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V-KOR Vanadium Battery Arrives in Perth for Trial

-  **V-KOR** trial battery has arrived in Perth from South Korea for first Australian deployment.
- Trial to commence during June at OzLinc Industries in O'Connor, Perth, Western Australia.
- 25kW (100kWh) trial battery to be integrated with a 21kW rooftop solar PV grid connected system.

Protean Energy Ltd (**Protean** or the **Company**) is pleased to advise that a 25kW (100kWh) V-KOR vanadium redox flow battery has arrived in Perth for a trial deployment, at a Perth-based industrial manufacturing site, commencing in June 2018 for approximately 4 months.

V-KOR is a jointly owned battery technology developed using propriety technology which is underpinned by 15 granted patents. The V-KOR technology is jointly owned by Protean (50%) and KOSDAQ-listed DST Co Ltd (50%) (**DST**).

The V-KOR technology has received grant funding of approximately \$120,000 from the Korean government for the development and testing of the V-KOR range of batteries in Australia. The grant has been issued by the Korea Institute of Energy Technology Evaluation and Planning (KETEP) which supports technical innovation in the energy sector.



Figure 1: V-KOR 25kW (100kWh) unit

The V-KOR trial battery consists of 2 electrolyte tanks, 2 battery stacks of 12.5kW, one 25kW inverter, associated electrolyte pumps and a power management system. The battery is housed in a 20-foot container, oversized to allow for ease of inspection during the trial period.

The battery unit will soon be transported to the site of OzLinc Industries (**OzLinc**) in O'Connor, where it is scheduled to operate for approximately four months from June 2018. OzLinc is a supplier of pipe, fittings, flanges, valves and hosing to the Australian marine, industrial and resources sectors. The V-KOR demonstration battery will be charged by a 21.1kW rooftop solar PV grid connected system.

The battery will collect representative operating data, demonstrate charging operation using both grid and solar supply and demonstrate automatic system power stabilization characteristics given a fluctuating solar supply.

Bevan Tarratt, Protean Energy Chairman said, *"This trial is about demonstrating the operation of a vanadium redox flow battery to potential Australian clients. We anticipate that the trial will translate to commercial orders for the V-KOR system. Protean is strategically positioned in the rapidly expanding energy storage market with the V-KOR battery technology and the Daejon Vanadium Project"*.

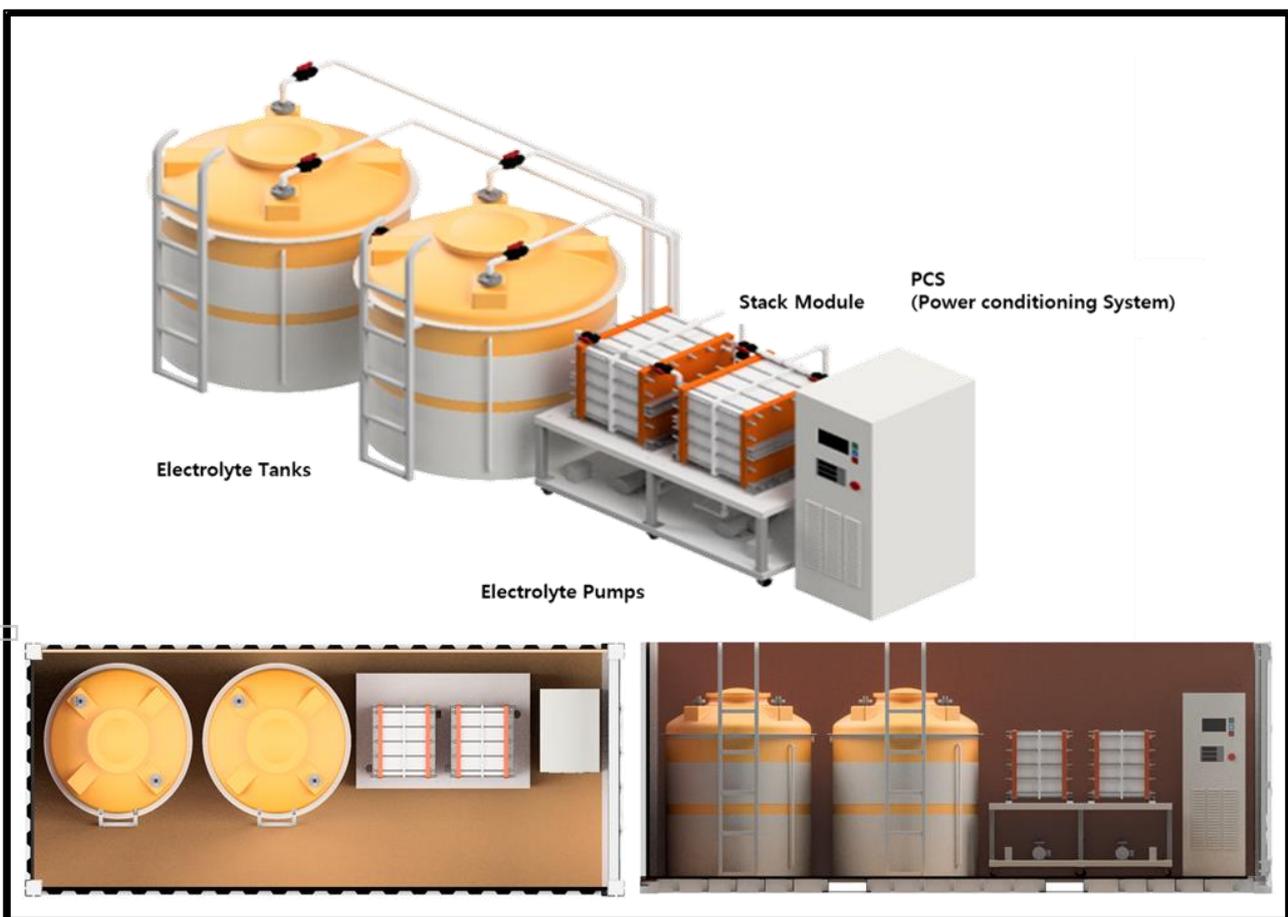


Figure 2: VRFB ESS container components

V-KOR Vanadium Battery

The V-KOR vanadium battery technology, owned 50:50 by Protean and DST, is a proprietary vanadium redox flow battery energy storage system (VRFB-ESS). V-KOR was developed in response to the growing demand for more efficient renewable energy storage solutions. The Company offers battery solutions built to order for commercial, industrial and grid scale applications.

V-KOR is a commercial stage technology that offers a rechargeable flow battery with the ability to store high levels of energy for longer and with a greater life expectancy than existing battery solutions. The V-KOR technology and batteries are scalable with built solutions from 2kW to 20MW or larger to suit customer requirements.

About the V-KOR Vanadium Systems

The V-KOR systems use vanadium ions in different oxidation states to store energy in the form of 2 liquid electrolytes. VRFBs are proven to have excellent durability & life spans up to 20 years.

An important attribute of VRFB systems is that their energy capacity is independent of the power rating, allowing them to be designed for highly specific energy and power requirements and making them well suited to applications with large energy capacity specifications. These batteries are currently used for grid scale energy storage applications where large-scale and long duration electrical energy storage is required. They are an ideal solution for rapidly growing renewable energy generation sources such as solar and wind.

The V-KOR battery has been developed over the past five years and patents have been granted to protect the design. Four stack sizes of flow batteries have been developed to date including 2.5kW, 5kW, 10kW and 25kW units to provide commercial options to customers with varying energy storage needs. VRFBs can be scaled up to provide large (1-5MW) storage units with energy capacity simply increased by increasing electrolyte volume.

Extensive testing has been carried out on both the 5kW and 25kW units. Over 2,000 cycles have been tested on the 5kW stack representing over 6 years of full daily cycles for a typical solar photovoltaic (PV) application and over 1,000 cycles on the 25kW stack with no significant degradation in performance. Both units have been independently tested by Korea Conformity Laboratories (KCL), a leading state-of-the-art national testing laboratory established over 40 years ago. In addition to the Australian trial, currently two 25kW stacks are undergoing field trials with KCL as part of a solar PV and VRFB-ESS combination trial.

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ABOUT PROTEAN ENERGY LIMITED (ASX: POW)

Protean Energy Limited is an energy company focused on the commercialisation of vanadium battery energy storage systems. The Company is also developing a multi-mineral project in South Korea through its 50% holding in Stonehenge Korea Limited (SHK). SHK is a JV company with two KOSDAQ-listed industry partners being DST Company Ltd (DST) [formerly KORID] and BHI Co Ltd (BHI). SHK owns 100% of the rights to 3 projects in South Korea, including the Company's flagship Daejeon Vanadium Project.

For further information, see www.proteanenergy.com or phone: T: + 61 8 9481 2277