OPPORTUNITIES

... for Australian participation in the global energy storage challenge
Ecoult Mission

Ecoult Vision

Partial State of Charge

Energy Storage for a Cleaner Planet
Ecoult Vision
Energy Storage for a Cleaner Planet
UltraBattery Technology

Partners
Size of the Energy Storage Industry Opportunity

**GLOBAL MARKET ESTIMATES OF ENERGY STORAGE SYSTEMS (BILLION $AUD)**
*(AT AUD/USD = 0.75)*

- **Diesel Efficiency in Remote Sites**
- **Micro-grid**
- **PV Energy Storage**
- **Dual Purpose (Figures shown are Global Reserve Power Market)**

![Bar Chart](https://via.placeholder.com/150)

- **2016/17**:
  - Diesel Efficiency: $0.58
  - Micro-grid: $0.96
  - PV Energy Storage: $1.11
  - Dual Purpose: $6.2

- **2017/18**:
  - Diesel Efficiency: $0.65
  - Micro-grid: $1.08
  - PV Energy Storage: $1.39
  - Dual Purpose: $6.4

- **2018/19**:
  - Diesel Efficiency: $0.73
  - Micro-grid: $1.22
  - PV Energy Storage: $2.08
  - Dual Purpose: $6.8

- **2019/20**:
  - Diesel Efficiency: $0.82
  - Micro-grid: $1.28
  - PV Energy Storage: $2.78
  - Dual Purpose: $7.4

- **2020/21**:
  - Diesel Efficiency: $0.91
  - Micro-grid: $1.34
  - PV Energy Storage: $3.99
  - Dual Purpose: $9.4

- **2021/22**:
  - Diesel Efficiency: $1.02
  - Micro-grid: $1.45
  - PV Energy Storage: $5.00
  - Dual Purpose: $10.4

- **2022/23**:
  - Diesel Efficiency: $1.15
  - Micro-grid: $1.58
  - PV Energy Storage: $11.6
  - Dual Purpose: $11.6
Opportunity for Australia

Storage Technology

Customer Application Needs & Performance
New Technologies

Supply Storage Products, Solutions, Services

Storage Technology

Customer Application Needs & Performance

New Business Models
New Business Models
Supply Storage Products, Solutions, Services

Storage Technology
New Technologies
Ecosystem IOT based Knowledge Industry Transformation

Customer Application Needs & Performance
New Business Models
New Business Models
Storage Technology
Customer Application Needs & Performance
New Technologies
Monitoring Data Analysis Online Service Portal
New Business Models
Role

Storage Technology

Customer Application Needs & Performance

Monitoring
Data Analysis
Online Service Portal

Understanding
Size of the Energy Storage Industry Opportunity

GLOBAL MARKET ESTIMATES OF ENERGY STORAGE SYSTEMS (BILLION $AUD)
(AT AUD/USD = 0.75)

$20B industry over next 5 years
Competitive Landscape

- Tesla
- Samsung
- Samsung SDI
- Hitachi Chemical
- BYD
- LG
Lead-Acid Market Dominance
Rechargeable Battery Market Worldwide 2000-2025

Lead-Acid Market Dominance
Rechargeable Battery Market Worldwide 2000-2025


2000: 280 GWh
2010: 380 GWh
2015: 427 GWh
2020: 575 GWh
2025: 775 GWh

- Lead Acid
- Others
- NiCd
- NiMH
- LIB
UltraBattery

Annual Market size

1. Starter battery $15B
2. Motive battery $3.5B
3. Standby battery $6B

State of Charge

*Partial State of Charge

1881 Cars
1960 Forklifts
1980 Datacenters and Telecoms
Today Energy Storage

28 GW Installed Base Reserve Power
Lead Acid (UltraBattery) is really good at PSoC

MW-scale island microgrid

Remote off-grid telco with diesel

Grid-scale PV

MW scale Multi-purpose on grid
Know your Competitive Advantages

Industry size
Pba industry 7x bigger than Li-ion
Relative size comparison of the battery industry

PbA vs. Li-ion

PbA: >350 GWh

Li-ion: <50 GWh
Know your Competitive Advantages

Industry size
Pba industry 7x bigger than Li-ion

Dual purpose
active & reserve power applications
Lead-acid – Reserve capability

Conventional battery on Float

UltraBattery in Partial state of charge

Reserve Event
## Dual Purpose – Economics

Marginal Differences to Support Dual Purpose

### Costs Single Purpose

<table>
<thead>
<tr>
<th>Costs</th>
<th>Single Purpose Costs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Full site costs</td>
<td>$X</td>
</tr>
<tr>
<td>Full connection costs</td>
<td>$X</td>
</tr>
<tr>
<td>Full PCS costs</td>
<td>$X</td>
</tr>
<tr>
<td>Full battery store costs</td>
<td>$X</td>
</tr>
</tbody>
</table>

### Dual Purpose – Marginal Costs

<table>
<thead>
<tr>
<th>Costs</th>
<th>Marginal Costs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Full site costs</td>
<td>$X + $0.3</td>
</tr>
<tr>
<td>Existing</td>
<td>$X + $0.3</td>
</tr>
<tr>
<td>Full connection costs</td>
<td>$X + $0.3</td>
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</tr>
</tbody>
</table>

- Existing: Higher rating on switchgear associated with UPS
- Existing: Double the size of the rectifier on the PCS
- Existing: Use UltraBattery rather than AGM (higher battery price)
- Existing: Use a store 115% as big as a UPS only store
Know your Competitive Advantages

- **Industry size**: Pba industry 7x bigger than Li-ion
- **Dual purpose**: active & reserve power applications
- **Forgiving technology**: continual discharge & charge, high voltage, no aircon etc.
Forgiving Technology – Ad Hoc Profiles

On-grid small industrial with PV

Remote off-grid telco with diesel

Heart of a microgrid

Off-grid luxury health retreat
Know your Competitive Advantages

Industry size
Pba industry 7x bigger than Li-ion

Dual purpose
active & reserve power applications

Forgiving technology
continual discharge & charge, high voltage, no aircon etc.

Indigenous manufacturers around the world
e.g. East Penn, Excide, Moura, Furukawa
Opportunity - Lead Acid Industry Partners
Know your Competitive Advantages

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Sustainability
recyclability rates btw. 96-98%
PbA batteries are clean and safe

Percentage recycled
Proven sustainability of the industry

- Lead
- Acid
- Plastic
Proven sustainability of the industry

Created from lead, acid and plastic
Proven sustainability of the industry
Proven sustainability of the industry

Collected
Proven sustainability of the industry

Broken down into the original components

Lead  Acid  Plastic
Proven sustainability of the industry

Repeat the cycle

Lead
Acid
Plastic
Lead emission elimination

3 large plants emit less than

Recycling plants in US

1 x Car

1957 Vehicle

>30 M batteries
>350,000 MT of lead
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Sustainability
recyclability rates btw. 96-98%
Global Commercialization Strategy

Projects

Products

Control System
Global Government Industry Competition
Getting by with a little help from our friends
Getting by with a little help from our friends
Research Project Support
Putting it all together – Tactical Plan

1 – Geographic Indigenisation
2 – UltraBattery Ecosystem
3 – Claim the High Ground
4 – Just Sell heaps of stuff
1 – Geographic Indigenisation
Ecoult in 2017
1 – Geographic Indigenisation
Putting UltraBattery Everywhere
3 – Claim the High Ground
New Projects

Exhibit A – Dual Purpose System

Exhibit B – Energy Portal
Exhibit A – Dual Purpose System
Exhibit A – Dual Purpose System

With Regulation

Profile Grid Sees

Profile of site with Critical Load

Site with Critical Load

UPS/PCS
Exhibit A – Dual Purpose System

Profile Grid Sees

UPS/PCS

Datacenter Load Profile

Site with Critical Load

Grid Failure
Exhibit B – Energy Portal

- UPS/PCS
- Peak lopping
- Demand management
- Regulation
- Smoothing

Site with Critical Load
Exhibit B – Energy Portal

Datacenter Load Profile

…with Islanding.
True multipurpose microgrid.

Profile Grid Sees

Site with Critical Load

UPS/PCS

Datacenter Load Profile

Exhibit B – Energy Portal
4 – Just Sell heaps of stuff
Broad Commercialization

Safe Operation
Performance
Competitiveness
Warranty