing offtake and funding

MIDSTREAM
Proven vanadium electrolyte manufacturing capacity

AVL built, owns and operates a manufacturing facility in Perth, Western Australia, capable of commercial vanadium electrolyte production

- 33MWh per annum energy storage equivalent of vanadium electrolyte production
- First production completed in 2024
- First use of AVL's vanadium electrolyte in an Invinity Energy Systems battery for WA utility Horizon Power
- Qualification of electrolyte well advanced with VFB industry leaders
- Ability to scale and replicate facility to meet growing demand
- Ability to process 3rd party vanadium oxides to supply high quality electrolyte prior to AVL oxide production

Pictured: AVL's CEO Graham Arvidson and Premier of Western Australia Hon Roger Cook MLA

DOWNSTREAM
VSUN Energy – engaging with mining and utility customers

IGO Limited

Nova Nickel Operation (Western Australia)

Installation of a VFB to provide storage capacity to allow for carbon free electricity to be used 24/7 at the Nova Nickel operation, reducing their CO_2 emissions as part of IGO's broader net-zero strategy.

Status: Battery operational, standalone power system under final stages of commissioning

Horizon Power

Kununurra (Western Australia)

Horizon Power, a utility owned by the Western Australia government, purchased a vanadium flow battery (VFB) to be installed at Kununurra as part of a long-duration energy storage project.

Status: Undergoing site acceptance testing and commissioning

Investment thesis

VFB rapid uptake into GWh scale energy storage systems

- Led by China, with over 20GWh of announced VFB projects
- Australia can be a fast follower given high level of renewable energy generation capacity

High metal content of VFBs

- Access to quality and quantity of vanadium oxides is critical to supply chain scalability

World class Australian Vanadium Project

- Project provides supply chain scalability and security for VFBs
- Advancing toward FID - permitting, offtake, financing

Ability to capture downstream value

- Competitive LCOS of VFB as solution for high growth long duration energy storage market
- VFBs display operational advantages vs lithium-ion BESS

Platform solution to long duration energy storage

- Whole of supply chain solution creates scalable LDES platform

Australian VANADIUM LIMITED

+61 (08) 9321 5594

info@avl.au

www.avl.au

Level 2, 50 Kings Park Road, West Perth,
Western Australia 6005