

Current landscape in Battery Technology

Type	Power	Range (miles)	Cost/ mile (£)	Technology Ready?	Major Problems	gCO ₂ /Km	Notes
Petrol/Diesel Refuelable	OK	450	0.17	Now	CO ₂ / Pollution/ Divestment	160	Oil industry fading
Lithium Ion Rechargeable	OK	100	0.50	Now	Fire, 6 hrs recharge	157	Poor sales, 2 year life, recharged from Oil/gas/coal
Lithium-Air Rechargeable	OK	3-400*	?	No > 10 yrs	Technically v. difficult, 6 hrs recharge	157	Experimental* recharged from Oil/gas/coal
Fuel Cells Refuelable	OK	300	0.18	Now	\$MultiBn Hydrogen infrastructure Required	88	Oil industry fading. (Main source of H ₂)

Metalectrique Changes the Game.

Metalectrique have developed an advanced chemistry for aluminium air batteries which can be used to power EVs safely and economically.

The chemistry was independently verified in France at Polytech Nantes in 2007 but the potential range for aluminium air batteries was not demonstrated in bench tests until 2013.

The current level of technological development combined with a supportive policy and commercial environment means that the time is right for Metalectrique to ramp up aluminium air batteries for global use.

The new landscape in Battery Technology.

Type	Power	Range (Miles)	Cost / Mile (£)	Technology Ready?	Major Problems	gC02 /Km	Notes
Aluminium - Air Refuelable	OK	1500	0.06	Now	Ramp up to global use	0	Aluminium industry can support

Metalectrique's Technology Breakthrough.

Metalectrique's advanced chemistry unlocks aluminium air battery technology:

- Increases cell voltage by 300mV (Figure 4).
- Allows the use of low purity aluminium.
- Limits the Hydrogen side reaction, gel formation & heat generation.
- Allows steady, long-duration power.
- Enables ordinary Aluminium to reach current densities of 180mA/cm2 [Figure 5]
- Allows overall battery energy densities >1350Wh/kg
- Removes the need for a recharging infrastructure

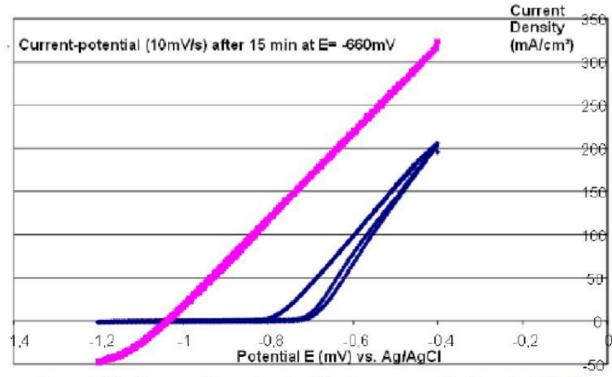


Figure 4. Metalectrique Electrolyte (pink line) increases cell voltage by 300 mV

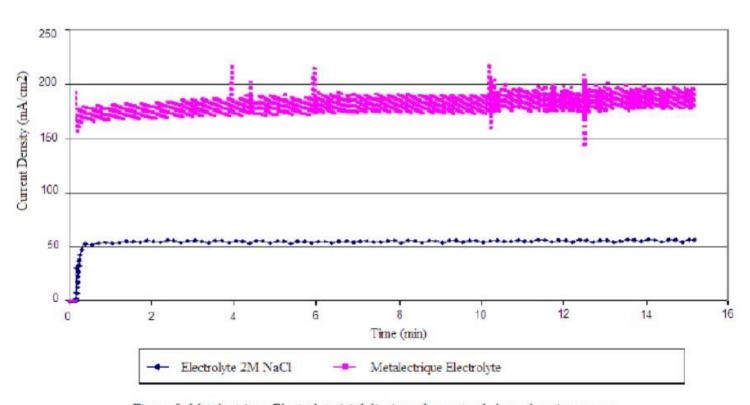
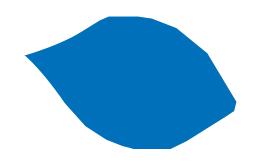
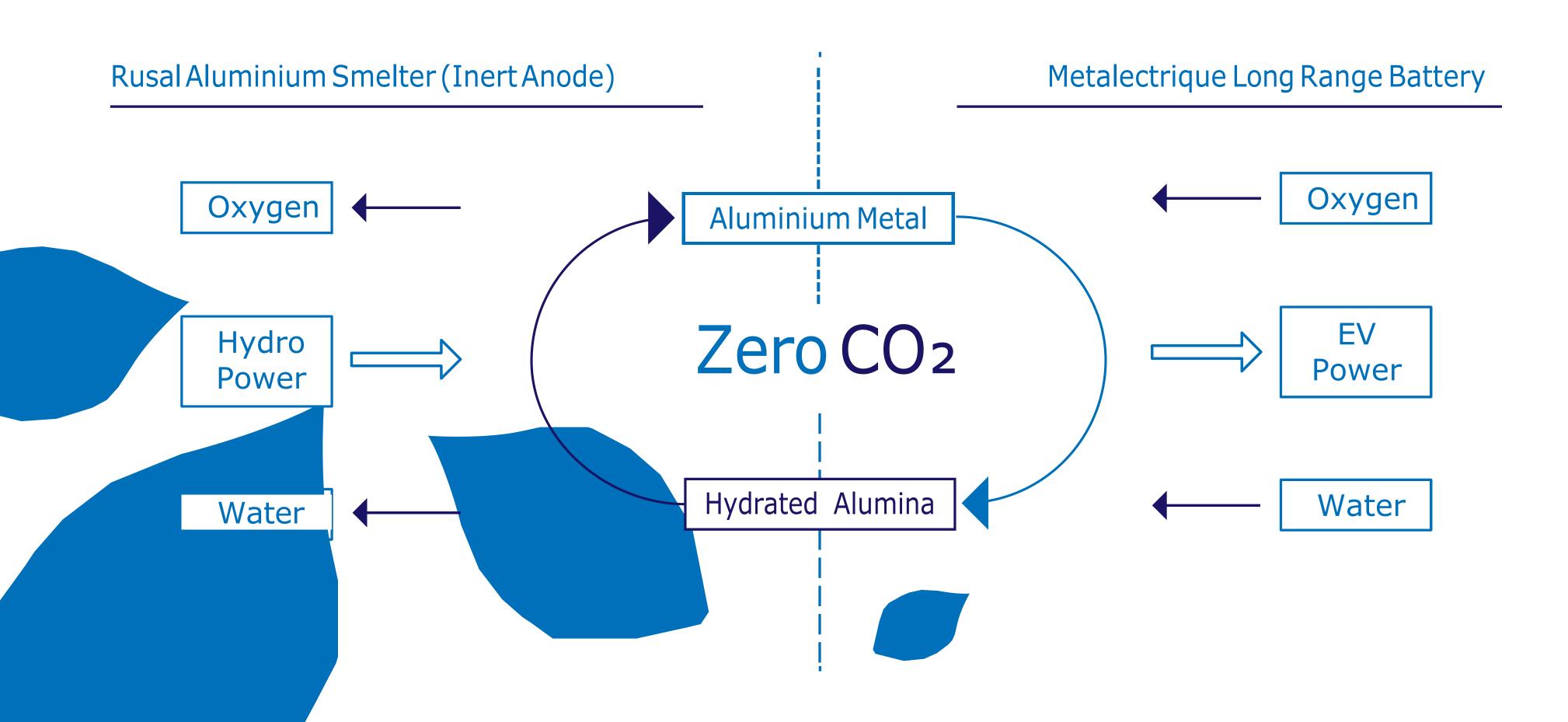


Figure 5. Metalectrique Electrolyte (pink line) produces steady long-duration power

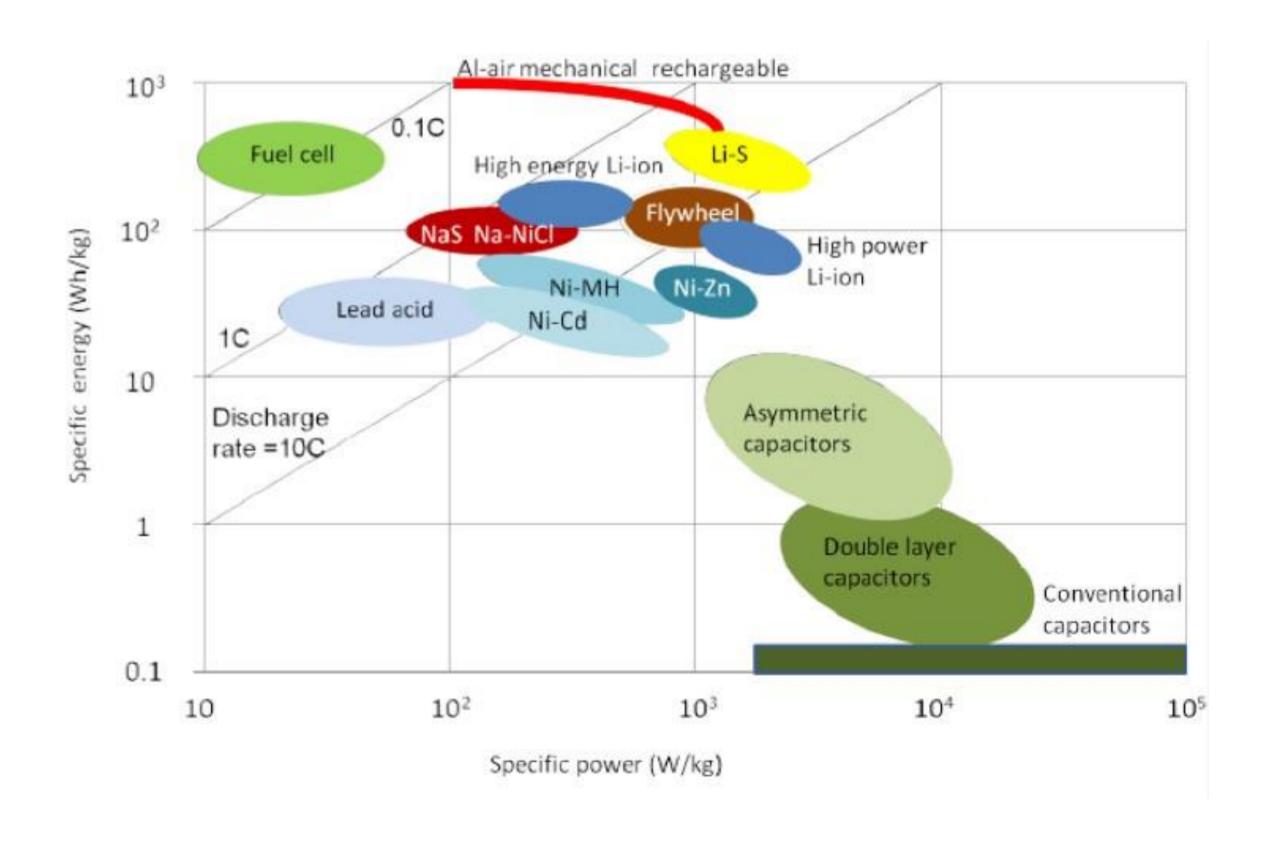
Delivering CO₂ - Free Driving.





How Does it Compare?

Aluminium-Air technology is superior to any other existing technology in terms of both power and range.



The Metalectrique Story so Far.

2006-8 Metalectrique SAS (France) KeyIPValidated

Power pack core design IP developed

2010-11

Metalectrique Ltd.

A 430 mile range power pack was modelled for the Gevco/Mira iMav city and independent analysis by Pera/Warwick University showed that this battery could achieve over 600 miles.

2012

MAL(R&D)Ltd.

MALR&D formed.
Concept Design of a full scale
prototype for Nissan Leaf.
Detail Design of a 1500 mile battery for
the Reva/G-Wiz
In-house production of prototype cell
parts for endurance testing.

2013

MAL(R&D)Ltd.

Achieved 1500 mile range in bench tests on several full-size Reva/G-Wiz battery cells. Successfully repeated 7 times. Cell range was within 1% of calculated range.

2004-5

Fuel Cell Integration Ltd.

Key IP developed to TRL6

2009 - to date

Metalectrique Ltd.

Technology supported by UK Government

2011

Metalectrique Ltd.

UK Government (UKTI) issued a special 'green light' letter about our technology.

Invited to join Low Emission Vehicle working Group with DfT.

2012

MAL(R&D)Ltd.

Commercial engagement with Lotus Engineering. Lotus provide technology route map to OEM compliance for the battery technology.

Commercial Deployment.

Al-air technology is now proven and the major barriers to commercially viability have been overcome through the development of recyclable and refuelable models.

Automotive Battery Development.

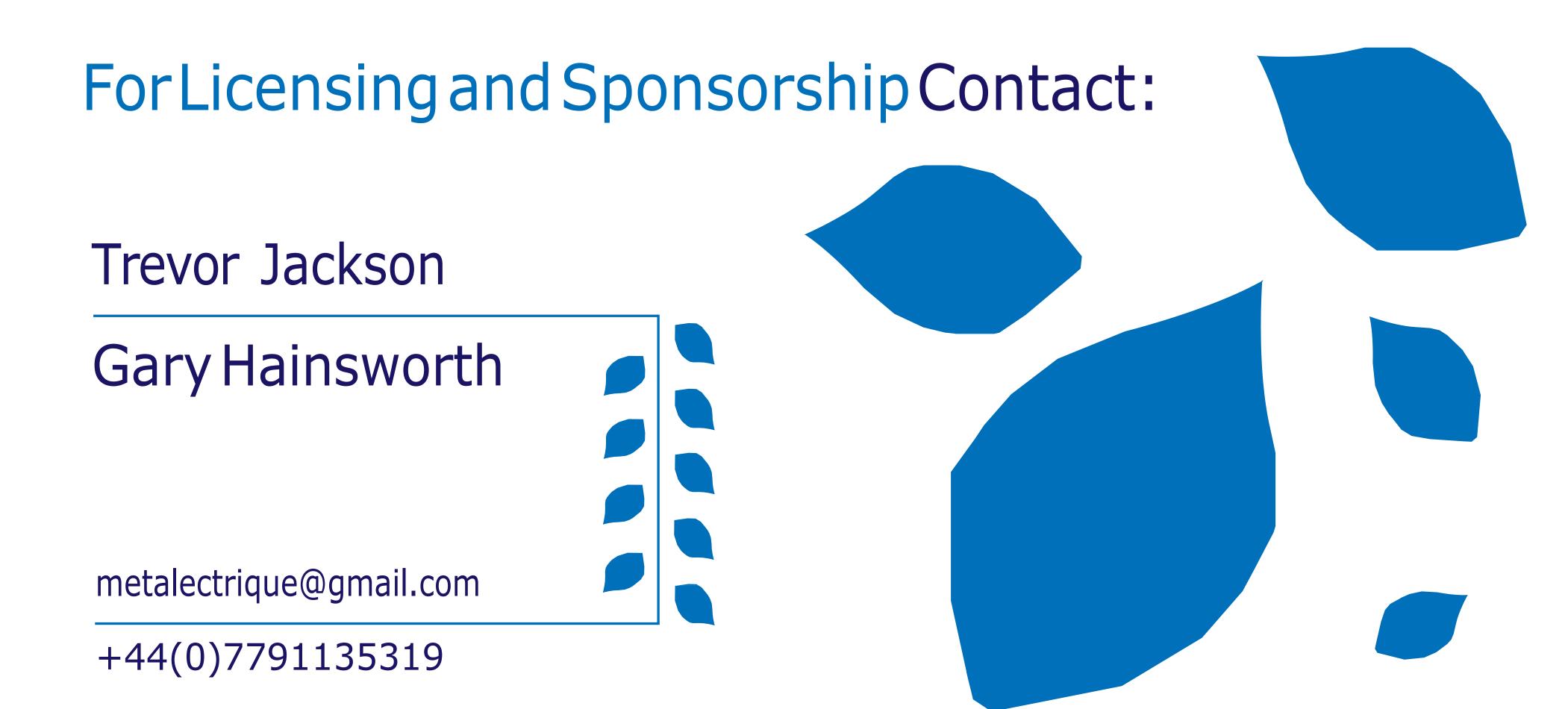
Designs produced in the MAL(R&D)Ltd/Lotus Product Definition Workshop were subjected to a rigorous three-month test programme. This concluded with seven repeat tests on the G-Wiz prototype cells and each test showed steady delivery of power for a range of 1500 miles. This range will be demonstrated in a MEGA Multitruck in 2017.



Military Battery Development.

MAL(R&D)Ltd completed a prototype BA5590 Type battery which is recyclable and refuelable. The MAL-R0117 will be entering production in 2017.





MAL(R&D)Ltd. Units 6 & 12 Tavy Business Park Pitts Cleave Industrial Estate Tavistock Devon PL190NU