



ASX Release

6 October 2017

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**ASX Code:**

UTR

**Shares:**

475,537,404

**Escrow Shares:**

159,980,717

**Options (various):**

82,000,000

**Performance Rights:**

41,250,000

## UltraCharge's Iron Flow Battery has Big Potential to Meet Uninterrupted Power Supply Demands

- Iron flow battery provides uninterpreted power supply (UPS) solution to complement growing renewable energy market
- One-year anniversary of South Australian electricity black-outs drives Australian demand for new battery storage options
- Lower capital and operating costs than current solutions with high energy capacity advantages
- Multi-million dollar market opportunity for off-grid and utility applications
- UTR to offer battery technology solutions for both the lithium ion and flow battery markets

UltraCharge Limited (ASX: **UTR**, **UltraCharge** or the **Company**) is pleased to announce further details on its iron flow battery technology. As previously announced, the Company has acquired this intellectual property (IP) through its exclusive license agreement with Epsilor, adding to its IP portfolio and energy storage offering. UltraCharge is now at the forefront of technologies offering solutions for both the lithium ion battery and flow battery markets.

Energy storage technologies are fast becoming a multi-billion-dollar market, and, in particular, there is growing demand for these technologies to compliment the renewable energy sector. Globally, there is increasing attention on the issue of energy security, giving rise to a worldwide transition from fossil fuels to renewable energy sources. Consequentially, this has resulted in a strong demand for new battery technologies, such as flow batteries that can complement renewable energy by providing a reliable uninterrupted power source. The total battery energy storage system market will reach \$6.8B by 2022 (Markets and Markets Report dated 3/2016), by 2020 the flow battery market is set to increase in value to US\$185M (Business wire, 2017).

UltraCharge's iron flow battery solution can potentially deliver reliable and steady energy, offering efficient use of renewable energy production. It resolves the "variable" nature of renewable sources (as they rely on location, weather, and time of day), by balancing supply and demand, providing an uninterrupted power supply (UPS).

Initial analysis of the Company's iron flow battery indicates low installation cost, Capex approximately US\$250/kwh, with operating costs estimated to be up to half the cost of diesel alternatives. Furthermore, the iron flow solution will run at 13c/kwh, lower than Tesla's PowerPack estimated run cost of 15c to 16c/kwh by 2020. These parameters suggest UltraCharge's solution, is more cost effective and energy efficient than other comparable solutions on the market.

The Company seeks to capitalise on this, and provide a UPS solution to meet market demand, ultimately reducing electricity costs for households, and communities in remote and rural locations. In Australia alone, this market has huge potential as the Australian Government acknowledges the recent one-year anniversary of the South Australian (SA) electricity black-outs and its impact on the community, that lead to the SA government formulating a \$550 million plan to become energy self-sufficient.

Australia is predicted to be the largest market for battery storage due to its high cost of electricity, number of households with solar panels and extensive solar resources. UltraCharge is well placed to capitalise on this market opportunity with its iron flow battery solution that is cost effective, with high energy production capacity.

A detailed overview of the Company's iron flow battery technology is contained in the attached presentation.

Kobi Ben-Shabat, CEO said *"We are very excited about the iron flow battery IP we have acquired, which increases our battery storage offerings and opens up extensive market opportunities. Our initial analyses of the technology has demonstrated promising results that indicate a more cost effective and high energy solution than others on the market. We look forward to capitalising on the flow battery market, and we see Australia has a huge growth market opportunity. We are working with our strategic allies to progress our strategy for the flow battery and I look forward to updating the market accordingly".*

**Kobi Ben-Shabat**  
**Chief Executive Officer**

**About UltraCharge Limited ([www.ultra-charge.net](http://www.ultra-charge.net))**

UltraCharge is a battery technology company based in Israel which has acquired exclusive rights to patented technology from the Nanyang Technological University in Singapore (NTU). The technology will replace graphite in anodes (negative pole) with a nanotube gel material made from titanium dioxide, in lithium batteries. This has the potential to revolutionise the market for lithium batteries by producing a battery that is safe, has a longer lifetime and is fast charging. UltraCharge has established a laboratory facility in Israel to conduct nanotube synthesis and fabrication of the nanotube anode, and is discussing supply options with end users in the global battery market



# ULTRACHARGE

LEADING EDGE LITHIUM-ION BATTERY TECHNOLOGY

## Iron Flow Battery Opportunity

6 October 2017



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## Great need for energy solutions that enable



**Thousands to millions** of watt-hours for renewable power systems such as solar and wind



**Efficient use** of production power and load balancing during peak demand



**Ability to store** excess power at off-peak hours



**Uninterrupted** power supply (UPS) for users with a need for long term MWh







## ADDRESSING MARKET NEEDS

### Energy Capacity

Up to 12 hours

### Long term stability

Unique anode/cathode combination with proven reliability

### Low installation cost

Around \$250/kwh system cost of 1MW

### Environmentally friendly and safe

Low impact on environment – recyclable components

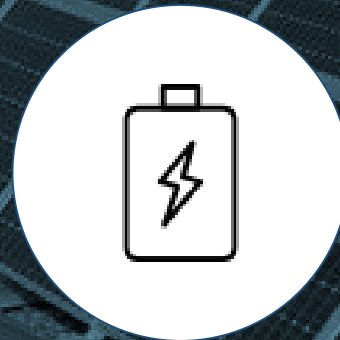
Photovoltaic panel arrays  
harvest solar energy



Supply off-grid  
locations



The UltraCharge  
Iron Flow Battery  
stores for use on  
demand.



Unprecedented  
Pricing

Generating  
electricity at  
**16-23¢/kWh**  
**vs.** diesel  
alternative at  
**31-34¢/kWh**

# IRON FLOW BATTERY OVERVIEW



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- High power density flow battery based on breakthrough nano-iron anodes
- Patented-pending technologies
- Ideal for selected energy storage applications – Grid Storage, Solar & Wind farm
- CAPEX under \$200/kWh DC
- Ability to supply up to 12 hours continuous power without re-charge
- Low manufacturing & running costs, with life cycle costs of 13¢/kWh vs. Tesla's Powerpack battery at 15-16¢/kWh by 2020
- Safer and more environmentally responsible than traditional Lithium Ion batteries due to recyclable components



Storage of billions of  
Watt-hours from  
renewables



Load shifting  
to peak demand



Efficient utilization  
of production



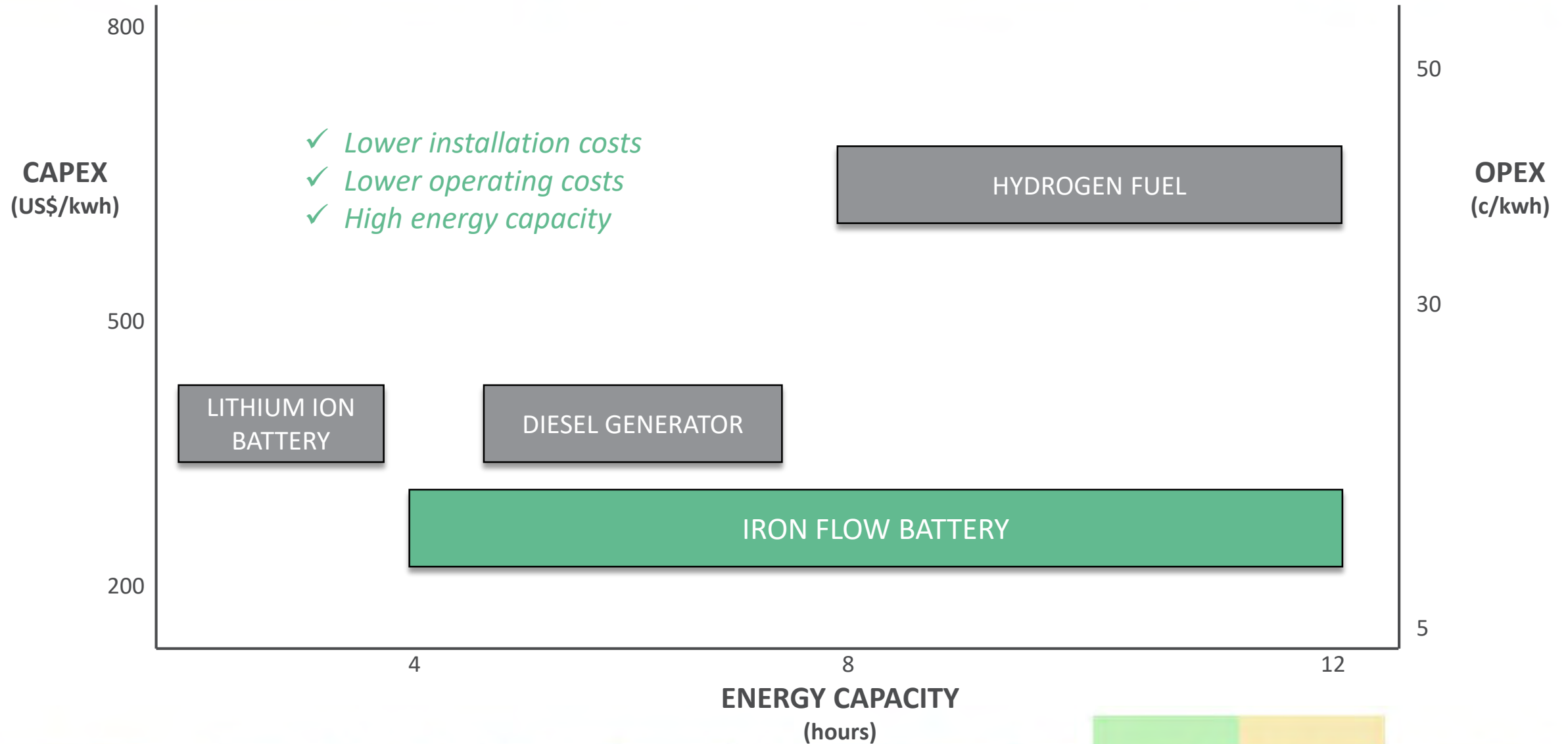
UPS for large users  
and long times



# TECHNOLOGY COMPARISON



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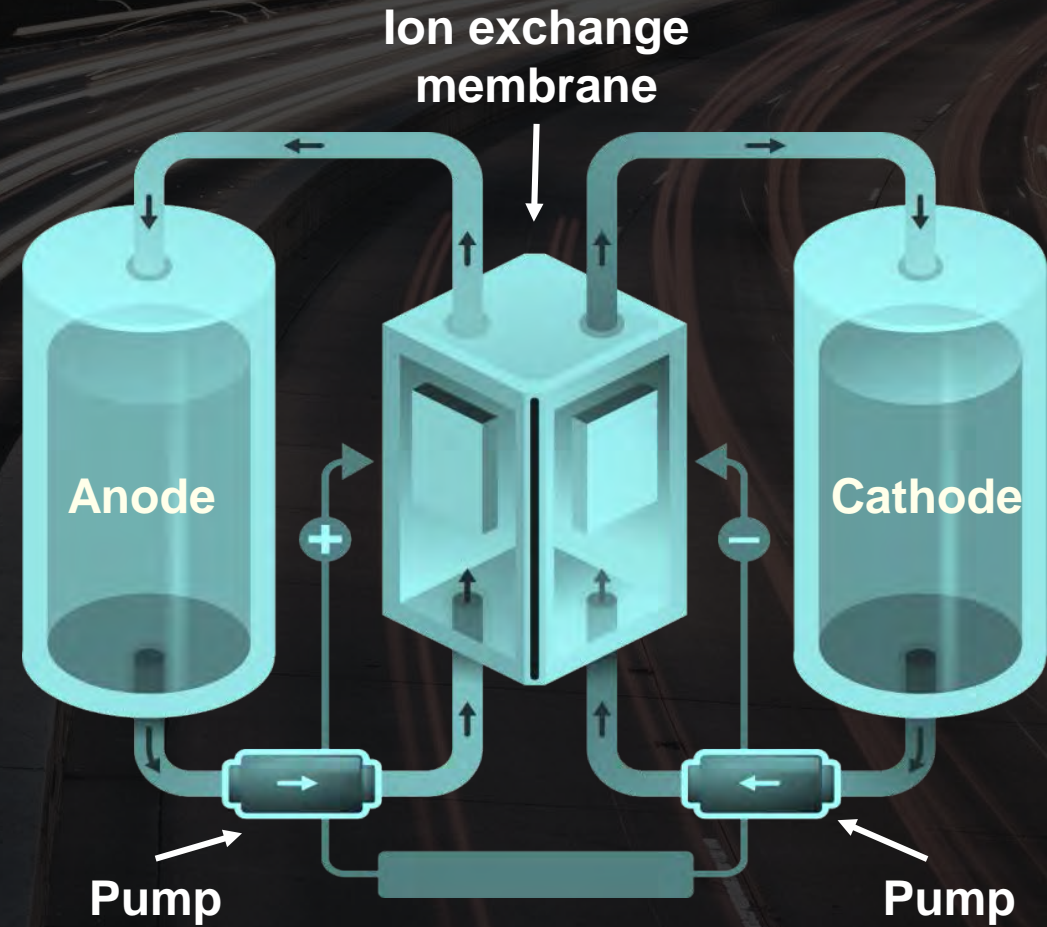
# HOW THE FLOW BATTERY WORKS

The liquid reactants are stored in external reservoirs.

They react within the tank to create electricity

The capacity increase is made possible by increasing the tanks.

The liquid reactants have a very long life span.





- **Robust** battery chemistry
- Components with a proven **long-cycling lifetime (10,000 – 20,000)**
- Iron / iron complex **hybrid flow battery**
- Advanced, **proprietary iron anode**
- **Liquid cathode** – complex iron pro/pre-cyanide
- **Bipolar cell** system
- **Battery Management System (BMS) cell control** system







Many islands and remote areas with **little or no interconnection** with grid systems.

Currently **use expensive diesel** generation as primary power source.

High-performance batteries expected to **enable transition** to PV generators and battery storage units (PV+Storage solutions).

Also ideal for wind farm, solar farms and off-grid applications that **need reliable, long duration** and independent power supply.

## EXAMPLE:

*If UltraCharge's Iron Flow Battery has a **storage capacity of 100kWh**, this means that it can provide up to **10 hours of power** - allowing users to be **~90% self-efficient** for their power needs.*



## Electrification of Rural Areas - \$154B

From 2010-2030, no. of people without access to electricity to drop from 1.4B to 1.2B.  
60% of electrification to be off-grid with mini-grid applications.  
A tremendous market for PV+storage systems such as UltraCharge Flow Batteries.



## Replacement of Gensets on Remote Islands - \$18B

Diesel generation usually main source for electricity on islands.  
5GW/90GWh batteries could potentially be deployed if market is fully addressed.



## Replacement of Gensets in Developing Countries - \$11B

Remote islands and replacement of diesel-based generation also in any location.





- A high power density flow battery based on breakthrough, patent-pending technology
- Efficient and reliable power production
- Very high levels of power supply
- Unique low cost manufacturing & operating
- Low environmental impact
- Poised to take the lion's share of a growing market
- Multi-billion dollar market opportunity





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## Contact

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