ENABLING THE SHIFT TOWARDS THE ECONOMY OF ELECTRICITY

>>>  
THE ENERGY OF THE 21ST CENTURY

Advanced Energy Conference
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Overview

StorEn is an energy storage company with a transatlantic development team, based at CEBIP at Stony Brook University.

Our All Vanadium Flow Batteries (VFBs) based upon:
• proprietary IP, and
• an innovative design philosophy

Dedicated VFB Energy Modules for financially-viable applications, such as power continuity.
Mission

Building upon the proven fundamentals of the All Vanadium flow technology, designing **Cost Effective** Energy storage Modules
Energy Storage Market Growth

28-fold Growth in the next 10 years

This can happen only if the cost is reduced!

Source: Navigant Research - May 9th, 2017
Our Technology

STACK PARAMETER
NOMINAL VOLTAGE 48 VDC
NOMINAL POWER 5 kW
PEAK POWER 8 kW
NOMINAL CURRENT 100 Amp
MAX CURRENT 320 Amp
MAX POWER DENSITY 0.65 W cm⁻²
OPERATING PRESSURE 0.3 bar
FLOW RATE 60 lt/min

25 kWh OUTDOOR

30 kWh UNDERGROUND

20 kWh INDOOR

500 kWh ESS
Target Applications

Platform
- New Gen Vanadium Flow

Families
- Continuity
- Storage
- Backup
- On Grid
- Off Grid

Product

Markets
- Telecom Towers
- Data Centers
- Military
- Industrial
- Hospitals
- Domestic
- Renewables
- Utilities/RTO
- Remote Areas
Why Vanadium Flow - Our IP

- A PROVEN TECHNOLOGY
- GREAT ROOM FOR TECHNOLOGICAL IMPROVEMENT

4 PCT APPLICATIONS with US Provisional priority

MULTIGRID™ is an innovative flow field that grants over 50% increase in power density
Why Vanadium Flow - Our IP

THERMASTABLE™ is an innovative geothermal design that increases the round-trip efficiency by about 5%. This makes our batteries ideal for harsh and torrid climates, and resilient in case of natural disaster.
Why Vanadium Flow - Our IP

**RESAFE™** is an innovative leak elimination system that eliminates periodic service inspections, thus reducing service costs.
EQUILEVELS™ is an automatic method for electrolyte rebalancing that eliminates periodic inspections, thus reducing service costs.
StorEn signed a **BINDING MOU** with Multicom Resources, an Australian mining company. Thanks to this Agreement, StorEn secured the exclusive availability of vanadium for the next 10 years with a price cap.
What About the Cost

**Australia: residential forecast**
StorEn’s IP at the current components prices can reduce the manufacturing cost down to

$133/kWh (70,000 unit p.a.)

Great scope for tech improvement - Future savings from:

- Larger manufacturing volumes e.g. like lithium
- Development of better performing components
- Economies of scale on the manufacturing of components

Hence, manufacturing cost could drop to $70/kWh
Challenges

Cost Reduction
• Performance increase > save on materials
• Elimination of servicing > reduced TCOs
• Reduction/optimization of components
• R&D effort > NYSEDA PONs; ARPA-E

Technology Switch
• Vanadium Flow has demonstrated fundamentals
• Going-concern Issue

Bankability
• Commercial financing e.g. leasing
• Product insurance > VIONX/New Energy Risk (August 2017)
Partnerships

**Clean Energy Business Incubator Program**
**Stony Brook University**
**NYSERDA**
**NY Bes+**

**Multicom Resources PTY Ltd.**
MOU to secure supplies of vanadium pentoxide. Multicom is an Australian vanadium mining company.

**Toray Industries Inc.**
*Innovation by Chemistry*
Development program for carbon components for Vanadium Flow Batteries. Toray Industries is a leading Japanese multinational chemical group of companies. Toray operates in 26 countries and has a total of over 46,000 employees.

**Chemours**
Development program for Vanadium Flow Batteries membranes. Chemours is a company of the DuPont Group of companies.

**Rensselaer Polytechnic Institute**
Testing of innovative membranes in cooperation with the Chulsung Bae Research Group. Founded in 1824 in Troy, NY, RPI, is a leading private university and research institution.

**The University of Padova**
R&D program with the Guarneri Research Group. Founded in 1222, it is the world fifth-oldest surviving university in the world. 2016 ranked the best Italian university with over 40,000 students.

**University of Illinois at Chicago**
Testing of innovative membranes in cooperation with the Sangil Kim Research Group. UIC is a state-funded public research-intensive university located in Chicago, Illinois, United States.
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