

# Redflow

1H19 Results  
26<sup>th</sup> February 2019



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# Company Overview

Established in 2005.  
Listed on ASX in 2010  
(ASX:RFX)



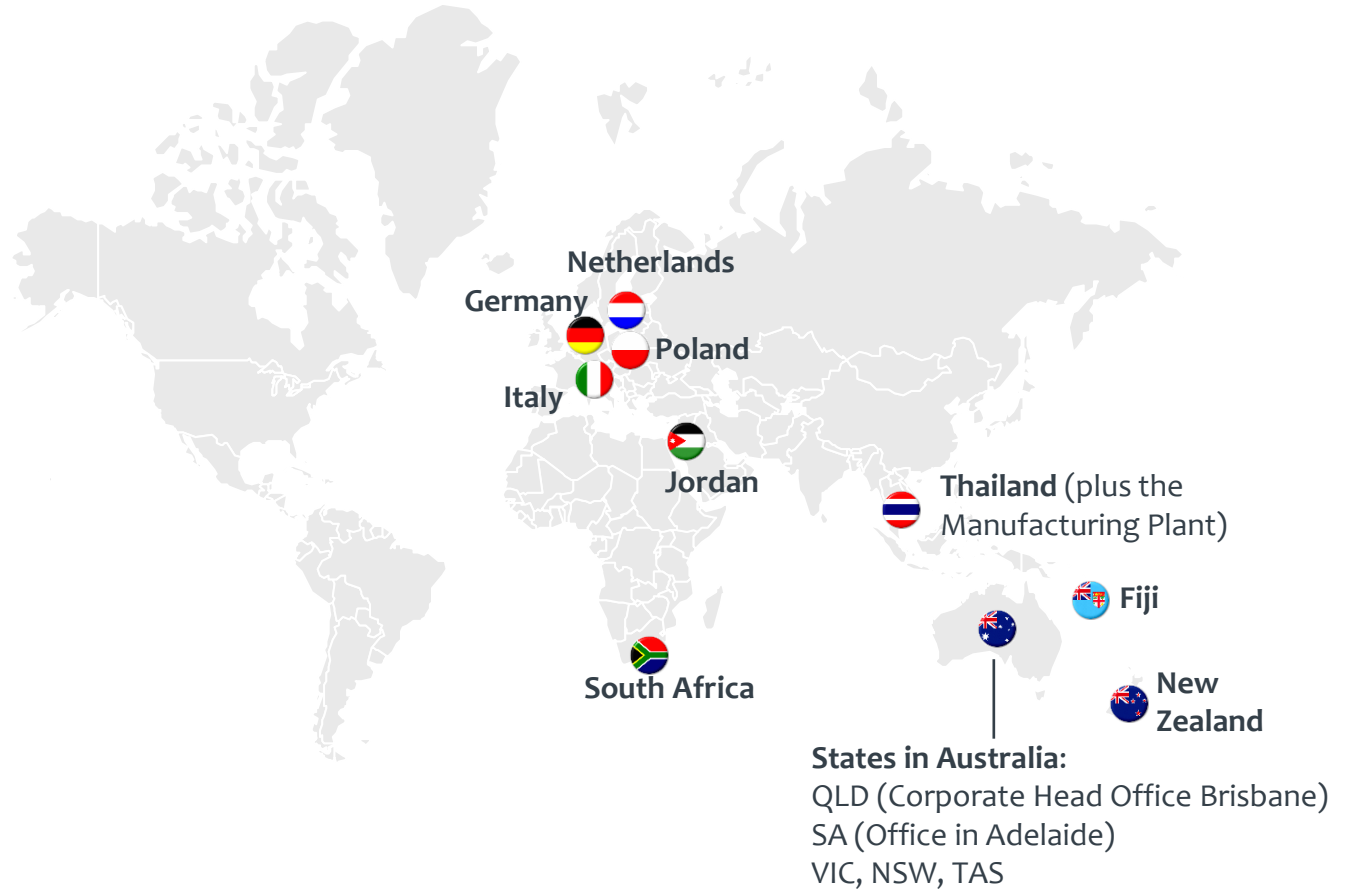
Redflow designs  
and manufactures zinc-  
bromine flow  
batteries



Headquartered in  
Australia. Company  
owned manufacturing  
facility in Thailand



Batteries currently  
deployed in nine  
countries



**Redflow is positioned to redefine energy storage in our target markets**

# 1H19 Key Highlights

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## Scalable Manufacturing

- Thailand factory now established and producing high quality batteries
- Produced 150 batteries in Dec 18.
- Scalable model for immediate demand (250 batteries/month). Moderate capex to scale factory to 54 MWh facility
- 30% Cost-down program underway and ISO9001 accreditation targeted for June 2019



## Customer & Markets

- Momentum growing - initial orders across telco, commercial and industrial and micro grid markets
- Attractive and growing sales pipeline – targeting volume opportunities following initial deployment
- Ability to extend current customer and partner ecosystem into adjacent markets and customers



## Board & Management

- Revamped Board and management team focused on commercialisation
- Managing Director, Chief Commercial Officer, CFO and Chief Deployment Officer recruited in last 12m
- Directors with deep technology and manufacturing experience recruited Sept/Oct 2018
- Investment in core capabilities required for sales growth and customer support



## Technology Leadership

- Ongoing investment in R&D to maintain industry leadership and battery performance
- Key projects include Gen3 stack, new electronics and tank design – 30% cost down
- Additional innovation launched – standby power mode

# Manufacturing Update

# An Established Manufacturing Base with Scalability

- Relocation of facilities to Thailand completed in April 2018
- Ownership ensures supply chain control, end to end quality assurance, scalability and flexibility to meet demand
- Clear benefits emerging from in-house manufacturing as production ramps up
- ISO9001 program underway – target completion June 2019
- Currently 75 FTE
- Model scalable to meet demand whilst delivering productivity and cost down benefits.
- Facility now proven at 150 batteries/month. Scale to 250 /month only requires double shift in selected processes (30 MWh)
- Current focus to scale volume and reduce cost – key engineering and productivity projects underway to deliver 30% cost down in 2019
- Moderate levels of capex required to reach ~450 batteries /month (54 MWh) (\$ 2-3M)



# Commercialisation Strategy



# Redflow Zinc-Bromine Flow Battery Advantages

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Ability to fully empty - with no damage!



Ability to utilise 100% of the battery's stored energy capacity all the time



Ability to turn off the battery without degradation



Ability to “park” a system at any state of charge and use it as required



No electrochemical degradation at 15 - 50<sup>°C</sup> battery operating temperature, no air conditioning required



Lower total cost of ownership and operation, especially in warm climates.



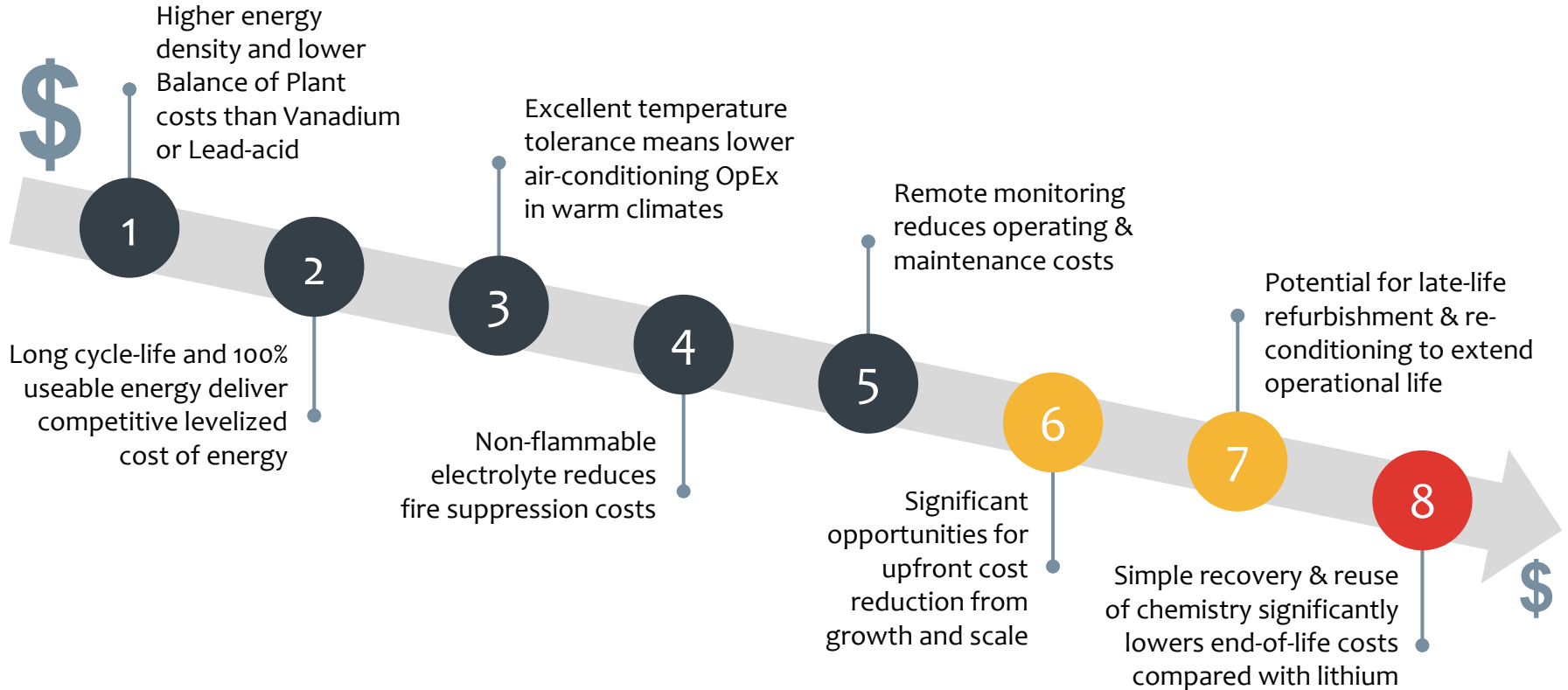
Not susceptible to thermal runaway



Reduced need for fire suppression costs and less hazardous at locations with valuable infrastructure



# Redflow Zinc-Bromine Flow Battery Customer Benefits



Current

Planned

Future

# 1H19 Commercial Highlights – Momentum Building



## Telco

Off-grid or backup power supply requirements for remotely located telco towers. Leverages renewable energy generation and mitigates theft

### Australian Telco

**Optus** –Optus has ordered six ZBM2s for mobile phone tower in environmentally sensitive Daintree rainforest

### South African Telco

**Leading telco** - 37 ZBM2s order to power remote mobile phone towers for leading South African telco



## Commercial and industrial / Microgrid

Reduce energy costs by replacing/ supplementing grid power and avoiding demand tariffs through storing off peak energy

### Australian Local Government

**Knox City Council** has built two state-of-the-art children’s centres in eastern Melbourne, each with 16 ZBM2 batteries

### Microgrid in Thailand

**Thai Government**-backed energy storage project has 10 x ZBM2 batteries (100 kWh) supplying energy for off-grid village in mountainous northern Thailand



## Residential

On-grid or off-grid solutions for greater energy independence, solar self-consumption and backup. Often multi-battery sites.

### High value deployments

Emerging partner eco-system in all Australian states

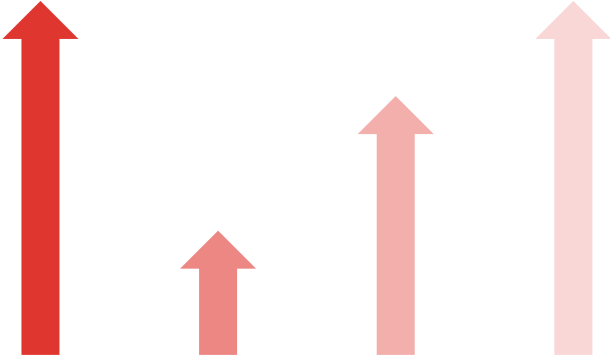
New training and certification program supports partners

Ongoing dialogue with local governments and industry bodies around participation in state battery programs

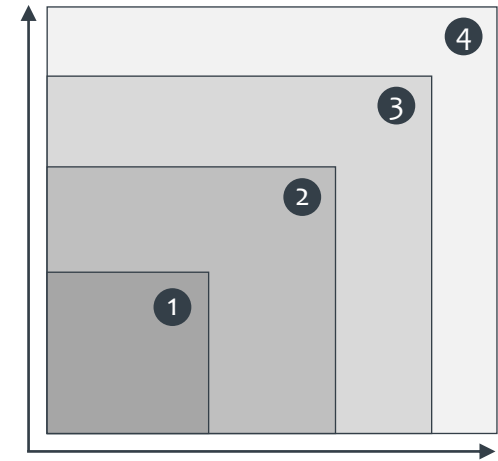
# Drivers for Redflow's Telco Strategy

- High power costs are a major factor that Redflow's batteries help mitigate
- Increase in infrastructure-sharing, core data growth and 5G expected to drive power and sites growth
- Battery theft a major issue in some markets – cost, uptime and revenue impacts
- Redflow features versus alternative technologies valued by target customers in key markets

Target ongoing orders in next 12m



Field Deployments	✓		✓	
Initial Orders	✓	✓	✓	
End Customer Engagement	✓	✓	✓	✓
Partnerships	✓	✓	✓	✓
Growth	>4%	6%	9%	8.5%
Size	127k	15k	4.4k	286k
Market	Sub Saharan Africa	Australia	NZ & Pacific	South East Asia



- 1 Extending current business with current end users beyond current deployments
- 2 Replicate with other customers in same markets e.g. other telcos in South Africa
- 3 Extend with partners and end customers into adjacent territories
- 4 Step out opportunities in new strategic markets – e.g. China, India and other growth market (Global Market Size 4.4 Million Towers).



Major activity in last 1H19

Figures calculated from TowerXchange data, and internal company research.

# Spotlight on South Africa

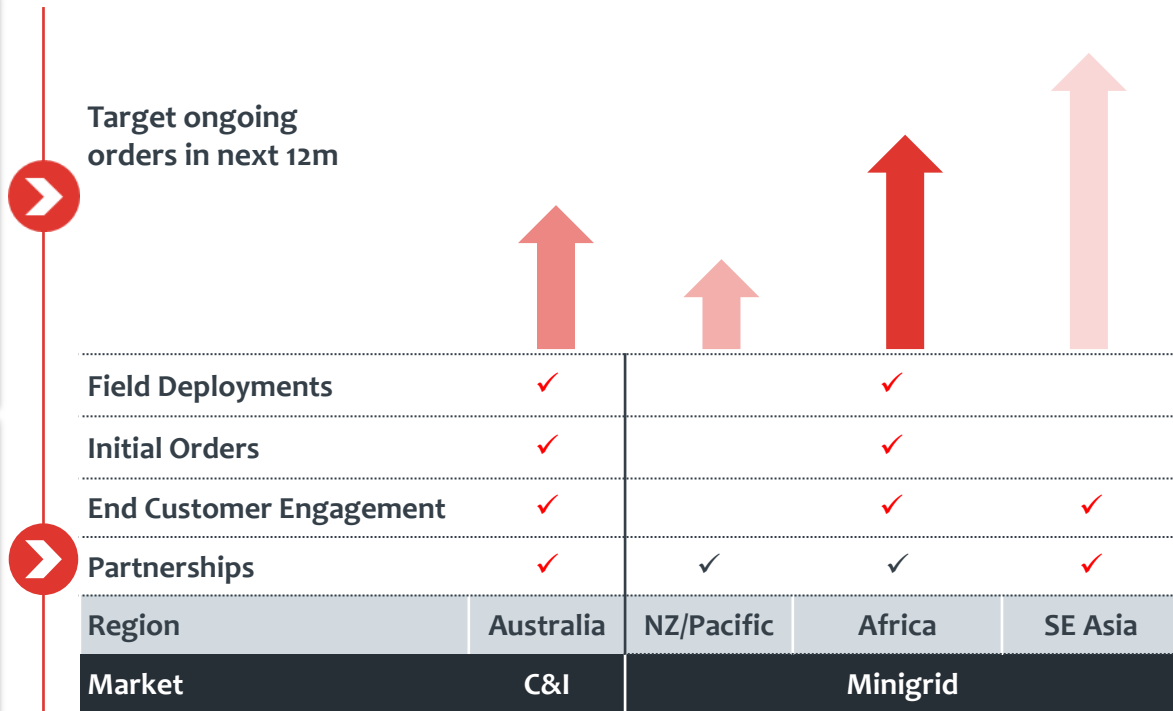
- Eskom – National electricity utility in crisis leading to widespread load shedding and black outs
- World Bank identified Eskom as a major risk to economic growth
- >28k cell towers in South Africa nationwide growing at 4% p.a.\*
- Mobile towers targeted by criminals - diesel, batteries, copper, and equipment theft
- Telco operator costs include repair and replacement costs, loss of revenue, security costs, emergency services uptime and network quality/uptime



- Long standing local partner with Specialised Solar Systems
- Redflow batteries deployed in South Africa since 2016
- November 2018 initial 37 battery order for new build telco sites for delivery through March 2019 to address theft issue – weight and limited value of components
- Current discussions with mobile operator for expansion into existing sites – diesel run time reduction and stand by power applications
- Additional opportunities being pursued in South Africa around in micro-grids and grid scale storage

# Look Forward C&I & Minigrid strategy

- **Next phase of solar growth is expected to be mid-size C&I deployments:** Business cases for solar, and increasingly storage, possible due to high electricity costs, peak tariffs and unreliable supply. Objective to expand recent deployment with local government and corporates into adjacent applications, customers and industries
- **Minigrids for community electrification in developing economies present a very substantial opportunity.** An estimated 1.3 billion people (approximately 1/5 of the world’s population) lack access to reliable electricity at home. Solar mini-grid projects in Africa and Asia is expected to grow from 3k installations in 2017, to over 31k by 2023\*
- **Future step out opportunities** such as participation in India’s electrification program - 235M people\*\*



✓ Major activity in last 1H19

\* Calculated from data provided by 'The Economist.'

\*\*\* From Institute of transformative Technologies, 'Achieving Universal Electrification in India – A roadmap for rural solar mini-grids.' 14

# 1H19 Financials



## Profit & Loss

Revenue for the period was \$502k down 58% on the prior corresponding period (pcp) with a reported Loss after Income Tax of \$4,912k up 27% on pcp.

The results were driven primarily by:

- A reduction in sales activity as the result of the transfer of manufacturing to Thailand and the subsequent time required to ramp up production in the new facility
- Revenue does not include ~60 batteries ordered but not yet delivered due to customer readiness.
- The Thai factory completed the first full battery in June: During December, the factory produced 150 batteries
- Ramp-up production processes still being optimised
- The expensing of freight for inwards bound materials and relocation of finished goods to Australia rather than capitalising into inventory
- The investment in personnel to drive the next stage of business growth

\$kaud	H1 FY19	H1 FY18
<b>Revenue</b>	<b>502.8</b>	<b>1,198.9</b>
Other Income	1,751.6	2,131.4
<b>Expenses</b>		
Raw Materials and Consumables Used	1,469.9	2,609.2
Other Expenses	5,696.7	4,576.4
<b>Loss before Income Tax</b>	<b>(4,912.2)</b>	<b>(3,855.3)</b>
Income Tax Expense	0.0	13.1
<b>Loss after Income Tax</b>	<b>(4,912.2)</b>	<b>(3,868.4)</b>
Other Comprehensive Income	(18.4)	1.9
<b>Total Comprehensive Loss Half Year</b>	<b>(4,930.6)</b>	<b>(3,840.2)</b>



# Balance Sheet

## Current Assets:

The Net cash position of \$7,857k is down 56% from prior comparison period (pcp).

This is partially offset by the Increase in Inventory, both Raw Materials \$5,217k up 11% and Finished Goods \$2,748k up 792% from 30 June 2018.

Finished Goods include batteries for orders previously announced where the customer is not ready for delivery yet. It is anticipated these will occur over the next 2 Quarters.

Other Current Assets are \$2,322k up 346% from 30 June primarily being the accrued receivable for the R&D Tax Incentive rebate. These funds were received in January 2019.

## Non Current Assets:

Are \$1,832k up 11% from pcp primarily being investments in production equipment for the Thailand facility.

\$kaud	31 Dec 18	30 June 18
<b>Current assets</b>		
Cash and cash equivalents	7,856.8	17,732.8
Trade and other receivables	69.7	253.9
Inventories	7,013.0	4,066.2
Other current assets	2,322.5	520.6
<b>Total current assets</b>	<b>17,261.9</b>	<b>22,573.6</b>
<b>Non-current assets</b>		
Property plant and equipment	1,213.8	1,024.2
Intangible assets	617.9	629.1
<b>Total non-current assets</b>	<b>1,831.7</b>	<b>1,653.3</b>
<b>Total Assets</b>	<b>19,093.6</b>	<b>24,227.0</b>
<b>Current liabilities</b>		
Trade and other payables	857.9	848.1
Other current liabilities	474.5	465.1
Provisions	1,615.9	1,938.9
<b>Total current liabilities</b>	<b>2,948.2</b>	<b>3,252.1</b>
<b>Non-current liabilities</b>		
Provisions	226.4	187.8
<b>Total non-current liabilities</b>	<b>226.4</b>	<b>187.8</b>
<b>Total liabilities</b>	<b>3,174.7</b>	<b>3,439.9</b>
<b>NET ASSETS</b>	<b>15,918.9</b>	<b>20,787.0</b>
<b>Equity</b>		
Contributed equity	111,305.5	111,300.9
Reserves	3,354.4	3,314.8
Accumulated losses	(98,741.0)	(93,828.7)
<b>TOTAL EQUITY</b>	<b>15,918.9</b>	<b>20,787.0</b>

# Cash Flow

Net cash (outflows) from operations was \$9,471k, and increase of \$3,554k from the prior comparison period (pcp) and is reflective of the change in the business from the pcp, being:

- Moving from outsourced/ contract manufacture to in-house manufacturing and the required increase in Inventory, both raw materials and finished goods
- The investment in ramping up production levels with the purchase of long lead time raw materials

Net cash (outflows) from investing activities was \$425k compared to \$119k for the pcp once again reflective ongoing investment in our in-house manufacturing capability

\$kaud	H1 FY19	H1 FY18
<b>Cashflows from operating activities</b>		
Receipts from customers	613.1	929.5
Payments to suppliers and employees	(10,200.3)	(6,858.2)
Grants R&D tax incentive received		
Interest received	125.4	36.1
Interest and finance charges paid	(9.3)	(11.7)
Income tax paid		(13.1)
<b>Net cash (outflows) from operating activities</b>	<b>(9,471.1)</b>	<b>(5,917.4)</b>
<b>Cashflows from investing activities</b>		
Payment for property plant and equipment	(351.9)	(62.1)
Payments for intangible assets	(73.3)	(56.9)
<b>Net cash(outflows) from investing activities</b>	<b>(425.2)</b>	<b>(119.0)</b>
<b>Cashflows from financing activities</b>		
Proceeds from capital raising		9,856.0
<b>Net cash (outflows) from financing activities</b>		<b>9,856.0</b>
Net increase / (decrease) in cash and cash equivalents	(9,896.3)	3,819.6
Effects of currency translation	20.2	(11.9)
Cash and cash equivalents at beginning of half year	17,732.8	2,699.5
<b>Cash and cash equivalents at end of half year</b>	<b>7,856.8</b>	<b>6,507.2</b>

# Key Priorities for 2H19

## Sales and Business Development

- Develop and secure regular volume orders for the telco sector
- Target 1-2 further lighthouse projects for commercial and industrial sectors
- Progress discussions for participation in Government subsidy programs for residential product
- Increase qualified partners in Australia and Asia Pacific

## Manufacturing

- Regularly producing 250+ batteries per month from current facility to 30 MWh p.a, matched to sales demand
- Execute on incremental improvement plans to increase yield
- Execute on ISO 9001 certification program for Thai factory
- Finalise demand driven scale plan for up to 54 MWh per annum
- Develop plan and options to achieve volume production to 120 MWh

## Engineering

- Execute on cost reduction program to end 2019
- Finalise development of single stack Gen 3 battery

## Supply Chain

- Diversify and expand quality supplier base
- Reduce lead times on long lead time materials

## New Markets

- Progress potential partnership opportunities in China
- Explore step out opportunities in other markets



# Platform now in Place to Deliver on Growth Strategy

The H1 FY19 results demonstrate Redflow has emerged from a two-year turnaround with the capabilities and momentum to position the Company for future commercial success

1. We now have batteries ready to meet current sales pipeline and a moderate order ramp up
2. At current price (USD\$~7k) and monthly volume at ~130 batteries/month we achieve a positive Gross Margin
3. Executing key engineering programs to drive 30% cost down on manufacture costs + volume supply discounts
4. Current batteries in stock will allow us to moderate working capital requirements over the next 6 months
5. Volume increases and efficiency projects will generate production yield benefits
6. R&D remains core element of Redflow shareholder value – AUD\$~4m investment
7. Leadership team in place – board and management - to delivery on opportunities available
8. Limited further SG&A cost required to reach 250+ batteries per month (30 MWh p.a.)
9. Plan for 450+ batteries / month in development (54 MWh p.a.) – est. capex AUD\$2-3m
10. Exciting global addressable market opportunity available with focus on immediate prospects

*ZBM2 batteries at Ban Pha Dan in Thailand: Microgrid opportunity in developing nations*



# Appendices



## Board of Directors

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**Brett Johnson**

**Non-Executive Chairman**

Over 10 Years Director experience of listed companies including Scott Corp Ltd and Helloworld Ltd. Over 25 years experience as General Counsel of listed Australian companies, including Qantas Airways.

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**Jenny Macdonald**

**Non-Executive Director & Chair of Audit Committee**

Extensive experience working with ASX listed and global companies at CFO and general management level. Jenny currently serves as a Non-Executive Director on the Boards of API Ltd., Redbubble Ltd. and Bapcor Ltd.

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**David Knox**

**Non-Executive Director**

Previous CEO and MD of Santos Ltd. from 2008-2015. David was also previously MD for BP Developments in Australasia from 2003 to 2007 and worked for BP in the U.K. and Pakistan.

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**John Lindsay**

**Non-Executive Chairman**

Previously held senior technology leadership roles including CTO at iiNet Ltd, CTO at Internode and GM of Chariot Internet. John is a director of the Australian Telecommunication Industry Ombudsman Ltd and of Uniti Wireless Ltd.

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**David Brant**

**Non-Executive Chairman**

An experienced businessman with strategic manufacturing expertise, is a Fellow of the Australian Institute of Company Directors with more than two decades of manufacturing and corporate experience in Australia and countries in Asia.

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# Management Team and Technical Experts

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**Tim Harris**  
Chief Executive  
Officer & Managing  
Director



**Richard Aird**  
Chief Operating  
Officer



**Trudy Walsh**  
Chief Financial  
Officer



**Dr. Mike Giulianini**  
Chief Technology  
Officer



**Tim McTaggart**  
Chief Deployment  
Officer



**Ben Shepherd**  
Chief Commercial  
Officer



**Simon Hackett**  
System Integration  
Architect



**Dr. Alex Winter**  
Consulting Engineer

# ZBM2 Technical Specifications

ZBM2 Technical Specifications	
<b>Voltage</b>	48 Volt DC nominal batteries (typical operating range 40-60V)
<b>Capacity</b>	Maximum 10kWh energy output per daily cycle No reserved battery capacity requirement – full 10kWh cycle depth available
<b>Dimensions</b>	845 L x 823 H x 400 W (mm) 33 L x 32 H x 16 W (in)
<b>Weight</b>	240 kg (530 lb) with electrolyte 90 kg (198 lb) without electrolyte
<b>Electrolyte volume</b>	100 L (26Gal)
<b>Energy efficiency</b>	80% DC-DC Max
<b>Internal (electrolyte) operating temperature</b>	Operating electrolyte temperature range of 15°C to 50°C (59°F to 122°F), ZBM2 can typically operate at ambient temperatures outside this range for extended periods
<b>Communication</b>	MODBUS RS485
<b>Safety data sheet</b>	DG Class 8 for electrolyte
<b>Power rating</b>	3kW (5kW peak) 3kW continuous: current up to 75A (40V disconnection point) *1 5kW duration depending on the State of Charge (SOC): current up to 125A (40V disconnection point) *1, 2
<b>Regulatory compliance marks</b>	CE and RCM
<b>Warranty</b>	36,500 kWh of energy delivered or 10 years (whichever comes first) *3 No cycle depth limitations – battery performance and lifetime is not sensitive to cycle depth



- \* 1 Values reported for ZBM2 at 100% state of health (SOH) and room temperature
- \* 2 Redflow internal testing shows a 5kW supply for approximately 45 minutes before disconnection, for a ZBM2 starting at 100% state of charge (SOC)
- \* 3 See full warranty document for details, Terms and Conditions apply

Source: <https://redflow.com/products/redlow-zbm2/>