



19 March 2014

Company Announcements Office
Australian Securities Exchange

Company Update

Attached is a Redflow company presentation providing an update on developments and progress of key deliverables.

Yours faithfully

REDFLOW LIMITED

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RedFlow Limited

Company Presentation

19 March 2014

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Executive Summary



RedFlow (**RFX**) is an energy storage company based in Brisbane, Australia and is listed on the Australian Securities Exchange (ASX). The company produces a unique zinc-bromide flow battery developed from technology initially pioneered by Exxon.

Key Points of Difference

- Over 600 batteries have been manufactured including 60 in a Smart City residential trial for 2 years
- Technology readiness level (TRL) such that product ready for commercial manufacture

Market opportunities

- Telecommunications infrastructure, renewable integration, remote power, sustainable and transmission and distribution investment deferral are all potential market applications.
- Existing customers currently developing prototypes for some of these markets.
- Prospective new opportunities as a result of recent GSMA trade show in Barcelona.

Partnering Business Model

- The company is partnering with large multinational companies with scale, expertise and established channels to market such as Emerson
- Manufacturing partner with Flextronics, a large global manufacturer with a specialised energy focus
- Ongoing development collaboration includes Sandia, CEA, AusGrid, CSIRO and the Universities of Sydney and Queensland amongst others

Deliverables for 2014

- Implementation of outsourced manufacture with Flextronics in progress and factory layout established
- Non binding indicative orders to be converted into firm sales as manufacturing capability increases
- Continue to collaborate with partners and leverage off their specialised expertise to further improve performance and extend the life of the product
- Completion of the higher voltage Cleantech program will provide expanded market opportunities including off-grids and micro-grids.

Core product – the RedFlow ZBM

Key Advantages

- Delivers 8kWh of energy with a continuous power rating of 3kW
- At least 2 years of 100% depth of discharge, daily charging and discharging available
- 100% capacity available on a daily basis → with no oversizing, requires less CAPEX
- Charge and discharge over several hours → matches application requirements
- 42-63 volt range & 48 volts DC nominal → matches standard electrical systems and below 60V safety regulations
- Round trip efficiency approx 75% - 80% (DC-DC) → good business case
- Tolerates up to 50°C → no cooling requirements or shelf-life problems
- Life of over 1,000+ full cycles (calculated at rated energy) → good business case → current tests show further improvements which will reduce the cost per kwh
- New materials encouraging – CSIRO, UOS and others – next 12 months improvements pipeline significant
- Current improvements under test include new materials to extend overall life as well as lower cost to manufacture thereby providing compelling commercial proposition for customers
- Capital cost per KWH of \$875 and ongoing operating costs NIL for at least 2 years (half the price of vanadium, comparable to similar lithium, more than advanced lead acid but usability of lead acid limited)

Over 9 years of research and over \$38 million invested to date on research and development.

The modular design allows for sizing suited to the application, cheaper manufacturing costs than single large bespoke systems and in built redundancy and backup for repairs and maintenance.

Core product – the RedFlow ZBM



Key advantages :

- High energy density zinc-bromide chemistry compared with other flow battery chemistries → smaller footprint and lighter
- No exotic or heavy metal materials used and all freely available
- Cost reductions through manufacturing efficiencies, cheaper materials and improved lifespan of battery
- Lightweight → dry weight of 90kgs (200 lbs) – lighter than competitors
- Full discharge / recharge on a daily basis with minimal degradation, unlike other batteries → no need to oversize battery
- Primarily made of recyclable plastic → take advantage of the plastics industry manufacturing capability in future product development and cost reduction
- Safe, water-based and recyclable electrolyte → reduced fire risk
- Scalable for different applications with higher voltages and capacity in progress from Cleantech project
- Smart system with in-built BMS to monitor performance and health remotely
- Bromide held in an inert salt form until it under goes the charging phase. At no stage is bromide gas formed in our battery.
- Bromide salts stable and used as disinfectant in spa's and it remains in solution
- HAZMAT 8 rating of the zinc bromide electrolyte is in reference to the corrosive nature of the liquid being acidic (pH of between 1- 4). Lead acid has same HAZMAT 8 rating and lithium a HAZMAT 9 rating
- Zinc Bromine salts don't have a gaseous phase , are non-flammable and will not react violently if subjected to excessive heat. Bromine is commonly used as a fire retardant



600+ RedFlow ZBMs
manufactured since 2009

Current system integration partners



- In mid-2013, RedFlow and Emerson Network Power entered into an agreement to take RedFlow's ZBM into new markets. Emerson Network Power is a business of Emerson, and a global leader in maximising reliability, deployment speed and efficiency of telecommunications networks.
- A large US conglomerate is developing prototype energy storage systems containing RedFlow ZBMs for military and commercial applications.
- Performed a trial with Sprint in Tucson, Arizona and this was successfully completed. This incorporated solar charging of the ZBM during the day and discharging in the evening, precharging the ZBM in off peak and storing all PV energy to 100% SOC then floating until peak demand.
- Higher voltage large scale support from S&C Electric Company, a major USA based utilities service provider.
- Negotiations in progress with other integrators after recent GSMA trade show in Barcelona.



Manufacturing



- In early 2014, RedFlow announced the appointment of Flextronics as its manufacturing partner. Flextronics is one of the world's largest end-to-end supply chain solutions companies, with facilities in over 30 countries and turnover of nearly US\$25billion.
- This was finalised after an extensive review of potential partners who could provide the precision and experience in plastics engineering and manufacture.
- This agreement provides scalability, quality assurance, repeatability and consistency to the product. Flextronics have a energy focussed division and this is thus mutually beneficial.
- Manufactured in North America
- Currently in process of transitioning to Flextronics – factory layout implemented.
- Reduced counterparty risk for system integrators and increased confidence in the product
- Provides a mechanism for medium to long term cost reductions

Potential Market Opportunity

Market Opportunity

The energy storage market is rapidly evolving and Lux Research has estimated that of a potential \$114 billion energy storage market by 2017, zinc-bromide flow batteries will have a 19% market share equating to a USD\$21 billion market opportunity. The Boston Consulting Group predicts the market for solar-integrated energy storage alone to be €15 billion by 2020. In addition, the McKinsey Global Institute lists energy storage as 1 of 12 potentially disruptive technologies. Use of energy storage mandated in California, New York State and Costa Rica in past 6 months.

Relevant ZBM Applications

- 1. Telecommunications infrastructure** – Powering the large number of mobile phone towers already in existence in off-grid, micro grid or fringe-of-grid areas is an attractive relevant market. Successful trials completed with Sprint Communications. Well suited for developed as well as developing markets.
- 2. Renewable integration** – Smooth and shift intermittent renewable energy generation, increasing utilisation of renewable energy sources. The use of solar and wind generation can be expanded significantly by storing energy for times of demand.
- 3. Remote power opportunities** – Powering remote areas not currently connected to the electricity grid as well as reducing the need for diesel generation. Trials underway with Powerco in New Zealand and prototypes being developed by large US conglomerate.
- 4. Sustainable solution** – sustainable alternative capable of being retrofitted to existing applications where environmental issues exist.
- 5. Transmission and distribution (“T&D”) investment deferral** –Shift electricity from off-peak to peak periods, deferring the need for expensive upgrades of expensive grid infrastructure as well as providing a stabilisation mechanism.

Technology



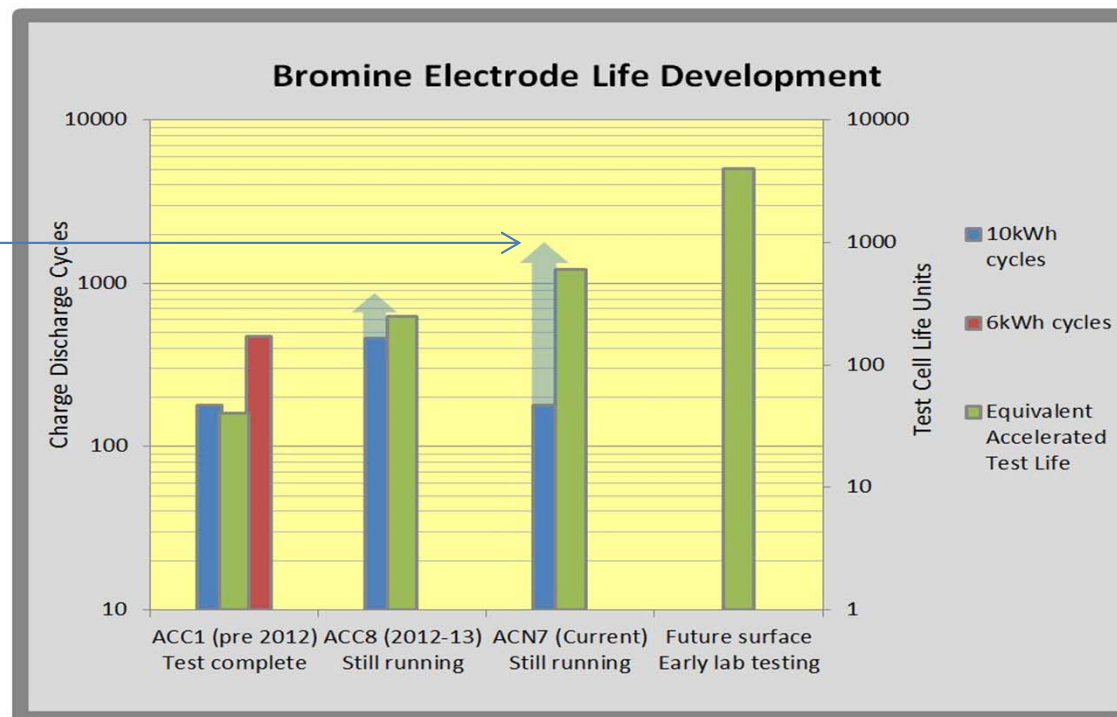
- Redflow has solved and patented the mechanical and electrochemical issues which other flow battery technology companies have all yet to resolve.
- TRL (technology readiness level) at a level where commercial manufacture and sales can commence.
- Over the past 18 months, Redflow focus has been on
 - resolving outstanding issues – a FMEA (failure mode and effect analysis) program was introduced ensuring all issues identified, prioritised and resolved. This saw over 54 issues methodically addressed.
 - reducing the number of parts – reduction of approximately 50%.
 - extending the electrode life – the number of calculated cycles is now well over 1,000 (approximately 3 years of 100% usage on a daily basis) a significant improvement from 18 months ago.
 - development of a higher voltage solution from the Australian Government Cleantech grant funding received.
- The decision to commence large scale manufacture was based on us achieving over 6MWh of energy throughput per battery (batteries still operating) demonstrating that the electrode longevity issue had been resolved and a calculated 1,000 cycles at 100% depth of discharge would be achieved. This equates to approximately 3 years of full daily charging and discharging and is continuing to increase as long term tests continue.
- Manufactured cost down will commence when manufacturing fully transferred to Flextronics and decreases expected to commence at end of 2014/beginning of 2015.

Technology



- Electrode development key focus for past 12 months and current performance now 6 times improved from 18 months ago.
- Pathway forward shows significantly enhanced performance from new materials with cheaper costs thereby extending the life and reducing the cost per kwh throughput significantly. These are currently on test.
- Further cost reductions expected as majority of the remaining components are plastic which has a universal low cost to manufacture per kilogram.
- Target cost reduction of at least 40% by end of 2015.
- Combination of lower costs and longer life could result in a compelling proposition

Commercial product



IP Protection

The current electrode, cell stack, hydraulic system, leak proof design, manufacturability and performance is protected by patents and our overall IP position is strong.

- Currently have 10 patent applications with over 100 claims
- Protection being sought in main markets including:
 - USA
 - Europe
 - China
 - Australia
 - India
 - Japan
- Patent applications have been filed for new electrode surfaces
 - Very high service life
 - Low cost materials
 - Ease of manufacturability

Cash Position

RedFlow currently has approximately \$4.2m cash on hand and is debt free.

We expect to receive a cash payment in October 2014 from the Research and Development Tax Incentive of approximately \$1m and have received approximately \$2.1m in grant funding, from a total grant of \$2.83m before the end of September 2014.

Large orders are not expected to require any working capital investment by Redflow.

Sustainable Cost Base

Operating overheads are stable at approximately \$500K per month which are not expected to increase as production increases.

Staff numbers are currently 46.

Market Capitalisation

The Company is currently capitalised at approximately AUD\$26 million (at \$0.15).

Over \$38m of capital and grant funding has been invested in developing the ZBM to the stage of having a commercial offering.

Thank You

Appendices



Corporate Overview



Board Profiles

Role	Name	Previous Experience
Chairman	Howard Stack	Previous directorships of listed companies include Bow Energy, Flight Centre, Data#3 and Australian National Industries. A partner of Allen, Allen and Hemsley until 2001, and corporate advisor to one of Australia's largest electricity generators until 2011.
Managing Director	Stuart Smith	A Chartered Accountant with previous experience as Chief Executive Officer and director of Cellnet Group. Previous experience with AAPT Mobile (Cellular One), Pacific Star (a joint venture between Bell Atlantic and Telecom New Zealand) and Ernst & Young in London.
Independent Non-Executive Director	Bruce Brown	Previously Managing Director and Chief Executive of Campbell Brothers Limited, a Director of Campbell Brothers and Transpacific Industries Limited, and previously Chairman of Flight Centre Limited.
Non-Executive Director	Richard Aird	RedFlow's Chief Operating Officer from early 2010 until July 2012. A professional operations manager with over 20 years' experience in commercial development and operations.

Key Personnel

Role	Name	Previous Experience
Chief Engineer	Dr Alex Winter	Previously with Schlumberger and experience includes over 9 years experience in fluid dynamics and mechanical design. Significant experience in various consulting and managerial roles in Austria and Argentina.
Chief Technology Officer	Dr Mike Giulianini	Over 13 years' experience as a systems engineer in development, management and executive positions with Solar Farmers, Integral Electric Technology and SELEX Communications Group in both Italy and Australia.
Business Development Manager	Bruce Ebzery	Over 20 years' business development experience in selling engineering services and products with large multinational companies and electricity utilities such as Energex.
International Sales Director	John Davis	Extensive experience in the telecommunications and energy storage markets in both USA and Europe for various companies including Deeya Energy (now Imergy).

RedFlow operating history



Demonstration system installations

USA

- ✓ Sandia National Laboratory – Owned by Lockheed Martin Corporation contracted to US Department of Energy (2 ZBMs have undergone testing)
- ✓ Recent prototype testing with large USA entity in association with US Defence Department

Australia

- ✓ 60 ZBMs installed in Ausgrid network (Australia's largest urban utility) as part of the Smart Grid Smart City Trial.
- ✓ 30 ZBMs trialled with Ergon Energy, Queensland's second largest distribution utility.
- ✓ State Government of Victoria (20 ZBMs - completed demo)
- ✓ The University of Queensland (24 ZBMs supporting large PV solar array)
- ✓ Global Change Institute at University of Queensland (36 ZBMs powering green building demonstration)

New Zealand

- ✓ Powerco – NZ – Evaluation of a R510 RedFlow Energy Storage System

Independent testing through:

- ✓ Sandia National Laboratories – extensive reports available
- ✓ University of Queensland
- ✓ Ausgrid (Electrical utility)
- ✓ Emerson Network Power
- ✓ Large military contractor in USA
- ✓ Powerco (NZ)
- ✓ CEA – French Government Nuclear and Alternative Energy (in progress)

Over 600 ZBMs manufactured to date

Contract manufacturing agreement with Flextronics.



History Timeline

- 1970 - technology pioneered by Exxon during the oil crisis of the 1970's - 1980's
- 2001 – technology licensed to and developed by Winter brothers
- 2005 – company formed to begin commercialisation
- 2008 – first patents filed
- 2009 – initial trials begin with commercial partners
- 2010 – capital raising via ASX listing
- 2012 – change in strategy, system integrators engaged, board replaced and company recapitalised
- 2013 – management replaced and system integrator agreements commenced. Substantial focus on product stability and commercial offering to take to market. Cleantech funding allows development of higher voltage solutions.
- 2014 – product finalised and Flextronics manufacturing partnership signed for commercial manufacture,



Redflow ZBM

Example of an Energy Storage System (ESS) using a ZBM