Investment case: redT energy

• A global market leader in vanadium redox flow machines
• An energy storage expert, with 29 years experience in the energy industry
• Tier-1 manufacturing capability
• Over 3.4MWh of machines deployed globally with more than 1.8 million hours operating experience
• Protective IP over system design and technical knowledge
• Addressable market larger than all other battery markets combined
• Demonstrable commercial success in core markets with €2.5m (43 units) secured orders for 2018
• €357m pipeline (€18.3m / 330 units under final stage negotiation)

Key Existing Customers

[Logos of e-on, centrica, Lifeboats]
What we do: redT energy

- **Energy storage experts**, specialising in durable, energy storage **infrastructure** which create **attractive economic returns** for customers

- **Multi-technology** energy storage solutions utilising **patented redT flow machines** or **hybrid systems** incorporating lithium

- **29 years** energy industry experience with **18 years** of energy storage product development combine to provide **complete business solution** for customers
Sustainable equity value

**Prove**
- Stack Technology proven
- System prototype
- Manufacturing Agreement
- Manufactured product
- Gen 1 design

**Scale**
- Market seeding programme complete
- Gen 1 system delivered
- Functional performing team
- Credibility through Case-studies Ambassadors

**Sustain**
- Gen 2 sales
- Energy Storage Expert Technology USP
- Orderbook across defined products
- Gen 2 system delivered
- Credibility through Case-studies Ambassadors

**Energy Storage Expert Technology USP**
- Not started
- Commenced
- Near completion
- Completed

- 3p
  - £7m
  - Q1 15
Market Opportunity
Energy market trends

Cost of Solar Generation: Tending to $0/kWh

Power Price Volatility: Peak Prices Rising

Grid Service Revenues: USA, UK + others coming online

Distributed infrastructure energy storage is now open for business
This is real, distributed infrastructure – not opportunistic investments based on short term (< 1 hour) arbitrage
Energy storage applications overview

**Grid Connected C&I – Renewables + Storage – ~15% IRR**
Certain geographies now economic; UK, Australia, Germany, USA
Time-shifting for self consumption, contracted services and merchant revenues

**Off-Grid & Weak Grid – ~30% IRR, 3-5 year payback**
Diesel energy production cost $0.50 to $1 per kWh. Solar desired in off-grid, but doesn’t work without industrial, heavy cycling storage. Solar + flow machine cost $0.20-0.30 per kWh (figures indicative of South African market)

**Renewables + Storage Grid Projects**
Decentralised, large scale renewables projects (Solar, Wind, Tidal etc.) supported by large scale, flexible energy storage platform asset

**Large Scale Grid Projects – Trading and Grid balancing (merchant returns- now economic)**
For long duration grid services at national / regional level (>3hours) as base case, then can perform all grid services at no incremental cost, including energy trading. Policy to price services (not subsidies). Works now in Germany & USA, UK viable in near-term
redT market segment growth

**Off-Grid**
- IRR: ~30%
- 3-5 Year Payback

**UK C&I**
- IRR: ~10-20%
- 7-10 Year Payback

**Australia C&I**
- IRR: ~10-20%
- 7-10 Year Payback

**Distributor**
- IRR: ~10-30%
- 3-10 Year Payback

**Totals**
- **Orders**
  - €2.5m
  - 43 units
- **Final stage**
  - €18.3m
  - 330 units
- **Pipeline**
  - €357m
## redT channels to mass adoption

### Direct Sales (C&I)
- UK, Australia, Africa & EU
- Establishes initial market credibility
- Develops customer use case
- ~ 12 month sales cycle

### Distributors
- Local renewable or energy experts
- Trusted and local to customers
- Initial 6-12 month onboarding process
- ~6 month sales cycle for prequalified leads
- 4 in UK, 2 in Africa plus E.Europe, S.E Asia, S.Pacific

### Large Projects (Developers)
- Large-scale infrastructure projects + tenders
- Stages; Project design, technical review & project finance
- ~ 1-3 years sales cycle

### Specific Programmes
- Specific campaigns directed at exploiting new opportunities with grants, subsidies etc.
- E.g. RDPE grant in UK

### Gen 3 Final Stage Selection

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<th>€1m (20 Units, UK)</th>
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<td>Direct Sales (C&amp;I)</td>
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<td>Distributors</td>
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<td>Large Projects (Dev)</td>
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<td>Specific Programmes</td>
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Unlocking on-grid energy storage

80%
Base Returns Locked In

- Use more solar
  Firming solar: 24/7 solar power
  Requires 4-8 hours of storage

- Batteries: 2 hours
  Flow Machines: > 4 hours

Save more on energy bills
Renegotiate supply contracts
Access wholesale power prices

Requires ~5 hours of storage to minimise price risk

20%
Merchant Revenue Upside

- Access more revenues

- Perform all services, remain flexible
  Batteries: 1 service (Freq. response)
  Flow Machines: All Services (stacked)

- Profit from price volatility
  System balancing: ~4 hours of storage

- Batteries: 30 mins only
  Flow Machines: 30 mins – 4 hours +

7-10 year Project Payback

redT machines = flexible platform
Unlocking all PV, PPA, Grid and Trading Revenues + additional non-quantifiable benefits

~15% IRR (Unlevered)
Comparing energy storage business models

Energy Storage Infrastructure

- Locked-In Returns: 80%
- Upside (Variable): 20%

High % of business case locked-in
Flexibility to change over time

Battery Storage

- Locked-In Returns: 25%
- Upside (Variable): 75%

Returns at risk
Non-flexible business case
Unlocking off-grid energy storage

100%
Base Returns Locked In

- **Use More Solar**
  - Firming solar: 24/7 solar power
  - Requires 4-8 hours of storage

- **Downsize Generators**
  - Reduce reliance on generators
  - Save up to 90% on fuel costs

- **Increase Efficiency**
  - Run gensets at optimised loads
  - Increase fuel efficiency & output

- **Reduce Maintenance**
  - Reduce strain on machinery
  - Improve machine lifespan

+ Upside
Non-Quantifiable Upside

- **Gain Energy Security**
  - Full independence from unreliable grid networks – gain business continuity

- **Reduce Carbon Emissions**
  - Increase sustainability and reduce environmental impact

3-5 year Project Payback
~30% IRR (Unleveraged)

dredT machines = energy infrastructure
Creates significant OPEX savings & supports environmental sustainability
Why flow technology?
Stationary energy storage market

“Larger than all electric vehicle and battery markets put together >$150B US market”

Goldman Sachs, 2015

New market driven by economics
Renewable + storage
Flow Machine
( currently 0.1%)

- Grid Services (All)
- Renewable Firming
  (4 hours – 24 hours)
- Network Reinforcement
- Energy Trading & Arbitrage

Pumped Hydro 99%

Bespoke Projects

Power

Application Duration

1 hour 12 hours 24+ hours

GW

MW

kW

Li-ion 1%
Freq. Resp
Small solar (<2 hours)
Back-up
Domestic

“Larger than all electric vehicle and battery markets put together >$150B US market”

Goldman Sachs, 2015
It’s a machine! Not a b*****!

Battery
- Single use consumable
- 10-20% Utilisation
- Ideal for:
  - Frequency Response Tenders – Good return in short run, but not sustainable long term
  - Single service
  - Occasional Managed Usage
  - Power Focussed

Machine
- Flexible Platform Asset
- 60-100% Utilisation
- Ideal for:
  - Multiple, stacked services – Financeable, Infrastructure Asset with good long term returns
  - Multiple, Stacked Services
  - Daily, Heavy Usage
  - Energy-Focussed
Lithium vs flow machines

**Batteries**
- Cheap Power
- Short Life
- High Levelised Cost of Ownership
- High Maintenance & % Degradation cost
- 0 to 50% depth of discharge
- Low recycle rate & environmental waste issue
- Thermal runaway fire risk up to 27°C temp restricted

**Machines**
- Cheap Energy
- Long Life, infrastructure
- Low Levelised Cost of Ownership
- Low Maintenance
- No Degradation
- 100% depth of discharge
- Fully reusable & environmentally friendly
- Safe, no fire risk
Time-shifting solar generation

Only <2 hour revenue using LIB (<50% cycle, 3-10 years)

6 hours - extra + 4 hour revenue using Flow Machine (100%, 20+ years)
Hybrid energy storage

Charge/Discharge events
- Lithium Battery
- Flow Machine
- Pulse Discharge (Flow Machine)
Why redT?
redT corporate strategy

Experts in energy storage solutions - project finance, software solution, engineering & asset management

Revenue-based infrastructure customer business models

Outsourced manufacturing – Gigawatt scale, Tier 1 global manufacturing capability

One of the lowest Cost Vanadium Energy Storage Machines available globally.
Production & deployment overview

UK & Europe
Grid-Connected
- Solar Firming
- Grid Services
- Peak-Shaving
- Arbitrage

Sub-Saharan Africa
Off-Grid, Weak-Grid & Microgrid
- Diesel Displacement
- Solar Firming
- Back-Up
- Arbitrage

Asia-Pacific
Grid-Connected & Off-Grid
- Diesel Displacement
- Solar Firming
- Grid Services
- Arbitrage
Achievements & outlook

Recent Achievements

Proven UK commercial model - opened up lucrative UK market

1st Vanadium/Lithium hybrid system to be deployed in Australia

Flagship demonstration site installed in cooperation with Centrica

Key demonstration site commissioned in South Africa (+ multiplier sales in Botswana)

Next generation 3 product development – Increased performance, reduced size & costs

Near-Term Focus

Further Sales of Gen 2 product in key markets – UK, EU & Asia

Delivery of Gen 3 product
Pre-orders - €11m final stage selection

Close “Mega” projects in-front of meter, large scale generation
redT selected as energy storage partner for large scale UK Tidal generation project

redT energy storage
Management & executive team

**Management Team**

- **Scott McGregor***
  **Chief Executive Officer**
  CEO since 2009, extensive experience within mining, finance and technology industries, redT CFO 2006-09

- **Dave Stewart***
  **Chief Operating Officer**
  Joined 2017 from Jabil inc. extensive experience within high growth tech companies (HP, Keysight)

- **Fraser Welham***
  **Chief Finance Officer**
  Joined 2018 from Green Investment Bank. Previous C-level experience with Element power, Shanks Group plc.

- **Jean-Louis Cols**
  **Technology Director**
  Joined 2017 from Logan Energy, previously Group Engineering Director at Intelligent Energy

- **Adam Whitehead**
  **Head of Research**
  Joined 2017 from competitor Gildemeister energy storage, where he held Head of Research position

**Board of Directors**

- **Dr. Jeff Kenna**
  **Chairman of the Board of Directors**
  Joined 2006. 30 years managing business in energy sector, policy advisor to EC, World Bank, UN and UK Government

- **Neil O’Brien**
  **Non-Exec Director**
  Joined 2016, previously CEO of Alkane Energy from 2008.

- **Jonathan Marren**
  **Non-Exec Director**
  Joined 2016, Advisor to company since 2006 with 16 years industry experience. redT CFO 2012-16.

- **Michael Farrow**
  **Non-Exec Director**
  Joined 2006. Founder and director of Consortia Partnership Limited, Jersey.

* Also a member of the Board
Appendix
Financial highlights

H2 2017 Trading Update:

“Performance in the second half of the year for the business was as expected with full year trading anticipated to be in line with market expectations”

H1 2017 Results:

Financial results for the group in **H1 2017** were in line with overall management expectations

- **€13.2m** in available cash (FY 2016: €2.8m)
- Loans and borrowings **€Nil** (FY 2016: €Nil)
- EBITDA loss for the period **€3.2m** (H1 2016: loss €2.2m)
1989
Founded in Kenya as "EGE" a renewable energy consultancy

2000
"E-Fuel" started as research project into using Vanadium flow technology

2006
"Camco Clean Energy" completes IPO on London Stock Exchange

2007
Camco completes one of the largest carbon credit deals under the CDM

2012
Vanadium Redox Flow technology proven & 1st system deployed in Portugal

2013
Company wins £3.6m contract to supply 1 MWh storage system to Isle of Gigha

2014
Company signs manufacturing partnership contract with global manufacturing leader, Jabil Circuit Inc.

2015
Company changes name from "Camco Clean Energy" to "redT energy" to focus on energy storage solutions business

2016
redT energy launches world's first contract manufactured, containerised vanadium flow machine & completes market seeding programme in UK, EU and Africa

2017
redT deploys over 4MWh of machines and enters new markets in Australia, E Europe and SE Asia

Corporate Timeline
redT 15-75 Machine being prepared for shipping to Johannesburg, South Africa

Internal view of redT 15-75 machine performing a charge/discharge cycle
redT 15-75 solar mini-grid project at the Thaba Eco Hotel in South Africa
redT’s flagship UK 1MWh site at The Olde House, a working farm and holiday retreat in North Cornwall
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