



# RedFlow Limited



## Solar power at night

*A RedFlow stand-alone power system being showcased in New Zealand. This is a packaged energy storage system with power electronics and controls, together with a utility-grade diesel generation set and the option of RedFlow-designed satellite based remote monitoring. It is designed for integration with a solar PV array and allows solar electricity generated in the daytime to be used after the sun has gone down.*

Quarterly Report  
Period ending 30<sup>th</sup> September 2010



# Corporate Directory

<b>Board of Directors</b> Mr Peter Pursey, AM (Chairman) Ms Anne-Marie Birkill (Non-executive) Mr Phillip Hutchings (CEO) Mr Chris Winter (CTO)		<b>RedFlow Group Companies</b> RedFlow Limited RedFlow R&D Pty Ltd RedFlow International Pty Ltd		<b>ACN</b> 130 227 271 116 992 253 128 888 997
<b>Company Secretary</b> Ms Karen Hudson				
<b>Address - Australia</b> 1 / 27 Counihan Road Seventeen Mile Rocks, Brisbane QLD 4073 Australia		<b>Contact Details</b> <a href="http://www.redflow.com.au">www.redflow.com.au</a> <a href="mailto:info@redflow.com.au">info@redflow.com.au</a> Phone: +61 7 3376 0008 Fax: +61 7 3376 3751		
<b>Representation in USA</b> John Davis Global Business Development Phone: +1 850-384-5275 <a href="mailto:john.davis@redflow.com.au">john.davis@redflow.com.au</a>		<b>Sales – Utilities and Corporate</b> Bruce Ebzery  Phone: +61 7 3376 0008 <a href="mailto:bruce.ebzery@redflow.com.au">bruce.ebzery@redflow.com.au</a>		
<b>Patent Attorneys</b> Fisher Adams Kelly	<b>Bankers</b> Commonwealth Bank of Australia	<b>Solicitors</b> DLA Phillips Fox	<b>Auditors</b> PriceWaterhouseCoopers	

## Company Overview

RedFlow develops and sells battery energy storage systems that reduce the cost of supplying electricity

<b>General Information</b> <ul style="list-style-type: none"> <li>RedFlow is one of the world's leading developers and manufacturers of kilowatt scale zinc-bromine flow batteries and associated systems.</li> <li>RedFlow is a globally focussed company headquartered in Brisbane, Australia, with representation in Florida and Seattle, USA.</li> <li>Powerco is RedFlow's distributor in New Zealand.</li> </ul>	<ul style="list-style-type: none"> <li>RedFlow's ZBM is also available as a 5 kW 48 volt DC system to reduce diesel generator running time in non-grid connected telecommunications sites</li> <li>RedFlow is developing the RF 200, a megawatt class energy storage system during 2010/11 financial year.</li> </ul>
<b>Zinc Bromine Batteries</b> <ul style="list-style-type: none"> <li>RedFlow's proprietary zinc-bromine battery modules (ZBM) provide 5 kW of power, and store 10 kWh of energy in a 220 kg sealed unit.</li> <li>Multiple ZBMs are linked together for higher power and capacity.</li> </ul>	<b>Customers</b> <ul style="list-style-type: none"> <li>RedFlow's products are used by major electricity utilities to supply reliable power to end users.</li> <li>The company deals with customers and selected distributors in Australia and in several locations internationally.</li> </ul>
<b>Energy Storage Products</b> <ul style="list-style-type: none"> <li>RedFlow supplies its ZBM batteries in ready-to-run energy storage systems that include all necessary power electronics and enclosures.</li> <li>RedFlow ZBMs are currently available in 3 kW and 5 kW packaged AC systems. These are certified for grid connection, with 10 kWh to 20 kWh capacities.</li> <li>RedFlow also supplies packaged diesel generating sets and energy storage systems which use conventional lead-acid batteries.</li> </ul>	<b>Applications</b> <ul style="list-style-type: none"> <li>RedFlow's products:             <ul style="list-style-type: none"> <li>Manage peak demand on electricity grids;</li> <li>Store intermittent solar energy for use during peak periods; and</li> <li>Reduce the operating costs of off-grid power systems.</li> </ul> </li> <li>RedFlow systems are installed with solar PV for managing peak load on rural electricity grids.</li> <li>With sophisticated control and communications systems, RedFlow's products are Smart-Grid ready.</li> </ul>

## Highlights of the Quarter

RedFlow made significant progress in the September 2010 quarter. Highlights of the quarter were:

- Commercially, RedFlow developed three important relationships:
  - Advanced negotiations for the appointment of Powerco Limited, New Zealand's second largest electricity and gas utility, as the exclusive distributor of RedFlow products in New Zealand;
  - Selection of Jabil Circuit, Inc, one of the world's largest contract manufacturers of electronics products, to provide low cost manufacturing of RedFlow's zinc bromine flow battery modules (ZBMs); and
  - Advanced negotiations with the University of Queensland to showcase the RedFlow 200 prototype in conjunction with Australia's largest solar PV generation system from early 2011. A memorandum of understanding was signed in October 2010.
- RedFlow's ZBM manufacturing operations continued to expand. On 10<sup>th</sup> August, Mr. Andrew Fraser, Queensland Treasurer and Minister for Employment and Economic Development officially opened RedFlow's Phase Two zinc-bromine battery factory.
- RedFlow furthered commercial preparations and development to supply ZBMs into the telecommunications sector.
- The RedFlow ZBM Reliability Demonstration Program progressed with a deep cycling battery completing over 370 cycles, equivalent to more than a year of daily cycling duty.
- A modest re-branding program was completed with the company's name changing to RedFlow Limited, and a streamlined approach to product names.
- The RedFlow 200 large scale energy storage prototype progressed well in its development phase.
- The company's board was further restructured with Ms Anne-Marie Birkill joining as a non-executive director and the appointment of Mr Peter Pursey AM as chairman.



***A RedFlow 5 packaged energy storage system using the company's ZBM battery modules. This supplies 240 volt AC power into the electricity network at peak evening times. It is recharged in the early hours of the morning when the network is underutilised.***

***Use of RedFlow's systems in this applications can be a cost effective way for utilities to manage peak power demand and reduce the need for high cost network upgrades.***

***This system is rated at 5 kW.***

## New Zealand Distributorship

RedFlow's distribution model includes the use of distributors and agents in particular territories where appropriate.

During the quarter, RedFlow agreed that Powerco Limited, New Zealand's second largest electricity and gas utility, will become the exclusive distributor of RedFlow products in New Zealand. Powerco will focus on the utility and remote area power systems market through a newly formed subsidiary branded as BasePower.

The distributorship means that Powerco will be able to provide reliable power supply to customers for selected rural locations where renewal of aging power infrastructure is being questioned on economic grounds.

The arrangement is the result of twelve months of work between RedFlow and Powerco in developing and showcasing packaged remote area power systems (RAPS) suitable for New Zealand conditions.

Described as "RAPS in a box", this RedFlow assembled system comprises a packaged energy storage system with power electronics and controls, together with a utility-grade diesel generation set and satellite based remote monitoring. It is designed for integration with a Powerco-supplied solar PV array.

The Distribution Agreement covers all RedFlow products including the zinc-bromine battery based larger energy storage systems.

RedFlow will be delivering the first five systems to be supplied under the new arrangements shortly.

## RedFlow 200 to be Showcased with Australia's Largest Solar PV Array

RedFlow and The University of Queensland (UQ) have entered into a memorandum of understanding on a world-first demonstration of large-scale energy storage in conjunction with Australia's most powerful solar photovoltaic (PV) generation system

The UQ PV project, now in the installation phase, will cover three buildings at UQ's St Lucia campus in Brisbane. At 1.2 MW, it will be among the largest research facility of its type in the world.

RedFlow will install and demonstrate the RedFlow 200 prototype (formerly with a working name of 'X+BOS' and announced in RedFlow June 2010 Quarterly report) alongside one section of the UQ solar field.

From a RedFlow perspective, the UQ demonstration location is an ideal location. The RedFlow 200 will store solar power generated from the 390 kW PV array on UQ Car Park 98B in the daytime.



*A RedFlow system combined with solar PV panels on demonstration at Powerco's depot in Palmerston North, New Zealand*

It will allow electricity to be fed back into the local network at the times when it is most needed.

RedFlow and UQ have agreed to share data on the interaction of storage, the PV array and the electricity network. Product development of the RedFlow 200 remains with RedFlow and its engineering team. All data and IP in relation to the RedFlow 200 design, construction and operation remains with RedFlow.

The RedFlow 200 is scheduled for initial installation at UQ in mid-summer, and with an upgrade in June 2011 to full capacity. The system will then operate for a 24 month demonstration phase.

## Manufacturing Scale-up

RedFlow is now actively planning its staged manufacturing expansion. The next step will be the new Phase Three ZBM factory in Brisbane, with operations commencing in mid-2011.

The Phase Three plant will be based in a leased facility in Brisbane of approximately 2,000 square metres. This will have a nominal capacity of 1,500 to 6,000 ZBMs per year, depending on how many shifts are worked. It will be somewhat more mechanised than the current Phase Two plant, and together with the higher volume and better supply chain, ZBM unit costs are expected to fall.

Importantly during the quarter, RedFlow signed a memorandum of understanding with Jabil Circuit, Inc, one of the world's largest contract manufacturers of electronics products to secure long term and low cost manufacturing at scale.

Jabil will provide RedFlow with specialist advice on process and design-for-manufacturing, along with planning for the Phase Three factory. There will also be the ability for RedFlow to access its global supply and logistics chain, offering further cost savings.

Looking further ahead, RedFlow plans to add significant additional ZBM manufacturing capacity through contract manufacturing with Jabil. This stage (Phase Four) envisages a much larger plant (initial capacity of tens of

thousands of ZBMs per year). It will be located in an offshore location.

This contracted operation will mean that RedFlow will have no exposure to plant capital costs other than perhaps specialist tooling. Moreover, the higher volumes and world-ranging supply chain of specialist contract manufacturing are expected to drive unit ZBM cost even lower. Phase Four is currently scheduled to be operational during 2013.

## Telecommunications Sector

RedFlow has been assessing the market for its zinc-bromine flow batteries in the telco sector for some time. Mobile phone operators rely on diesel gensets to generate electrical power at remote sites (base transceiver stations – "BTS") where utility power is unavailable.

The operating costs for those diesel gensets make up a large proportion of variable costs. As a result, telecommunication operators are constantly examining ways to operate the sites more cost effectively.

Use of RedFlow ZBMs in this application can help telecommunication companies reduce both diesel usage and greenhouse gas emissions. While lead-acid batteries are used in some BTS installations, these are often regarded as high cost and short lived components.

The technical specifications of these installations are similar to the solution RedFlow has already developed and is selling to Powerco in New Zealand.

RedFlow is developing two routes to reach this market:

- a) Direct sales into BTS installers in selected countries; and
- b) Working through a value added reseller into the major telecommunication original equipment manufacturers ("OEMs", the major global companies who supply equipment to the world's telcos.)

RedFlow had encouraging results from both strategies during the quarter.

Deliveries into this sector for trial use will start from January 2011 against an order of sixty ZBMs packaged for telco applications.

## Product Re-Branding

During the quarter, RedFlow reviewed its former product naming and branding protocols.

To simplify our product range, we settled on a new group of product names, each starting with RedFlow, and then with a number to indicate the kW rating.

For example, the former Power+BOS range is now labelled as 'RedFlow 3' or 'RedFlow 5'.

The X+BOS large scale product is now referred to as 'RedFlow 200' signifying its 200 kW rating.

## RedFlow 200 – Large Scale Energy Storage

Development of the RedFlow 200 progressed well during the quarter and is on schedule. RedFlow appointed an experienced electronic engineer as project leader and he has joined the full-time staff.

The core power electronics undergoing development, the RedFlow DC-DC converter, was successfully prototyped and tested for repeated cycles on a zinc-bromine battery under load. The next phase is to manufacture a trial batch of these components.

Meanwhile, the internal mechanical layout and thermal design is in progress by the RedFlow 200 technical team.

The first prototype is scheduled for deployment within the next three months to the demonstration site at The University of Queensland.

## Reliability Demonstration Program for Zinc-Bromine Batteries

RedFlow continues with its long term Reliability Demonstration Program for zinc-bromine battery modules.

At the time of this report, the deep cycling battery undergoing repeated 100% depth of discharge cycles had completed over 370 such cycles, equivalent to more than a year of daily cycling duty.

*A RedFlow 5 packaged energy storage system at work within the Ergon energy network.*



## Phase Two Factory Opening

On 10<sup>th</sup> August, Mr. Andrew Fraser, Queensland Treasurer and Minister for Employment and Economic Development officially opened RedFlow's Phase Two zinc-bromine battery factory.

The Phase Two factory is now being optimised, and production is stabilising.



*Queensland Treasurer and Minister for Employment and Economic Development Mr. Andrew Fraser with RedFlow founders Chris and Alex Winter at the Phase Two ZBM factory opening*

## Corporate News

Mr. Peter Pursey AM, a current RedFlow director, was appointed as Chairman of the RedFlow board. RedFlow appointed Ms Anne-Marie Birkill as a non-executive director. Anne-Marie is a General Partner in OneVentures, a venture capital fund backing innovative companies in clean technology, IT&T and new media and life sciences sectors.

After the end of the quarter, Mr Alex Winter and Mr Richard Aird retired from the company's board. They both continue to have ongoing executive positions with RedFlow, as Chief Engineer and Chief Operating Officer respectively.

Those changes completed RedFlow's transition in a corporate governance sense to a board appropriate for a listed company.

RedFlow held its 2010 Annual General Meeting on 29<sup>th</sup> September. All resolutions put to the meeting were adopted.

RedFlow undertook a successful share offer during the quarter. The equity raising was oversubscribed and RedFlow increased the size of the offer to partially meet investor demand.

Mr Iain Smith, formerly Company Secretary and Group Services Manager, left RedFlow at the end of the quarter. He made an enormously important contribution to RedFlow's foundation years, perhaps best marked by the fact that his duties needed to be re-assigned across five people in the organisation. Ms Karen Hudson, RedFlow CFO has been appointed Company Secretary.

## Continuing Growth

RedFlow's engineering, production and commercial team grew again during the quarter. Total employee numbers are now 45 staff, with several contractors engaged as well.

## Name Change

In recognition of the maturing of our activities into the full commercial phase, the company's name was changed from RedFlow Technologies Ltd to RedFlow Limited

## Phil Hutchings, CEO, RedFlow Limited

If you have any questions, I would be pleased to assist.

Phone + 61 7 3376 0008

Email [phil.hutchings@redflow.com.au](mailto:phil.hutchings@redflow.com.au)



RedFlow 200 – large-scale energy storage system, undergoing development.



**Corporate Office and Factory**

RedFlow Limited  
1 / 27 Counihan Road  
Seventeen Mile Rocks  
Brisbane QLD 4073  
Australia

Phone: +61 7 3376 0008  
Fax: +61 7 3376 3751

[info@redflow.com.au](mailto:info@redflow.com.au)

[sales@redflow.com.au](mailto:sales@redflow.com.au)

**Sales – Utilities & Corporate**

Bruce Ebzery,  
Utilities Sales Manager,

Phone: +61 7 3376 0008  
Mobile: +61 4 2243 8960  
[bruce.ebzery@redflow.com.au](mailto:bruce.ebzery@redflow.com.au)

**Stand Alone Power  
Systems Sales – Australia**

Gary Jubb,  
National Sales Manager,  
Australia

Phone: +61 7 3376 0008  
Mobile: +61 4 8876 8820  
[gary.jubb@redflow.com.au](mailto:gary.jubb@redflow.com.au)

**Sales – USA & International**

John Davis  
Global Business  
Development  
Mobile: +1 850 384 5275  
[john.davis@redflow.com.au](mailto:john.davis@redflow.com.au)

[www.redflow.com.au](http://www.redflow.com.au)

