

A photograph of a Redflow battery storage system. The system consists of multiple racks of white, rectangular battery modules, each with a red top. The racks are arranged in a row, and the system is housed within a modern, dark-colored metal structure. The background shows a corrugated metal wall and a fence, suggesting an outdoor or semi-outdoor industrial setting.

Redflow

FY2020 Results

27 August 2020

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Children and Family Centre at
Wantirna South, Melbourne,
Australia

Company Overview

Headquartered
In Brisbane, Australia

Company owned manufacturing
facility in Thailand

Redflow designs and manufactures zinc-bromine flow batteries

Major Target Markets
Telco
Commercial, Industrial & Utility
Remote Area Power Systems
High end Residential

Key Geographies
Australia
New Zealand
Africa
Selected other markets

~100 current deployments across multiple countries*



Redflow is redefining energy storage in our target markets

Investment Thesis



Market leading flow battery energy storage provider with deep technical competence



Growing diversified blue chip client base with addressable spend in growing 4m+ mobile tower market and other industries



40% growth in deployments over the last 12 months



Strategic growth opportunities in adjacent applications and markets



Independent testing shows no changes in the capacity or performance over sustained cycling*



\$120m invested over 15 years in proprietary technology and commercialisation



Move to Thailand manufacturing facility has reduced manufacturing costs by 40% (current Gen2.5 battery)



Targeting a further 30% reduction in manufacturing cost (Gen 3 battery), with further scale based cost reduction opportunities

The Opportunity for Redflow

- The world is transitioning to a lower carbon energy system
- Storage sits at the core delivering reliable, affordable, low-carbon electricity
- Flow batteries have a specific role in the energy storage ecosystem

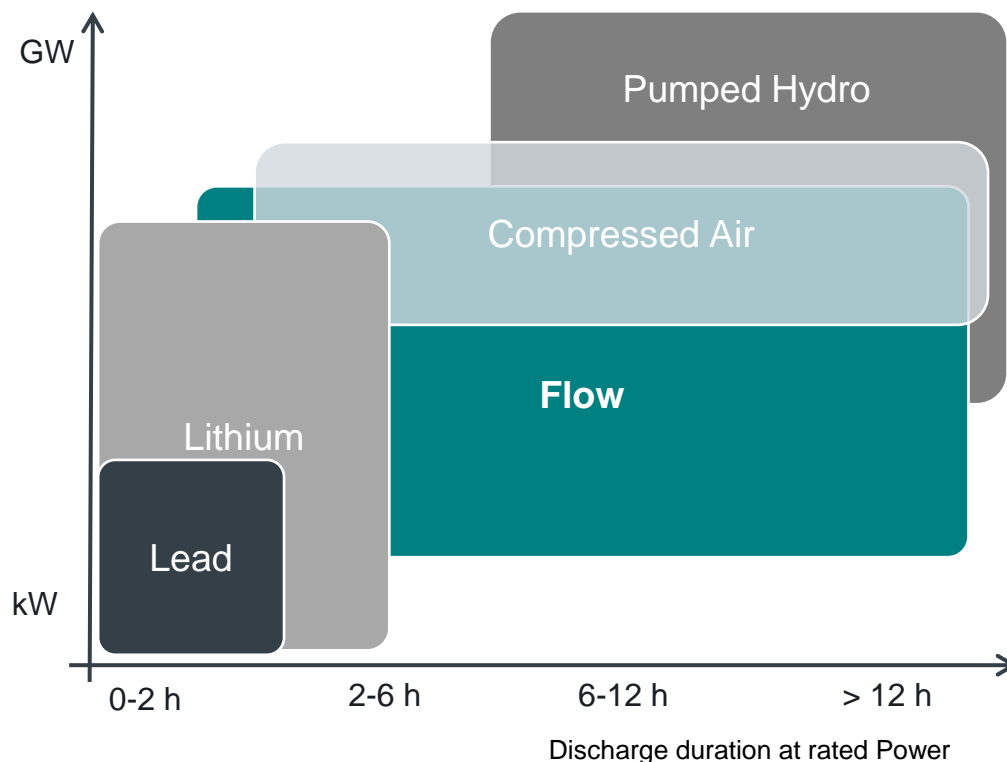
Market for redox flow batteries forecast to be worth **US\$4.5 billion** by 2028²

“Flow batteries are potentially going to be a big contributor in stationary energy storage, like the grid-level stationary energy storage”

Australia Chief Scientist Dr Alan Finkel¹

- ✓ Flow batteries suited for 10kWh applications up to multi MWh
- ✓ Comfortable with discharge times of up to 15 hours (at rated energy)
- ✓ Chosen for versatility, adaptability and robustness

Stationary Storage Market by Type (Illustrative)



Patent protected technology with unique features



Gen2.5
(Current)



Gen3.0
(Target Customer trials Dec2020)

Competitive position is protected through 10+ years investment in an IP portfolio across multiple countries plus trade secret knowledge



Flow chemistry is like a reversible electroplating process



Unlike conventional batteries, it is **happy to run flat and repeatedly use 100% of its energy capacity**



Excellent tolerance for high ambient temperatures without external cooling



Compact Flow battery; this modular design enables scalability 10kWh → multi-MWh



Smart battery including Battery Management System (BMS) with remote monitoring and diagnostics plus self-protection features



Strong environmental credentials recyclable HDPE plastic and re-usable electrolyte



A number of theft mitigation features, incl. software and hardware innovations



Robust long life battery



Not susceptible to thermal runaway

Major Target Markets

Our sweet spots include...

Energy-focussed applications

Frequent cycling

Warm climates that rapidly degrade other batteries

Present Focus



Telco

- >4m mobile towers globally
- Power costs a major factor
- Load shedding / weak grids increase demand for long duration batteries
- Increase in infrastructure sharing and tower companies
- Battery theft plus commercial and environmental concerns over diesel use

Provide technical and commercial value proposition across off-grid, weak-grid and back-up power supply applications



Remote Area Power Systems (RAPS)

- Battery Energy Storage System crucial to RAPS with renewable energy sources and can improve efficiency of fossil fuel generation.
- Needs high temperature tolerance, and frequent deep cycling. Minimal capacity decline, like ZBM, highly desirable to maintain optimum operation over life.

Redflow solution is well suited to these and our ten year warranty offers an attractive commercial proposition



Commercial, Industrial & Utility

- Multiple industries where stable and cost efficient power is critical
- Key issues include intermittent power, high peak demand tariffs and maximising renewable use
- Address solar curtailment
- Sub-station support as demands on grid increase.

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

Priority Target Market – Telco sector

4 million

telco base stations globally with
4.6% CAGR growth 2019-2024¹

120,000

new base stations are deployed
yearly – mostly in countries with
poor grid infrastructure²

1 million +

off-grid and bad-grid towers by
2020 with **over 90%** using diesel as
main power source²

Major growth in markets and geographies with no or weak grid environments plus resiliency programs in developed markets such as Australia

- Growth expected in areas of poor or limited grid connection and concentrated in Africa & Asia²
- Government sponsored initiatives to improve telco resiliency/back up³

Base stations energy use are a major cost component for Telcos

- 160,000⁴ base stations in Africa. Existing engagements cover ~37k towers
- 21,000⁴ base stations in ANZ & Pacific. Existing engagements cover ~16k towers
- 407,000⁴ in Asia (excl China, India & Japan). Existing engagements cover ~18k towers
- Expected increase in power consumption due to 5G. Widespread upgrades of mobile base station power systems is anticipated

Growth of tower companies and infrastructure services

- Focus on efficient energy management and emergence of energy as a service models

Renewable Energy Commitments

- Global telco operators have clear and ambitious renewable energy goals e.g. replace use of diesel⁵
- Government driven and funded initiatives to reduce blackspots in key countries.
- Government programmes to fund, subsidise or mandate build out of towers in rural or remote locations

1. Mordor Intelligence, *Telecom Towers Market, Growth, Trends and Forecast (2019 - 2024)*

2. GSMA Report, *Green Power for Mobile*, December 2014

3. For example, Australian government AUD\$37m Telecommunications Emergency Resilience Package to improve the resilience of communications networks, 2020

4. TowerXchange 2019 Market Reports (Africa and Asia)

5. Vodafone Group *Sustainability Report*, 2019

FY20 Highlights



Remote agriculture property
in Western Australia

FY2020 Key Highlights



Ongoing Commercial progress despite COVID headwinds

- ✓ FY2020 sales up 144%, to \$1.95 million, (FY2019: \$800k)
- ✓ Total sales revenue for FY2020 highest for Redflow since FY2012
- ✓ Initial sales with a number of new end customers including the RCG in NZ, Swansea University in the UK and Vodacom in South Africa
- ✓ New partner relationships in Australia and South Africa – Delta, Mobax
- ✓ Overall pipeline stable and progressing even with COVID-19 related impacts



Growing set of reference deployments and performance data

- ✓ >40% increase in total deployments over last 12 months. Key customer rollouts impacted by COVID-19 in some markets
- ✓ Growing set of reference deployments for rural and agricultural market in Australia
- ✓ Reference demonstration deployment in China Qinghai province with Zbest
- ✓ Proven performance after 600 cycles through ongoing government sponsored testing
- ✓ Key telco reference site in NZ now delivered >60 MWh of energy



Acceleration of Gen3 and new innovation

- ✓ Significant progress on Gen3 battery including new stack, Mk12 board, new tank
- ✓ Targeting Dec 2020 customer trial
- ✓ New innovations launched including anti theft features and standby power mode
- ✓ Thailand factory achieved ISO9001 certification July 2019



Tight cost control and capital raise

- ✓ Achieved payroll cost reduction of ~\$2.0 million (versus FY2019)
- ✓ Secured available government COVID-19 support measures
- ✓ Achieved material savings through negotiations with one strategic supplier
- ✓ Cash balance of \$3.4m as at 30 June 2020, with additional \$5.3m received via Entitlement Offer and Shortfall Placement

FY20 Financials



Telecommunications scaled
battery installation

Profit & Loss

Revenue for the period was up 144% on prior corresponding period (pcp) to \$1.95m

Reported loss after income tax of \$10m driven primarily by:

- Higher sales to customers
- Other Income up 34% resulting from an increase in the R&D Tax rebate received, Export Market Development Grant (EMDG), JobKeeper and Australian Federal Government Cash Flow Boost
- Other expenses down 17% due to \$2m reduction in payroll costs and other expenses
- Raw materials and consumables used increased to \$5,534.8k due to higher cost of sales as a result of higher revenue, the moderation of production volumes resulting in an under recovery of manufacturing overheads and the impairment of ZBM2 finished goods due to the accelerated development of the Gen3 battery

A\$'000	FY2020	FY2019
Revenue	1,948.4	800.1
Other Income	2,595.0	1,938.1
Expenses		
Raw Materials and Consumables Used	5,534.8	3,413.1
Other Expenses	8,975.5	10,823.2
Profit/ (Loss) before Income Tax	(9,966.8)	(11,498.1)
Income Tax Expense	50.9	71.9
Profit/ (Loss) after Income Tax	(10,017.7)	(11,570)
Other Comprehensive Income	(4.5)	(25.5)
Total Comprehensive Loss Year	(10,022.2)	(11,595.5)

Balance Sheet

Current Assets:

Solid Net cash position of \$3.4 million, with additional \$5.3 million received via Entitlement Offer and Shortfall Placement in July-August

Inventories down 29% from pcg

- Raw materials of \$3,476k down slightly from 30 June 2019
- Finished Goods of \$2,127.8k after the impairment, down \$1,976k from 30 June 2019. This is a result of moderating Thailand production to meet customer demand
- Finished Goods includes batteries for orders on hand where the customer is not ready for delivery yet

Current Liabilities:

Trade and other Payables are \$562k lower than the pcg. This is a result of moderating production and lower demand for raw materials

A\$'000	30 June 2020	30 June 2019
Cash and cash equivalents	3,390.2	10,902.4
Trade and other receivables	135.3	61.3
Inventories	5,603.8	7,866.9
Other current assets	377.4	316.0
Total current assets	9,506.7	19,146.7
Property plant and equipment	766.9	1,089.6
Intangible assets	630.4	606.6
Right of use assets	76.0	-
Total non-current assets	1,473.3	1,696.2
Total Assets	10,980.0	20,843.0
Trade and other payables	492.1	1,054.6
Lease liabilities	76.2	-
Other current liabilities	417.7	759.4
Provisions	1,456.4	1,313.4
Total current liabilities	2,442.4	3,127.4
Lease liabilities	-	-
Provisions	65.0	118.1
Total non-current liabilities	65.0	118.1
Total liabilities	2,507.4	3,245.5
NET ASSETS	8,472.6	15,597.5
Contributed equity	119,670.3	119,586.2
Reserves	4,218.6	3,410.0
Accumulated losses	(115,416.3)	(105,398.7)
TOTAL EQUITY	8,472.6	17,597.5

Cash Flow

Net cash (outflows) from operations down 52% on pcp to \$6.9 million:

- Substantial increase in Receipts from customers, as a result of higher battery orders and deliveries in FY2020.
- 32% increase in Grants, R&D Incentive due to increased R&D Incentive receipt, Export Market Development Grant and JobKeeper payments
- Payments to suppliers and employees down 35.9% to \$11.1 million, following inventory build in FY2019, moderation of battery production and lower headcount in FY2020.

Additional \$5.3 million in cash raised in Entitlement Offer and Shortfall Placement in July-August 2020

A\$'000	FY2020	FY2019
Cashflows from operating activities		
Receipts from customers	1,881.0	1,001.0
Payments to suppliers and employees	(11,128.5)	(17,360.2)
Grants, R&D tax incentive received	2,313.8	1,751.6
Interest received	67.2	178.5
Interest and finance charges paid	(10.0)	(17.2)
Income tax paid	(60.5)	(46.3)
Net cash (outflows) from operating activities	(6,936.9)	(14,492.6)
Cashflows from investing activities		
Payment for property plant and equipment	(146.6)	(479.4)
Payments for intangible assets	(198.6)	(138.1)
Proceeds from sales of PP&E		22.0
Net cash (outflows) from investing activities	(345.2)	(595.5)
Cashflows from financing activities		
Proceeds from capital raising	-	8,395.5
Transaction costs related to issues of equity securities	(66.2)	(155.1)
Principal elements of lease payments	(186.4)	
Net cash (outflows) from financing activities	(252.5)	8,240.4
Net increase/(decrease) in cash and cash equivalents		
	(7,534.6)	(6,847.7)
Effects of currency translation	(22.4)	17.3
Cash and cash equivalents at beginning of year	10,902.4	17,732.8
Cash and cash equivalents at end of year	3,390.2	10,902.4

Commercial Strategy



Knox City Council Installation -
Redflow CEO Tim Harris, Dr Alan-
Finkel and Simon Hackett

Commercial Strategy - Our Pathway Forward

The Current Situation

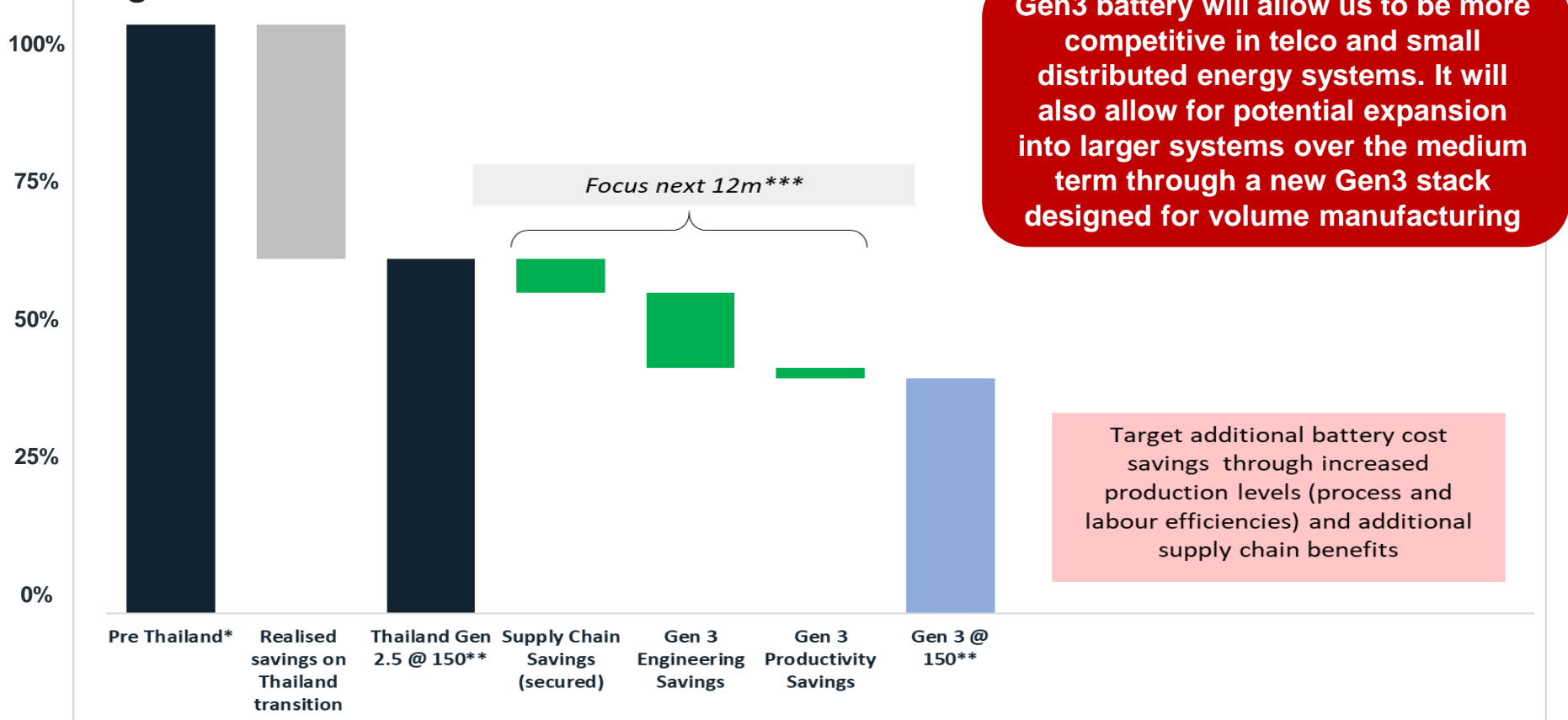
- COVID-19 had an impact on our ability to execute on our growth strategy in the second half of FY2020
- We are continuing to progress activity but we expect the situation will remain dynamic for some time
- Strong set of opportunities aligned with our value proposition in our key markets
- FY2020 experiences highlighted further price competitiveness and reducing the effort of installing and commissioning our battery is required to significantly increase our value proposition
- Accelerating Gen3 battery development therefore critical to future sales and drive commercial margin
- Ongoing cost management will also be critical

Our Way Forward

- Continue primary focus on telco for next 12 – 24m. Additional emphasis on off grid and poor grid environments with extensive use of renewables, diesel generators and issues such as battery theft
- Prioritise Australia, NZ and African markets outside of existing opportunities in other markets
- Progress current end customer and partner engagements with ability to order batteries in volume in next 12-18m following COVID-19
- Further expand reference deployments and proof points of battery performance
- Accelerated development of Gen3 Battery – initial customer trials in late 2020 and Thailand readiness for production ramp up
- Ongoing investment in innovation to enhance value proposition
- Updated management team to reflect required capabilities and cost management. New CTO joining end August 2020, Chief Commercial Officer leaving October 2020. Ongoing prudent cost management across all operations
- Progress potential strategic partnerships including options to licence our battery technology into specific markets

Thailand and Gen3 Cost Down

Gen3 expected to deliver significant unit cost benefits. Further progress targeted through economies of scale



* Pre Thailand costs based on 3rd party manufacturing partner last quotation March 2017 at 90 batteries per month plus electrolyte and electronics board (outside of quotation). Excludes Battery Management System costs and any required external enclosures

** Thailand Gen2.5 and Gen3 costs at 150 batteries per month estimated. Fully allocated costs. Excludes Battery Management System Costs and any required external battery enclosures

*** Focus next 12m consisting of (a) Supply chain savings secured agreed end 2019 with supplier; (b) Gen 3 engineering savings assumes engineering changes currently being developed and trialled are successful; and (c) productivity savings assumes engineering changes are successful and result in a reduction in manufacturing working

FY21 Key Priorities



Remote agriculture property
in Western Australia

Key Priorities for FY21

Sales and Business Development

- Future sales focus and business development activity focused on key markets in Africa, Australia and New Zealand
- Focus on key applications where we have achieved significant traction to date
- Drive sales growth and regular orders - dependent on COVID-19 recovery and ability to serve key markets

Research and Development

- Focus development and accelerated testing for Gen3
- Continue development of new features. Immediate targets include new Industrial Battery Housing and ability to work in parallel to Lead Acid. Target launch H1 FY2021

Expense management

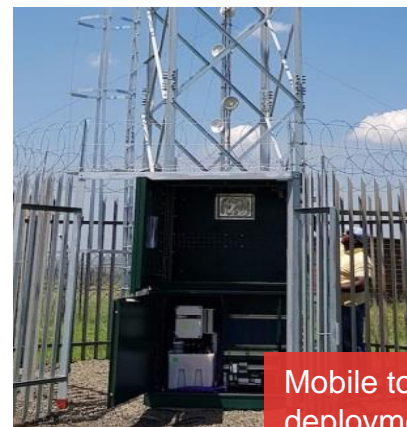
- Maintain cost containment measures in place and pursue additional savings measures where prudent
- Progress supplier strategy – security of supply, diversification and volume frameworks

Financing

- Continue to explore and progress strategic investment discussions including licensing



New Industrial Battery Housing for telco/commercial outdoor installations



Mobile tower deployment for Moropa, South Africa

Appendices

Redflow Battery Performance

Independent Australian government funded testing show sustained performance

- Redflow is part of a Australian federal government funded testing of multiple batteries through the Canberra Institute of Technology. Managed by ITP Renewables
- After some earlier challenges with battery manufacturing faults, Thailand manufactured Redflow battery has been on test since Feb 2019
- The battery is cycled twice per day close to 100% DoD charging at approximately 2.7kW and discharging at approximately 2.0kW.
- April 2020 report shows a SOH of 100% after ~600 cycles. See report [here](#)
- Latest Redflow internal analysis of battery on ITP test bay shows no changes in the capacity, performance and behaviour of the battery can be determined after more than 700 equivalent cycles (>7000 kWh out). Analysis conducted 23rd May 2020.

Redflow Battery Test – Delivered Energy



Figure 8: Estimated full charge capacity per cycle by the Redflow battery pack

Graph extract from ITP *Public Report 8 Lithium-ion Battery Testing*, April 2020 which shows average energy discharged from the battery during testing. See report [here](#)

ZBM2 Technical Specifications

ZBM2 Technical Specifications

Voltage	48 Volt DC nominal batteries (typical operating range 40-60V)
Capacity	Maximum 10kWh energy output per daily cycle No reserved battery capacity requirement – full 10kWh cycle depth available
Dimensions	845 L x 823 H x 400 W (mm) 33 L x 32 H x 16 W (in)
Weight	240 kg (530 lb) with electrolyte 90 kg (198 lb) without electrolyte
Electrolyte volume	100 L (26Gal)
Energy efficiency	80% DC-DC Max
Internal (electrolyte) operating temperature	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
Communication	MODBUS RS485
Safety data sheet	DG Class 8 for electrolyte
Power rating	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
Regulatory compliance marks	CE and RCM
Performance	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)

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