



ASX ANNOUNCEMENT

4TH SEPTEMBER 2019

AVL SECURES VANADIUM REDOX FLOW BATTERY SALE

Vanadium Redox Flow Battery to form part of solar and energy storage system at an orchard in Victoria

KEY POINTS

- **AVL's wholly owned subsidiary, VSUN Energy Pty Ltd, has secured an order for an 20kW/80kWh vanadium redox flow battery**
- **The vanadium energy storage system will be installed at an orchard in Pakenham, Victoria**
- **The system will be attached to an existing 60kW solar array which will be expanded by a further 100kW of solar generation**
- **Increased renewable energy supply is the key driver for the client**
- **The agricultural sector provides a strong client base for reliable, safe and long-duration energy storage**
- **Final configuration is dependent on results of grant application**

Australian Vanadium Limited (ASX: AVL, "the Company" or "AVL") is pleased to announce the sale of a solar and vanadium redox flow battery (VRFB) energy storage system by its 100% owned subsidiary VSUN Energy Pty Ltd (VSUN Energy). The final project configuration is subject to the successful award of the Victorian on-farm energy grant under the Agriculture Investment Energy Plan. The client has paid a deposit for the solar and battery set up.

VSUN Energy was launched by AVL in 2016 to drive growth of the VRFB market in Australia. Its first VRFB installation was at a native tree nursery in Busselton, Western Australia, (see ASX Announcement dated 18 May 2016 '*AVL Signs First CellCube Vanadium Battery Sale in Western Australia*').

In collaboration with renewable systems provider Profit Share Power Pty Ltd, VSUN Energy will install a 100kW solar system with a 20kW power, 80kWh energy storage VRFB at an orchard in Pakenham, Victoria. The system will provide a minimum of four hours of stored renewable energy with its designed configuration and will allow the client to increase their onsite renewable generation and consumption, far in excess of what would be capable with a standalone solar array.



The orchard, owned by Priest Bros, is located in Pakenham on the edge of the Gippsland region of Victoria. The family owned and operated orchard covers around 80 acres over three properties and produces many different varieties of apples. Priest Bros' goal is to reduce the emissions generated via energy use for the orchards and to provide a reliable and renewable source of power to the site, particularly the irrigation system and packing sheds.

AVL's Managing Director Vincent Algar commented, "The agricultural sector is seen as a key market for VRFB energy storage systems. I recall reading about a dairy farmer in Holland installing a battery in 2016 and VSUN Energy's first installation was at a native tree nursery in Busselton. I think the qualities of a long-life asset which will reliably deliver renewable energy via a non-flammable product are key strengths of the VRFB that particularly appeal to the farming sector."

We are delighted to be working with Priest Bros and Profit Share Power on this project and are particularly pleased that they have decided to pursue a battery product that will allow them to reduce their overheads whilst still achieving their primary aim of sustainable operations. Having this Australian invention working consistently on a daily basis for the next 20+ years at the orchard, shows that there is a growing recognition of the role that VRFBs can play in the energy storage sector.

We and many of our partners see the integration of VRFBs with generation systems as being the building blocks of many renewable energy projects about to be rolled out, where businesses decide that they want a long life, low risk source of renewable and uninterrupted power."



Figure 1 Priest Bros Apple Orchard



Shane Priest of Priest Bros' commented, "We have had our initial 60 kW solar system installed for some time now and enjoy the energy cost savings it delivers. Having reviewed our energy use we know that increasing our solar capacity and adding energy storage is going to improve both our energy reliability and reduce our operating costs. We were particularly attracted to the VRFB due to the lack of flammability and the number of hours of energy it could provide along with the added bonus of its long life. Being a hard working business, we need equipment that can work hard for us and when you see the ability of the VRFB storage technology to handle rapid and frequent charge/discharge cycling with no impact on the battery life, well it was a no brainer to choose that technology."



Figure 2 Avalon Battery VRFBs

The VRFB solution for this project is being supplied by battery manufacturer Avalon Battery. The VRFB's strengths are its longevity, lack of performance degradation over time and thousands of cycles, 100% depth of discharge and the ability to re-use the non-flammable vanadium electrolyte at the end of the battery's life. Avalon Battery has recently entered into an agreement with South African vanadium producer, Bushveld Minerals, to provide a leasing option for vanadium electrolyte. This reduces the capex of the VRFB and provides security of electrolyte disposal in the future.

Vanadium is traditionally used to strengthen steel, but there is a growing global demand from energy storage through its use in VRFB and in the cathodes of lithium-ion batteries. VSUN Energy was launched by AVL in 2016 to drive the Company's vertical integration strategy, with the Company planning to produce vanadium products for customers in both the steel and battery markets. To achieve this, a pilot vanadium electrolyte plant was installed at the University of Western Australia and the Company

successfully produced vanadium electrolyte, (see ASX announcement dated 19 January 2017 '*AVL successfully produces Vanadium Electrolyte from Pilot Plant*'). Work undertaken during metallurgical testing for The Australian Vanadium Project has enabled the Company to produce a standard mine product of a high purity 99.4% V₂O₅, with samples becoming available after the current testwork to undertake further evaluation of V₂O₅ purification for battery and specialty chemical markets, (see ASX announcement dated 28 May 2019 '*High Purity Pentoxide Produced*').

For further information, please contact:

Vincent Algar, Managing Director

Tel: +61 8 9321 5594

ABOUT AUSTRALIAN VANADIUM

AVL is a resource company focused on vanadium, seeking to offer investors a unique exposure to all aspects of the vanadium value chain – from resource through to steel and energy storage opportunities. AVL is advancing development of its world-class Australian Vanadium Project, with 183.6Mt at 0.76% vanadium pentoxide (V₂O₅), containing a high-grade zone of 96.7Mt at 1% V₂O₅ with an Ore Reserve of 18.24Mt at 1.04% V₂O₅ comprised of a Proved Reserve of 9.82Mt at 1.07% V₂O₅ and a Probable Reserve of 8.42Mt at 1.01% V₂O₅, reported in compliance with the JORC Code 2012 (see ASX announcement dated 19 December 2018 '*Gabanintha Pre-Feasibility Study and Maiden Ore Reserve*').

AVL has developed a local production capacity for high-purity vanadium electrolyte, which forms a key component of vanadium redox flow batteries (VRFB). AVL, through its 100% owned subsidiary VSUN Energy Pty Ltd, is actively marketing VRFB in Australia.

ABOUT PRIEST BROS

Priest Bros is a fourth-generation family owned and operated orchard that has been growing premium quality fruit for over 100 years and is located in Pakenham, on the edge of the Gippsland region of Victoria. Priest Bros Orchards has around 80 acres of apple trees over three properties that produce many different varieties.

ABOUT PROFIT SHARE POWER

Profit Share Power supplies, builds and maintains onsite power generators. After a successful site assessment, Profit Share Power uses any and all available subsidies (available for renewable power generators – whether they are reliant upon battery, solar, solar thermal, wind or any other renewable type of onsite power generation) to make the electricity those generators supply to the customer's site, lower cost than any grid-supplied electricity retailer can provide.