Vanadium redox flow batteries

UBS Energy Transition Call – 21 May 2020
Climate change is driving an energy transition and a growing need for ESG investment.
Presenters

Larry Zulch
Chief Executive Officer

- Over 25 years as CEO of investor-backed technology businesses
- Focus on directing companies transitioning from development stage to commercialisation
- CEO of Dantz, acquired by EMC (Dell EMC)
- CEO of Savvius, acquired by LiveAction (Insight Venture Partners - $23 billion PE)

Matt Harper
Chief Commercial Officer

- Avalon Battery founder
- Responsible for sales, business development, marketing, and field engagement
- 20 years in flow battery & fuel cell industry with strong technical and product background
- Senior positions at VRB Power Systems and Prudent Energy
- Masters from MIT
Invinity Energy Systems

Leading global manufacturer of Vanadium Flow Batteries (VFB) for businesses, industry, utilities and electricity networks.

Invinity's VFB:
- Commercially proven
- Cost competitive
- Safe & non-flammable
- Fully recyclable
- Extremely durable

Our VFBs make renewable energy reliable, delivering low-cost, low-carbon power on demand.
- >10MWh installed worldwide
- Europe, Asia, North America, Australia and Africa

AIM-listed (AIM:IES), unique opportunity to invest in a London-listed, pure-play flow battery company
Complementary, Development Stage Companies

**redT**
- **Founded:** 2006 (AIM:RED)
- **Locations:** UK (England, Scotland), South Africa
- **Employees:** 51
- **FY 2018 + H1 2019 Revenue:** £2.7 million ($3.6m USD)
- **Flow Battery Storage Projects:** 20 totaling 4.5 MWh

**Contributing:**
- Commercial expertise
- Business case analysis
- Key market presence (UK, Australia, Africa)

**Current challenges:**
- Product cost reductions
- Scaling business activities

**AVALON BATTERY**
- **Founded:** 2013
- **Locations:** North America (U.S., Canada)
- **Employees:** 28
- **FY 2018 + H1 2019 Revenue:** $2.6 million USD (£2.0 million)
- **Flow Battery Storage Projects:** 21 totaling 4.8 MWh

**Contributing:**
- Core product module
- New executive leadership
- Key market presence (USA, Canada, Asia)

**Current challenges:**
- Developing commercial capabilities
- Scaling business activities
Invinity’s Foundation: Proven battery module

Invinity VS3
40 kWh, 10 kW module
Includes BMS, cooling, enclosure.

- 3rd generation, self-contained vanadium flow battery
- Shipped fully functional from factory
- One of the largest fleets of essentially identical flow batteries (over 160 deployed to date across 3 generations)
- The “building block” for future projects

Building block for projects from 250 kWh to 12 MWh

Scalable Architecture
- Battery Module
- Battery Unit
- Stacked Battery Unit
- Stacked Battery Cluster

VS3 Internals
Stacks (Power)
Power Electronics
Electrolyte Pumps
Tank Set (Energy)
The flow battery market opportunity

Flow batteries support long duration, unlimited cycle applications better than lithium.

### Key flow battery applications

<table>
<thead>
<tr>
<th>Application</th>
<th>Duration</th>
<th>Cycle Count</th>
<th>Driving Opportunity</th>
</tr>
</thead>
<tbody>
<tr>
<td>C&amp;I solar + storage</td>
<td>Medium</td>
<td>High (daily+)</td>
<td>Low-cost dispatchable solar</td>
</tr>
<tr>
<td>Grid Services Providers (&quot;GSP&quot;)</td>
<td>Medium</td>
<td>High (daily+)</td>
<td>Renewable balancing</td>
</tr>
<tr>
<td>Electric car charging</td>
<td>Medium</td>
<td>High (3-4x daily)</td>
<td>Manage demand spikes</td>
</tr>
<tr>
<td>Communications infrastructure</td>
<td>Long</td>
<td>Low (without solar)</td>
<td>Need for resilience</td>
</tr>
<tr>
<td></td>
<td></td>
<td>High (with solar)</td>
<td></td>
</tr>
<tr>
<td>Microgrid</td>
<td>Long</td>
<td>High</td>
<td>Diesel substitute</td>
</tr>
<tr>
<td>Grid capacity management</td>
<td>Medium</td>
<td>High (daily)</td>
<td>Grid infrastructure limitations</td>
</tr>
</tbody>
</table>

Bloomberg New Energy Finance: “Energy Storage is a $620 Billion Investment Opportunity to 2040”
Case Study: Energy Superhub Oxford

Energy Superhub Oxford is a grid-connected project

- High-profile £41 million reference site
- Showcasing EV charging, energy storage, low carbon heating
- Developed by Pivot Power (subsidiary of EDF Renewables)
- Programme to develop 45 similar sites across the UK to support EV integration and balancing of renewables onto the National Grid

Invinity Will Provide UK’s largest flow battery

- 2MW / 5MWh flow battery system
- Flow batteries chosen due to their ability to cycle heavily without significant degradation
- Order to be fulfilled with 162 Invinity VS3 modules

Consortium Partners:
Addressing a global market

Product Development Centre & Strategic Manufacturing
Vancouver, Canada

Business Development & Investor Relations Hub
London, UK

Regional Sales Hub
California, USA

European Production & Final Assembly Centre
Edinburgh, UK

Regional Sales Hub
Johannesburg, RSA

Primary Component Manufacturing
Suzhou, China
**Invinity Opportunity Pipeline**

<table>
<thead>
<tr>
<th>Stage</th>
<th>Base</th>
<th>Upside</th>
<th>Pipeline</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Modules</td>
<td>394</td>
<td>603</td>
<td>3,083</td>
<td>4,080</td>
</tr>
<tr>
<td>Capacity</td>
<td>13.8MWh</td>
<td>24MWh</td>
<td>123MWh</td>
<td>161MWh</td>
</tr>
</tbody>
</table>

**Sales Strategy**

- **Short term**: C&I (commercial & industrial) and GSP (grid services providers) in UK, U.S. & Australia.
- **Mid term**: Utility segment in core markets, C&I and GSP in Asia, Europe & Africa
- **Utilise channel partners** (EPC, Developer, PV installer) to feed pipeline
- **Strategic sales** to generate follow-on volume potential (e.g. Utilities, Water, Industrial, Agricultural, Telecoms)
- **Maximise value of key reference sites** through effective PR and marketing
Building the world’s leading flow battery company

- **Regional Targets**
  - UK & EU, Western US, Australia
  - Secondary markets: Africa, Asia

- **Commercial Focus**
  - BtM C&I solar and storage (Current)
  - Grid service providers (Current)
  - Utility-scale / Network storage projects (Medium-term)

- **Corporate Priorities**
  - Complete integration of merged companies
  - Evaluate combined sales pipeline including resources necessary
  - Focus on delivering ESO
  - Develop COVID-19 contingency plans