Media Release: Vanadium energy storage installation

Australian Vanadium Limited is pleased to provide an update on the installation of its first vanadium energy storage device.

- 10kW power output/100kWh energy storage successfully installed.
- System operational and grid-connected.
- Company's ongoing sales and marketing strategy to showcase technology, focus on additional sales.
- Technical capability developed for future installations.
- Vanadium energy storage showing its strength as a stable, efficient and cost effective solution.

Australian Vanadium Limited (ASX: AVL, "the Company" or "AVL") is pleased to update the market on the latest developments in its energy storage strategy.

Vanadium Redox Flow Battery Energy Storage

The vanadium redox flow battery (VRFB) is an energy storage device designed to store large amounts of energy, usually generated from renewable sources.

As per ASX announcement 'AVL Signs First CellCube Vanadium Battery Sale in Western Australia' dated 18th May 2016, the first battery purchased by AVL through its 100% owned subsidiary VSUN Pty Ltd has now been successfully installed at a native tree nursery in Busselton, Western Australia.

Media Release

The attached media release is being provided to a wide range of media contacts throughout Australia and is provided with this announcement for the market's information.

Further information

Please visit our website or further information for contact Managing Director, **Vincent Algar; +61 8 9228 3333**

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ASX ANNOUNCEMENT

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PRESS RELEASE

14th September 2016

VSUN INSTALLS THE FIRST VANADIUM REDOX FLOW BATTERY IN WA ON BUSSELTON FARM

'Reliable, Renewable and Cost-effective Option for Many Off-Grid Australian Farms'

PERTH-based VSUN Pty Ltd – a wholly-owned subsidiary of Australian Vanadium Limited (ASX: AVL) – has installed the first CellCube, a Vanadium Redox Flow Battery Energy Storage System (VRFB) in Western Australia on a farm near Busselton.

It is the first time a VRFB has been commissioned in the state and the development is an example of the wave of new power options now available for Western Australians, as the energy sector continues to diversify.

The storage system was constructed by world-leading flow battery manufacturer GILDEMEISTER energy storage GmbH in a facility close to Vienna, Austria and then shipped to WA. The total project value of the CellCube storage system and solar PV system is A$164,000 excluding shipping costs.

AVL managing director Vincent Algar said: "It is expected this farm installation will be the first of many on Australian farms, as vanadium flow batteries can store large amounts of solar and wind power, and they are a perfect option for many off-grid farming operations, particularly in the more remote parts of WA."

"Seeing is believing and the newly-installed CellCube FB10-100 now allows VSUN to showcase the benefits of large energy storage devices to commercial customers.

"This includes the ability to time-shift up to 10 hours of power usage, by storing renewable energy from the solar PV system for later use."

Mr Algar said, aside from agriculture, the GILDEMEISTER storage systems have large cost-saving energy ramifications for a range of industries, including mining and resources.

"Many WA farmers will find installing a vanadium battery, with appropriate solar panels, will be cheaper in the long term, than connecting to the grid or running diesel generators," he said.

Mr Algar said these storage systems can provide reliable three phase power for high energy use applications, such as welding, and the energy system in operation on the Busselton farm – which includes solar power panels and the battery – was good value.

VSUN Renewable Energy Solutions – is a highly progressive, innovative energy business that has capitalised on its international connections and synergies as a wholly-owned subsidiary of resource company Australian Vanadium Ltd. VSUN is the major distributor of GILDEMEISTER's energy storage systems in Australia. Their CellCubes are based on the vanadium redox flow technology allowing for clean, zero-emission and fast energy supply. The CellCube has been developed over more than 15 years with around 10 years of practical application results and over 100 installations worldwide.

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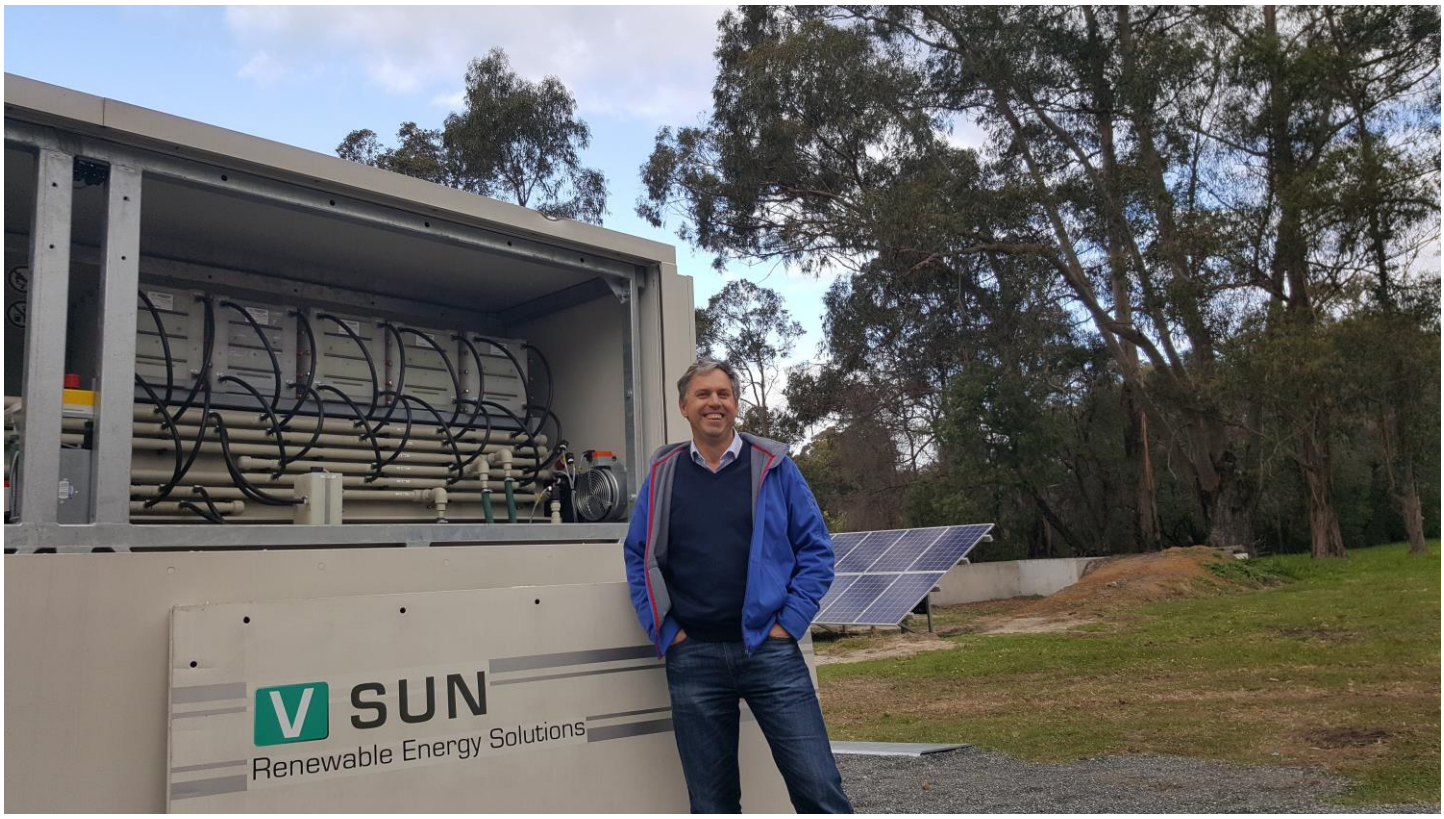

Managing Director, Vincent Algar, next to the CellCube vanadium redox flow battery.

BACKGROUND: Busselton Property Owners (The Stuarts)

Farm owner, Lucy Stuart, said she planned to build a new house at her Busselton property, in which she has installed the first CellCube vanadium flow battery in Western Australia.

“As part of building a new house, obviously, the first thing you look at is how to get grid power to the house,” she said.

“We started doing some research. The commercial system is actually called the CellCube and it will deliver power for the entire farm without us needing to then extend grid power to the house. So it's starting to look cost-effective from that point of view. Then we found there are actually a lot of added benefits. We currently get single-phase power out to the farm – which is normal, that's typical – but this system will produce three-phase power, which is what we're getting in the city here. And the third thing is a bonus, but it's important to us – it might not be important to everyone – but we are fairly committed to sustainable, clean energy. So it's the perfect three-point 'tick in the box' for us.”

VSUN’s battery installation will help business expand on her property, thanks to reliable and cheaper power.

The farm operates a small tree nursery with irrigation and power supplies.

“We can expand the workshop, if we can get that three-phase power,” Mrs Stuart said. “There are often interruptions to the power supply in rural areas and installing a vanadium battery will allow us to use appliances with a heavy draw-down, without having to time our usage around off-peak hours.

“Theoretically, we hope to be 90% self-sufficient with our power. We are also registered as a power exporter, so we can sell back to the grid. So, although that's not initially our primary desire, it’s going to be a nice thing to have.”

Mrs Stuart said it was hugely important for her personally to set up an alternative power supply to diesel.

“Diesel is only going to get more expensive anyway, and we wanted clean energy that's sustainable,” she said.

“Obviously solar power isn't new, but being able to trap that and hold it chemically, which is what these vanadium batteries can do, is a huge asset.”

Busselton property owner Lucy Stuart

BACKGROUND: Sun Connect (Solar PV)

Zamien Sumich, part owner and manager of Sun Connect Pty Ltd, said he believed this 15kW solar PV System installation which charges a vanadium flow battery, was the first of its kind in Australia and he expected there to be many more.

Sun Connect is a leading supplier and installer of high-end commercial solar PV systems in Australia.

Mr Sumich said: “This solar and battery installation will provide the client with three phase power to the site, which would otherwise not be possible due to their location. There is potential for a wide roll out of three phase, self-sufficient power supply to end of grid or rural customers who, up until now, have only had single phase supplies.”

"Now potential manufacturing businesses could be self-sufficient and provide their own power, but could also remain grid connected should they choose.

"Sun Connect has long held the view that high-quality components and technology are essential in the renewable sector. We have made a concerted effort to source the most reliable, long-life products available and — whilst most of the current crop of battery technologies may need replacing many times in a system’s lifetime — vanadium flow batteries are longer lasting and will not degrade over their life as with lithium and lead acid products.

"Sun Connect will look to provide lithium storage options for clients in specific situations, but clients looking at high-charge/discharge applications and longevity of battery life, need only look at the life expectancy of batteries in phone, cars and laptops to see that there are constraints and limitations to how long they will last and how efficiently they will operate. All of this being said, one big factor not often raised for rural sites is safety. Vanadium flow batteries have no fire risk, nor risk of explosion unlike what we have seen recently with lithium in applications such as phones, laptops and home storage units.

"Partnering with VSUN in the supply and installation of such a flexible, reliable and safe product has been a no brainer for us. Sun Connect’s solar PV systems have expected lifetimes of more than 20 years and therefore match up extremely well with the CellCube’s life expectancy of more than 20 years."

About Australian Vanadium Limited and VSUN Pty Ltd

AVL is a diversified resource company with an integrated strategy with respect to 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 the development of its 100%-owned, world-class Gabanintha vanadium project. Gabanintha is currently one of the highest-grade vanadium projects being advanced globally with measured, indicated and inferred resources of 91.4Mt, grading 0.82% V_2O_5 and containing a discrete high-grade zone of 56.8Mt, grading 1.0% V_2O_5 reported in compliance with the JORC Code 2012 (ASX Announcement 10 November 2015 and Table 1).

AVL also aims to develop a local production capacity for high-purity vanadium electrolyte, which forms a key component of VRFB. The Company has recently purchased a vanadium electrolyte pilot plant from C-Tech Innovation Limited, a research, technology and innovation organisation based in the UK (ASX Announcement 7 June 2016). C-Tech Innovation Limited has developed technologies for electrochemical preparation of vanadium electrolyte as well as many other chemical and electrochemical technologies. The pilot plant purchase will enable AVL to develop unique vanadium electrolyte production expertise and capability in Australia, through both stand-alone and planned mine-attached facilities. The pilot plant will be used to test and verify the production of vanadium electrolyte products that are suitable and approved for use in third party VRFB products being sold in Australia, New Zealand, the Pacific and Asia.

AVL, through its 100%-owned subsidiary VSUN Pty Ltd, is also actively marketing VRFB in Australia through a distribution agreement with world-leading flow battery manufacturer, GILDEMEISTER Energy Storage GmbH (ASX Announcement 11 April 2016).

AVL managing director Vincent Algar is also chair of Vanitec's newly-created Energy Storage Committee. Vanitec is a not-profit international organisation that promotes the use of vanadium bearing materials.

BACKGROUND

What are the basic differences between large lithium-based batteries and vanadium redox flow batteries (VRFB)?

VRFB use a different method of storing energy than Li-Ion batteries. VRFB use a circulating electrolyte solution of vanadium pentoxide to store the charge in tanks, while Li-Ion batteries store all the charge inside the battery cell itself. VRFB have lower energy density compared to Li-Ion, but since the tanks can be scaled up to any size, have the ability to store a lot more total energy. Li-Ion Batteries are able to deliver very high power quickly, hence are very suitable for mobile applications such as electric vehicles.

VRFB are energy batteries and therefore very suitable for storing large amounts of energy (particularly renewable energy) for later use. Because vanadium flow batteries can cycle more often and to greater depths of discharge (100%), they have a longer life that Li-Ion batteries that eventually become less efficient when cycled too frequently. Inherently, vanadium flow batteries are safer than Li-Ion since they are not prone to the thermal runaway known to occur with Li-Ion batteries.

Vincent Algar, managing director of AVL Ltd, said in many cases, vanadium batteries were more suitable alternatives for long-duration, heavy-duty phase three power applications than lithium and that made vanadium electrolyte batteries a good solution for remote mine sites and farms.

Mr Algar said: "There's plenty of room in the battery storage world for lots of different systems, especially when they've got different characteristics and they fulfill different niches.

"If you produce many kilowatts or megawatts with renewables and you want to store them for many hours, then a vanadium flow battery is perfect for you. If you need just two minutes of power or want to make a short car trip, then that's what lithium is good for."

What are the available sizes and costs of Vanadium Redox Flow Batteries (VRFB)?

VSUN sells GILDEMEISTER's VRFB which come in two ranges. The smaller one starts at FB10-40, giving 10kW of power and 40kWh of storage. That range goes up to FB30-130. The larger range starts at FB200-400, giving 200kW of power and 400kWh of storage. Both ranges are scalable in multiples.

When working out costings for energy storage many factors need to be included, such as lifespan, degradation, cycling capacity, depth of discharge and inbuilt characteristics such as inverters and climate control. We are happy to discuss pricing on specific projects with potential clients as although the products are a turn-key solution there are many variables which need to be taken into consideration.

Please go to:

www.australianvanadium.com.au

www.vsun.com.au

http://energy.gildemeister.com/en