CUTTING EDGE METALS AND THE FUTURE OF BATTERIES

LEAP SUMMIT

4TH JUNE 2019
“In the 21st century, hundreds of millions—and eventually billions—of human beings will transform their buildings into power plants to harvest renewable energies on site, store those energies in the form of hydrogen and share electricity, peer-to-peer, across local, regional, national and continental inter-grids that act much like the Internet.” – Jeremy Rifkin

Many different processes exist to convert electrical energy into other forms of energy for storage purposes e.g. pumped hydro, fly wheels, hydrogen and batteries etc.

Batteries are now increasingly being deployed through novel technologies in much larger, utility scale applications.

Forecasts of 158GWh of Storage by 2024 (13x increase) with an investment of US$71B*, increasing to 2800GWh by 2040 requiring investment of US$620B#

What is the path forward:
- Selecting the right materials for the right batteries for the right application
- Reduction in technology costs through increased adoption
- Integration with existing energy sources and energy markets – innovation and advancement
- Stable, affordable and sustainable supply of raw materials – this is where the resource companies get involved

# Bloomberg New Energy Finance -
Multicom Resources Limited

- Privately owned Queensland Company focussed on development of Saint Elmo Vanadium Resource in Julia Creek.
- Currently progressing Environmental Impact Assessment and Mining Lease Approval.
- Pre-feasibility studies near completion.
- **High quality** vanadium pentoxide ($V_2O_5$) produced through test work.
- Executed LOI’s with strategic offtake partners.
- Wholly owned subsidiary, Freedom Energy, established for the **energy storage market**.

“Multicom is focussed on the supply of low cost, high quality products to strategic partners in sustainable markets”
### STABLE SUPPLY - VANADIUM FUTURE DEMAND DRIVERs

#### Conventional Demand
- High Strength Steels
- Automotive
- Aerospace
- Pipelines
- Rail
- Buildings/Tunnels/Bridges
- Ships

#### Emerging Demand
- Further Rebar Regulation
- Vanadium Flow Batteries (VFB)
- Electric Vehicles
- Lithium Vanadium Phosphate Batteries
- Rapidly Industrialising Countries

#### Next Generation Demand
- Smart Glass Applications
- Autonomous Vehicles
- Artificial Intelligence Applications
- Robotics
- Quantum Computing

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90% of the current demand is used in steel production.

Between 2017-2025, Vanadium Flow Batteries (VFB) alone are expected to increase vanadium demand by 20%.

Vanadium compounds are unique. Able to exist as insulators and conductors, the metal is at the forefront of next generation technologies.
RIGHT MATERIALS FOR THE RIGHT APPLICATIONS

WHY VANADIUM FLOW BATTERIES?
A demonstrated technology with proven fundamentals

- DURABLE, 25 yrs or 15,000 cycles
- NO DECAY, in capacity over time
- 100% RECYCLABLE
- 100% REUSABLE ELECTROLYTE
- ECONOMIES OF SCALE, as duration increases

with significant opportunity yet for technology improvement and cost reduction

- INCREASED POWER DENSITY
- INCREASED ENERGY DENSITY
- INNOVATIVE COMPONENTS
- VOLUME MANUFACTURING
Multicom & StorEn have entered into an agreement to advance the development and commercialisation of StorEn’s Vanadium Redox Flow Batteries.

Some facts on StorEn’s batteries:
- Designed to deliver superior performances at a lower cost;
- Very low cost per cycle, eight times lower than lithium-ion batteries; and
- Battery life of 25 years

StorEn’s first full scale prototype currently installed at Stony Brook University (NY) with additional prototypes being manufactured for distribution to Multicom in Australia.

StorEn’s residential battery can be charged and discharged at up to a constant power of 5kW (with maximum peak power of 6kW) and provides 30kWh of energy (6hrs discharge at full power).
Low cost 10 years supply of V205 to StorEn.

Battery units to be manufactured under JV.

Freedom Energy has exclusive distribution rights across the Asia Pacific.

Mechanism for Multicom to acquire equity in StorEn and vice versa.
CURRENT AREAS OF COLLABORATION

- Conceptual design of battery manufacturing facility complete. Working with Downer Group on scope for next level feasibility studies.
- MOU in place with one of Queensland’s largest residential developers.
- Currently negotiating MOU with an interstate energy provider regarding further areas of collaboration.

- 2,000 Powerwall™ batteries installed and networked
- Their cost was subsidized by GMP
- Households paid $1,500 + $15 per month (for 10 years)
- $8M invested by GMP
- Access to batteries’ capacity granted to GMP to stabilize the grid and shave peaks
Queensland Industry Representative and Founding Steering Committee for the recently approved (10th April 2019) Future Battery Industries Co-operative Research Centre.

Affiliate Partner in the QUT Hydrogen Process Research and Development funded by ARENA.

Currently exploring options with the Innovative Manufacturing Cooperative Research Centre to fund battery manufacturing facility development work.
NEXT PHASE OF RELATIONSHIP DEVELOPMENT

- Identify locations and partners for next two trial batteries to be delivered to Queensland by end of 2019.
- Advance discussions with additional utility providers.
- Advance discussions with telecommunications providers.
- Initiate next phase of feasibility studies with Downer Group.
- Progress discussions with Townsville City Council regarding land options regarding manufacturing facility.
QUESTIONS AND FURTHER DISCUSSION