



**ecoult**  
energy storage solutions

John Wood, CEO

[john.wood@ecoult.com](mailto:john.wood@ecoult.com)

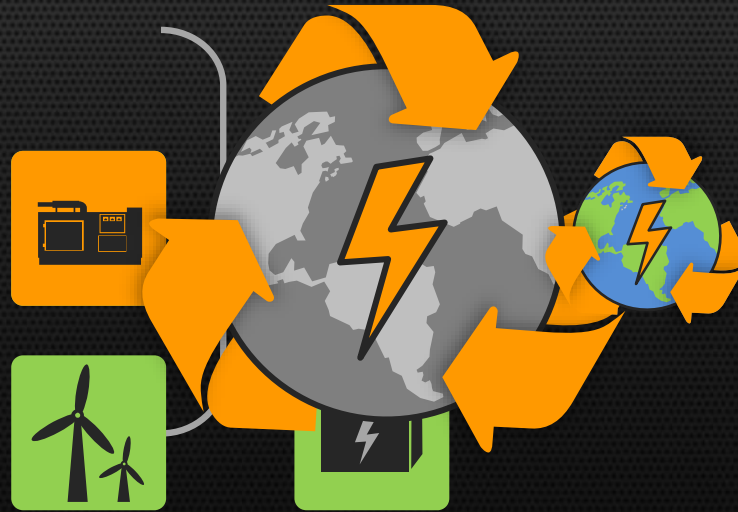


**Energy Storage for a  
Cleaner Planet**



# Energy storage for a cleaner planet

The value of storage on the grid



ENERGY STORAGE FOR A CLEANER PLANET

# Substantial Storage Experience



**5+ years**

Industrial PV self  
consumption



**5+ years**

Remote  
PV/diesel telco



**6+ years**

Grid-scale  
PV



**5+ years**

Grid  
frequency reg.



**3+ years**

PV/micro-hydro  
resort



**2+ years**

Heart of PV  
microgrid



**4+ years**

PV/diesel/wind  
MW island  
microgrid

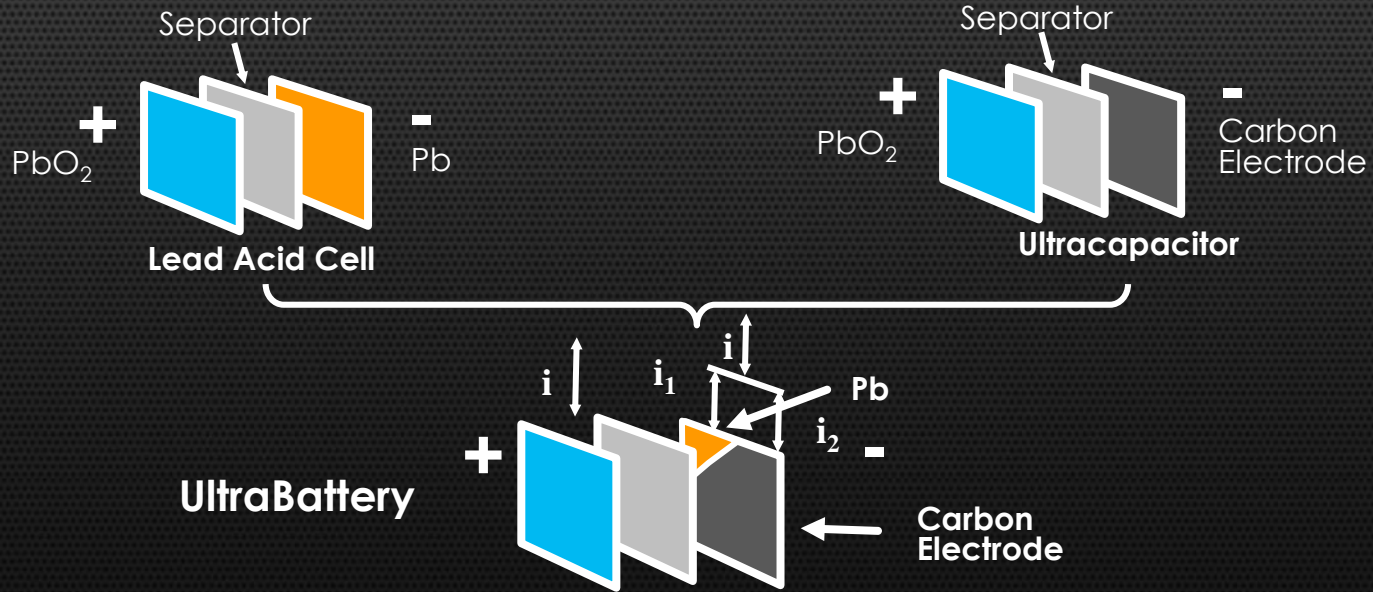


**3+ years**

Multipurpose  
installations

**Projects with Significant Successful Field-life History**

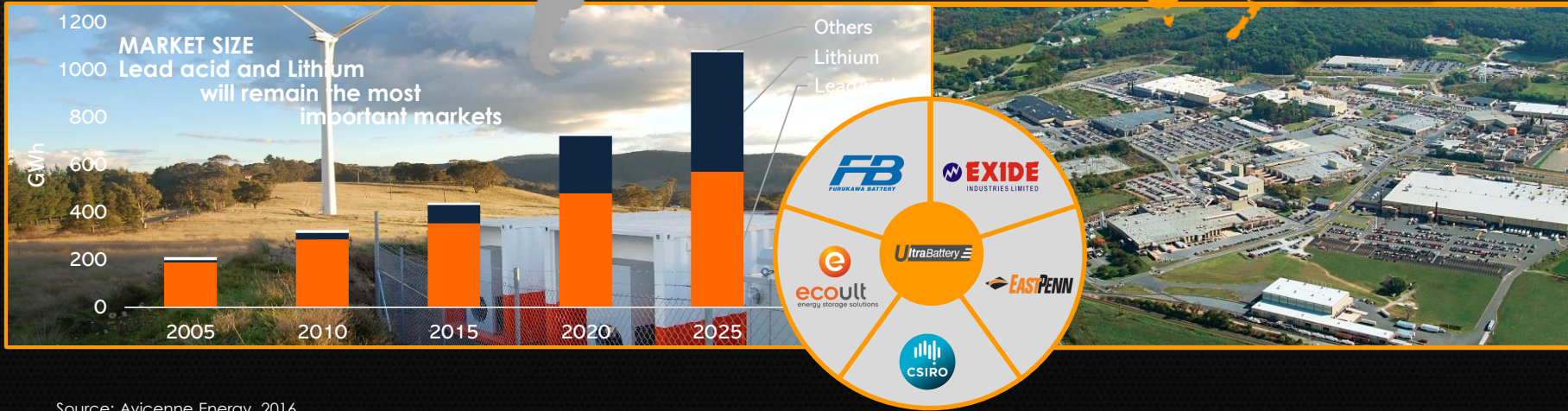
ENERGY STORAGE FOR A CLEANER PLANET

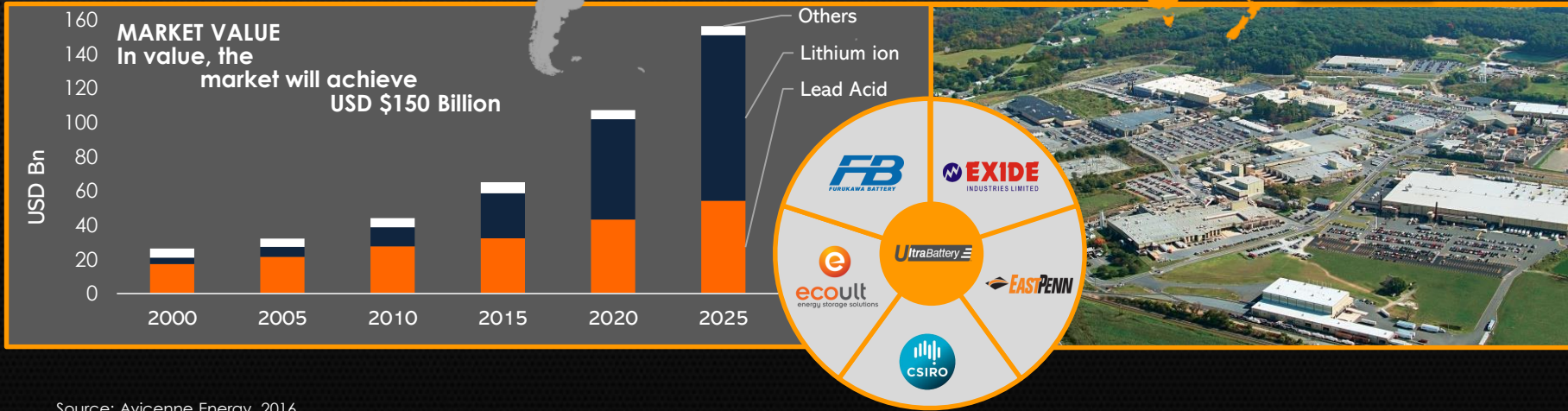


## UltraBattery: Hybrid Battery/Ultracapacitor

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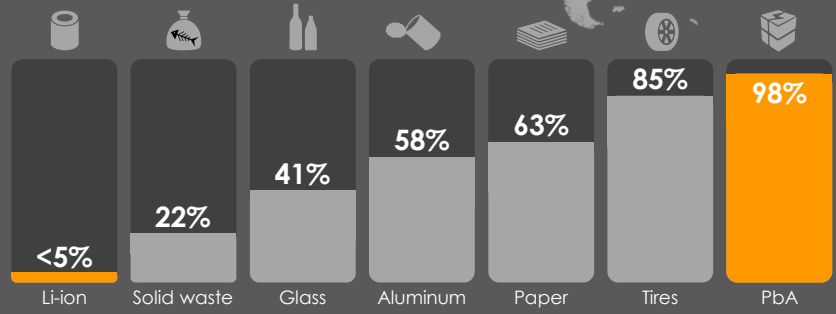






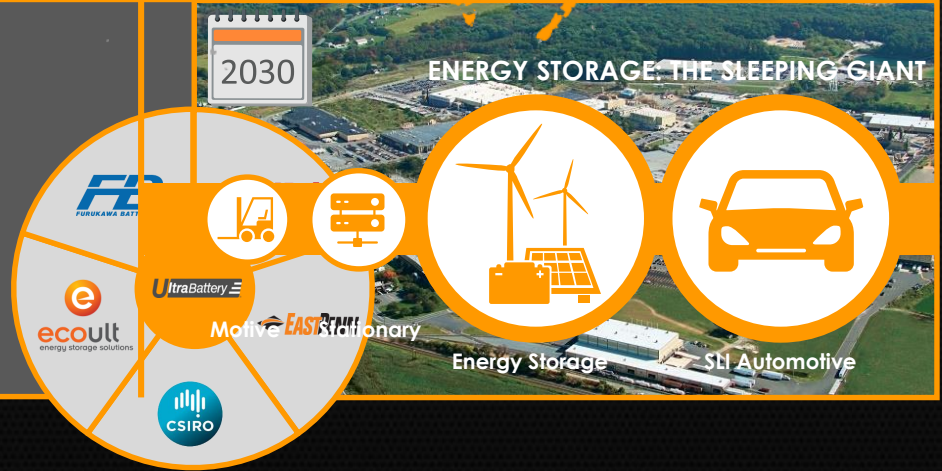


ENVIRONMENTAL SUSTAINABILITY



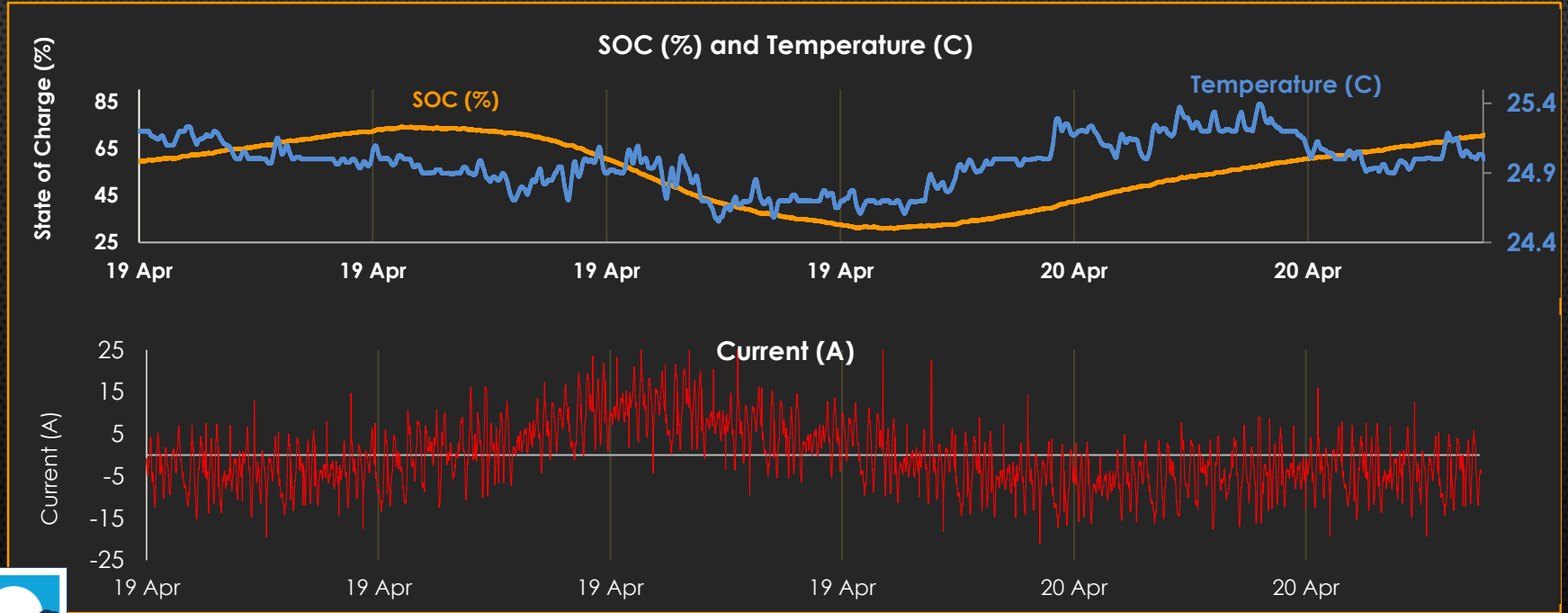
2030

ENERGY STORAGE. THE SLEEPING GIANT





# Excels in Partial State of Charge and Temperature



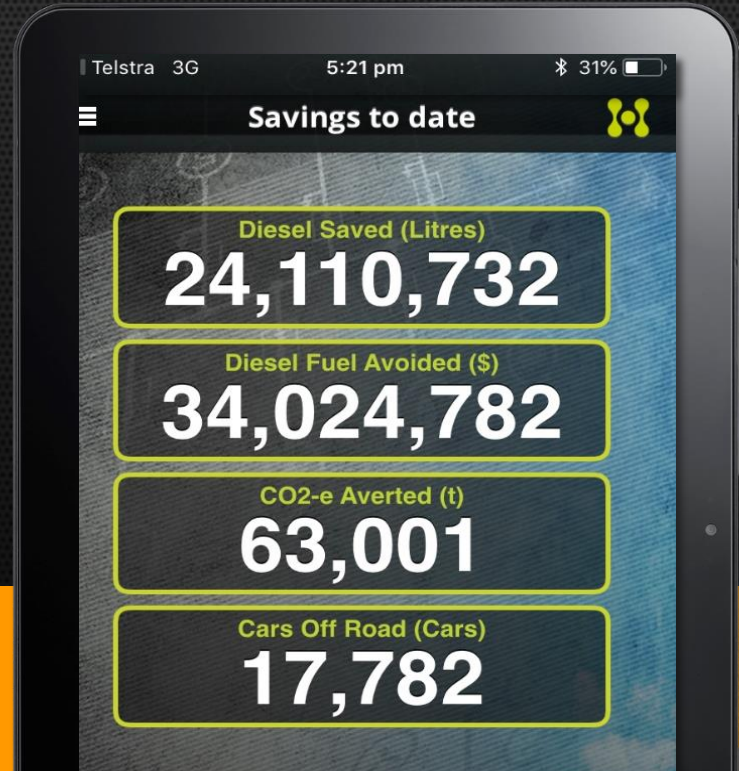
Under test  
at NELHA

**MW Multi-purpose: NELHA project**  
ENERGY STORAGE FOR A CLEANER PLANET



# Impact and Commercial Benefit

Example: Hydro Tasmania KIREIP Project



## Impact and commercial benefit

- + **Sophisticated global projects**
- + **Mission-critical quality**
- + **High value customers around the world**

**World-first Defence Project, USA**

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# Impact and Commercial Benefit

Example: Remote telecoms



## Impact and Commercial Benefit

- + Robust remote power supplies
- + Diesel mitigation
- + High reliability

**Scaling Up in a Harsh Climate**

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# UltraBattery®

Made in India for India

Exide Industries Limited

UltraBattery made in India

- Battery technology
- R&D
- Knowledge base
- Manufacturing
- Systems assembly
- Full solutions



Japan



USA



Australia



India



Potential for Impact and Commercial Success in the Developing World

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# We designed the UltraFlex in Australia

- + For passive battery temperature management
- + For robustness
- + For easy transport and installation



**Global Energy Storage**  
ENERGY STORAGE FOR A CLEANER PLANET



# We designed the UltraFlex in Australia

- + For passive battery temperature management
- + For robustness
- + For easy transport and installation
- + The great Australian dream →



3 degrees Celsius separates the warmest and coolest battery in a string.

**Global Energy Storage**  
ENERGY STORAGE FOR A CLEANER PLANET





**Then we took the first  
one to India...**

**+ For passive battery  
temperature management**

**+ For robustness**

**+ For easy transport and  
installation**

**+ The great Indian reality →  
(best laid plans, and all that...)**

**Global Energy Storage (Smooth Starts are Rare in New Markets!)**

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CONSUL  
NEOWATT

DELTA



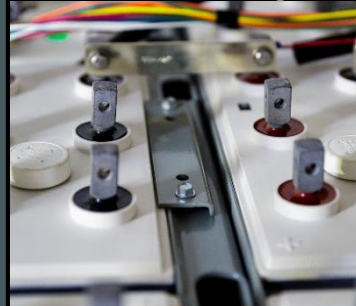
Inverters



EXIDE  
INDUSTRIES LIMITED



UltraBattery  
& Racking



CHLORIDE



Electronics  
& Monitoring



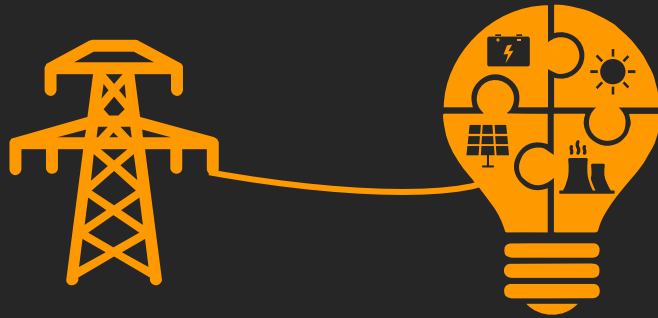
ecoult  
energy storage solutions

All now made by our partners in India, for India

Control systems and IP:  
Made in Sydney by Ecoult.

What we've done since then  
ENERGY STORAGE FOR A CLEANER PLANET

# Where UltraBattery is taking Energy Storage Next



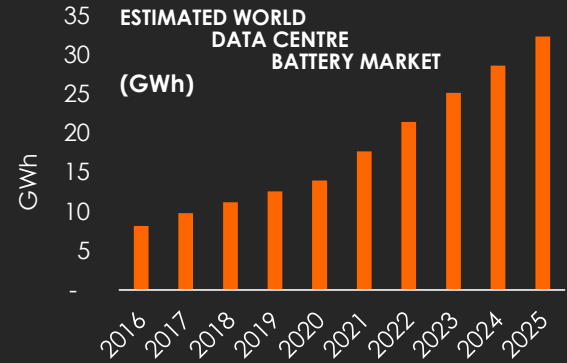
Grid ancillary services,  
behind the meter power optimisation  
**AND** the ability to *island* as a microgrid.  
All in a single installation

## STANDBY AND UPS MARKET

A LEAD ACID MARKET

Data Centres Of The World Will Consume 1/5  
Of Earth's Power By 2025

DATA ECONOMY 12 December, 2017

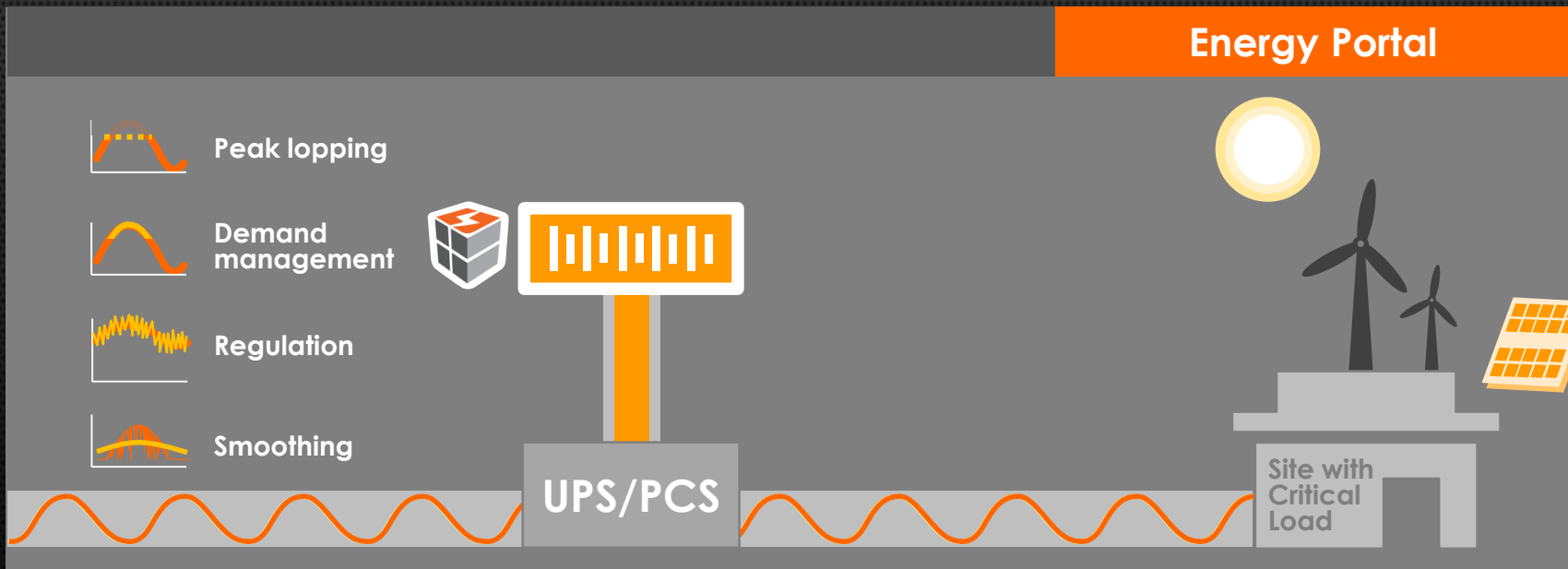


Double this to include telco market

Sources: Bloomberg New Energy Finance (2017), Telegeography (2018), Avicenne (2014)

ENERGY STORAGE FOR A CLEANER PLANET

# Energy Portal - Putting it all together

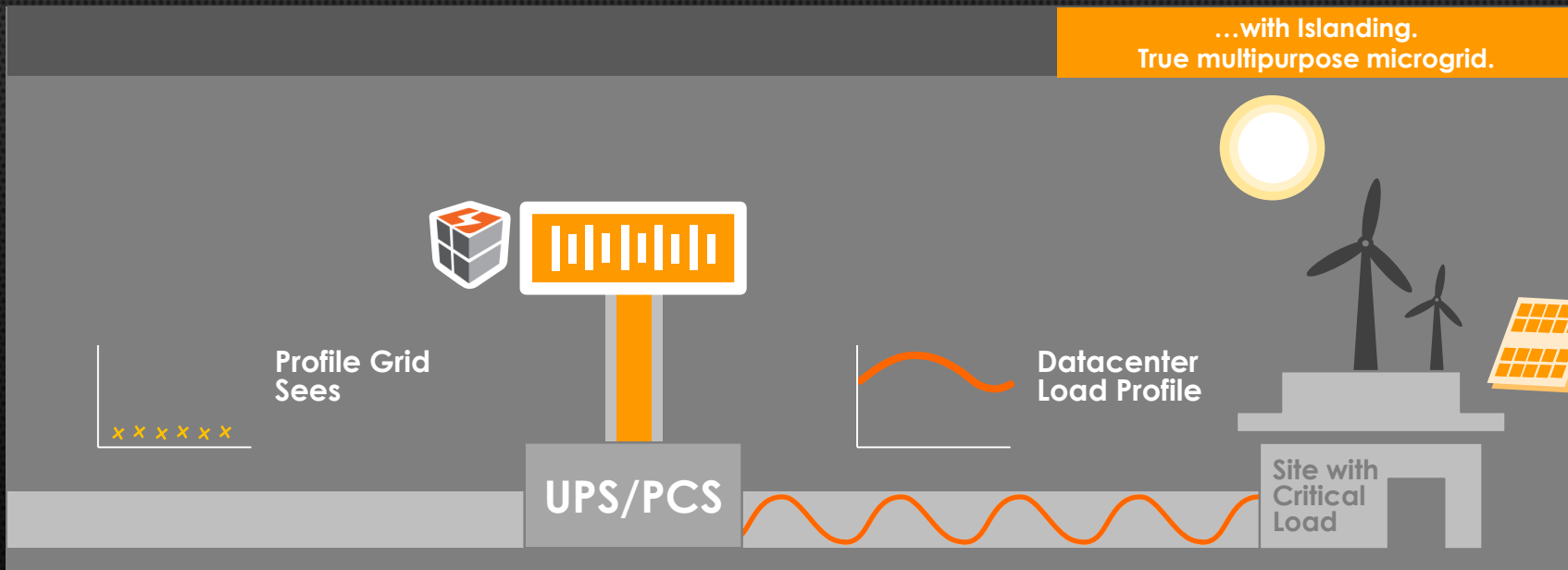


**Critical infrastructure: Renewable, Islanding Microgrid**

ENERGY STORAGE FOR A CLEANER PLANET



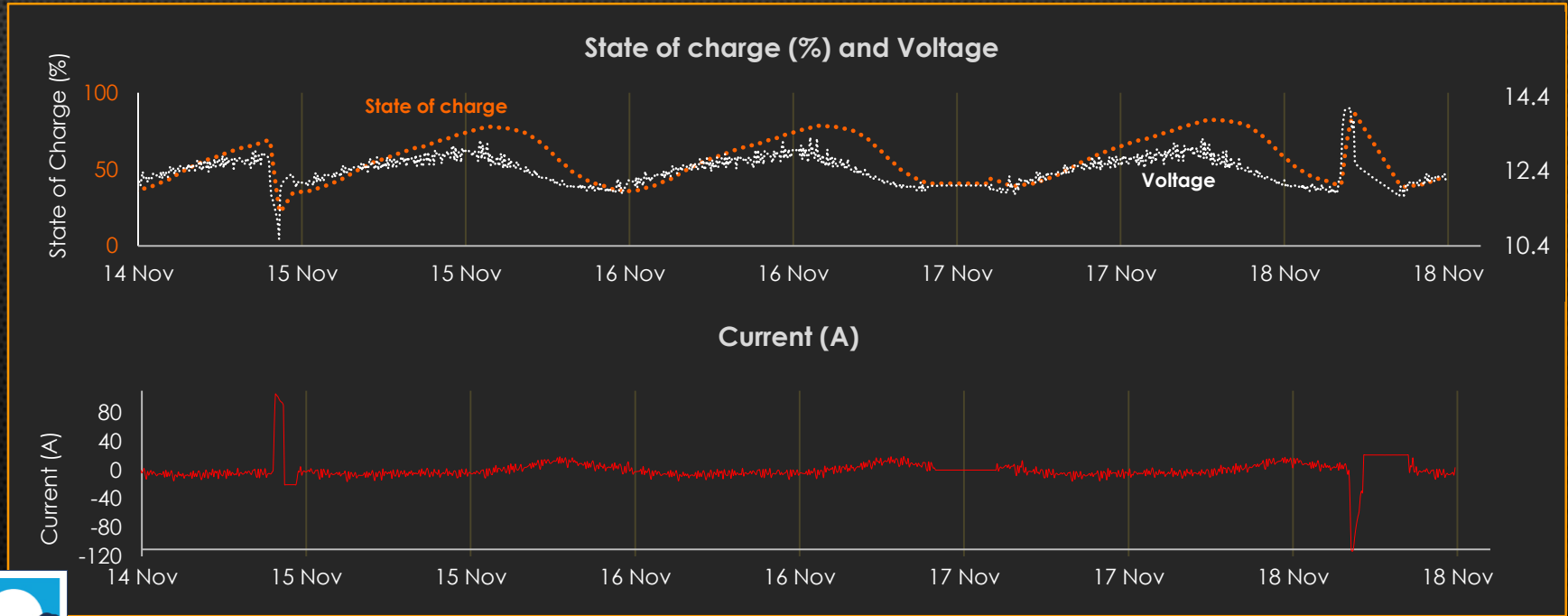
# Energy Portal - Putting it all together



**Critical infrastructure: Renewable, Islanding Microgrid**

ENERGY STORAGE FOR A CLEANER PLANET

# Benefit Stacking: Energy Portal Testing



Under test  
at NELHA

**MW Multi-purpose: NELHA project**  
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## Capabilities



**RESEARCH & BATTERY  
UNDERSTANDING**



**HARDWARE & FIRMWARE**



**SCADA & CLOUD  
COMMUNICATIONS**



**DATA ANALYSIS &  
REPORTING**




**APPLICATIONS & PHYSICAL  
DESIGN**



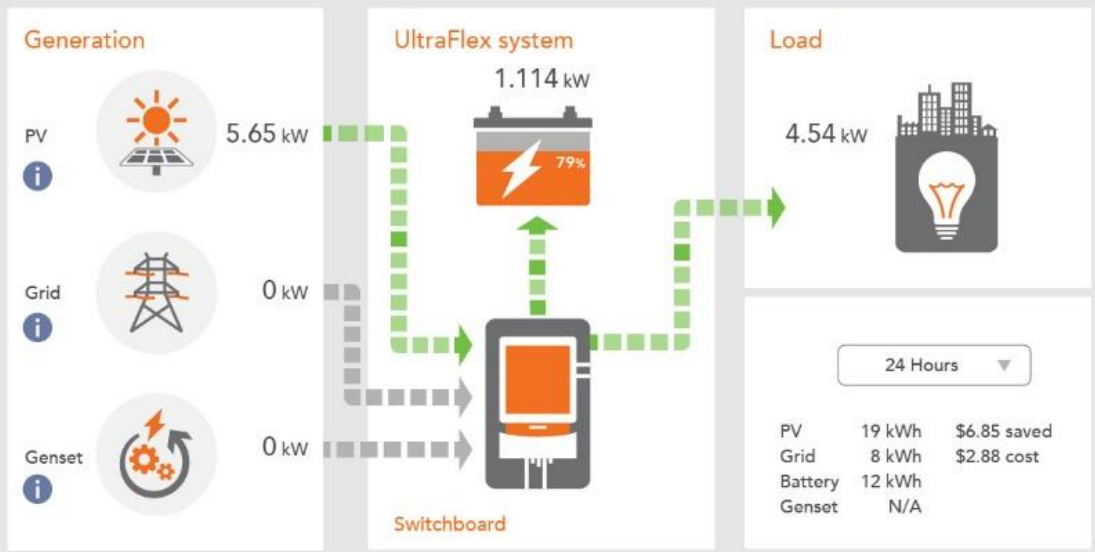
**ELECTRICAL DESIGN &  
PROJECT MGT.**

## Global energy storage

- + High-tech battery, monitoring and control solutions
- + Formed in 2007 by CSIRO
- + Acquired by EPM in 2010
- + kW to MW storage solutions powered by UltraBattery®


**Site Details**
Status ● ● ●
SoC  92%

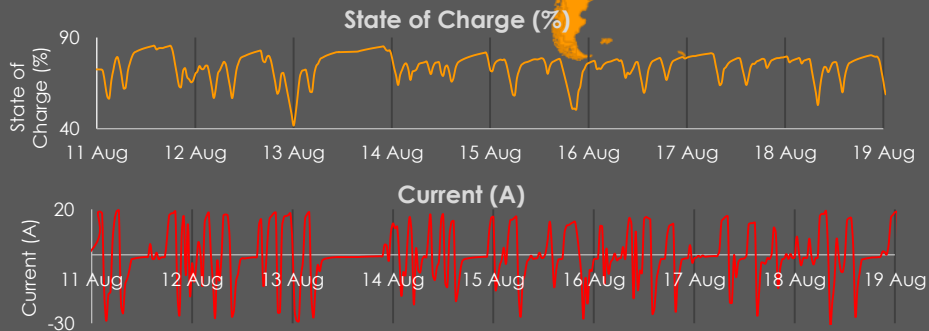
Power Flow
History
Analytics and Reporting
System Information



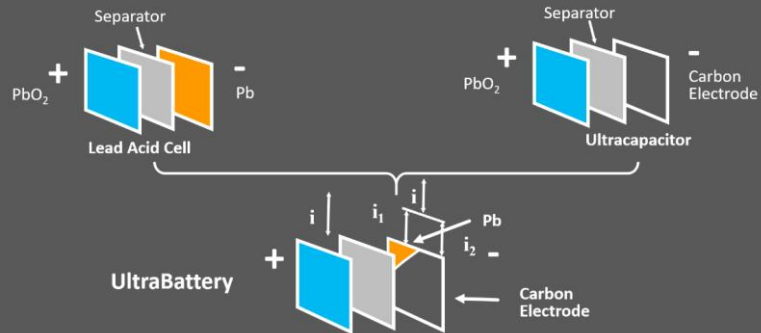




UltraBattery



**Excels in Low Rate with High & Variable Temperature**





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