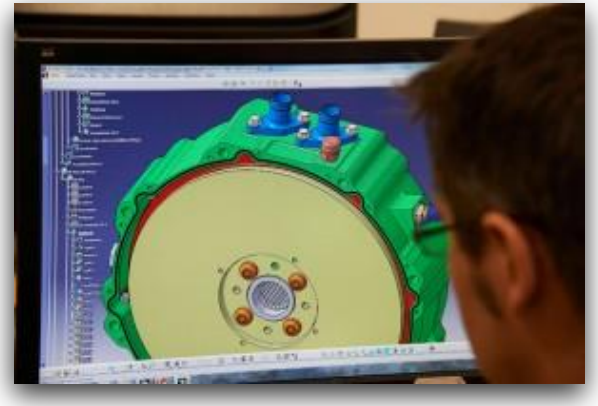
MAKE IT BIG IN BRITAIN

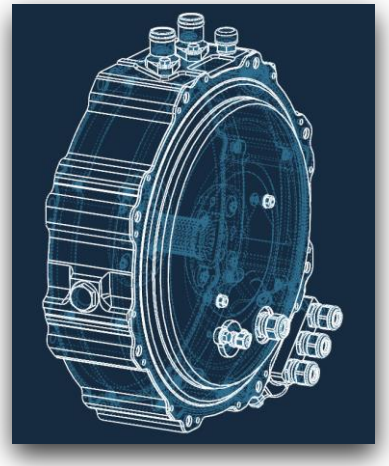
HIGH VALUE MANUFACTURING

Chris Harris

CEO, Yasa Motors

YASA MOTORS IN BRIEF





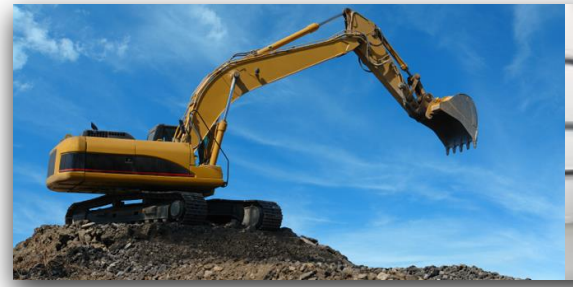
- YASA Motors designs, develops & manufactures high power & torque electric motors in 20-500KW range
- Proprietary patented axial flux motor technology
- For a given power & torque requirement we can deliver smaller, lighter electric motors at lower cost than the competition in our category

MARKET OPPORTUNITIES

YASA MOTORS

Hydraulic Power Replacement

Hybrid Power and Power Generation



Traction

USPs: High power density
High torque density

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TSB PROJECTS

Year	Project	Description	Partners
2009-2011	YAMOT	Develop & validate YASA motor for automotive applications	Sevcon, Morgan, Oxford University, TRW Conekt
2011-2013	MSYS	Integration of YASA motor with 3-speed gearbox & shared cooling circuit – included first polymer constructed motors	JLR, MIRA, DSD
2011-2013	KTP (1)	Development of joining technologies for volume manufacture and high reliability for low mass electric motors	Oxford Brookes University
2013-2015	KTP (2)	Novel cooling systems for electric motors	Oxford Brookes University

- YAMOT & MSYS valuable for developing technology and first products
- KTPs valuable for gaining access to skills and facilities, training and recruiting new staff

THE MANUFACTURING CHALLENGE

YASA MOTORS

Today

Tomorrow

- YASA has volume opportunities today
- **Government investment support would help save/create high value manufacturing jobs & increase UK exports**
- Risk of manufacture moving off shore without additional investment support

Can't justify investment in developing volume production line without volume order

Can't get volume order without demonstrating volume production line

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HIGH VALUE MANUFACTURING

David Mackie

Managing Director, Marine Biopolymers

TREASURE FROM THE SEA - SEAWEED

Seaweed…

- Ubiquitous
- Overlooked
- Abundant
- Natural
- Source of high value

MARINE BIOPOLYMERS LTD

- Since 2010
- Vision – multi-component extraction from Seaweed
- Foundation of business – Alginate - #1 seaweed component
- Re-introduce alginate (& other) manufacturing to the UK
- Differentiation (to date) – radically improved Alginate process
- Location – West coast of Scotland

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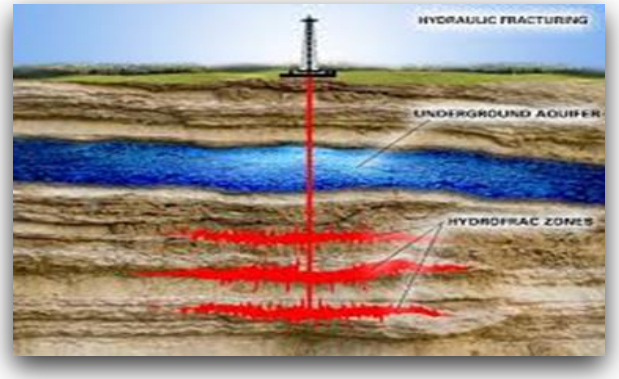
MBL – NEW ALGINATE PROCESS

- Good context for MBL – current processes "outdated"
- With no baggage – think the unthinkable…
- Radically improved new process
  - > 5 times faster
  - > 5 times smaller
  - 50% of stages removed (> 20 to ~ 12)
  - Less "hungry" – water, energy, process chemicals
  - Maximise "renewable" aspects
  - Crafted to allow other components extraction
  - Dramatically cheaper than competitive processes
- Global potential – not just UK, but any place with brown seaweed

SCALING UP – HELP FROM INNOVATE UK

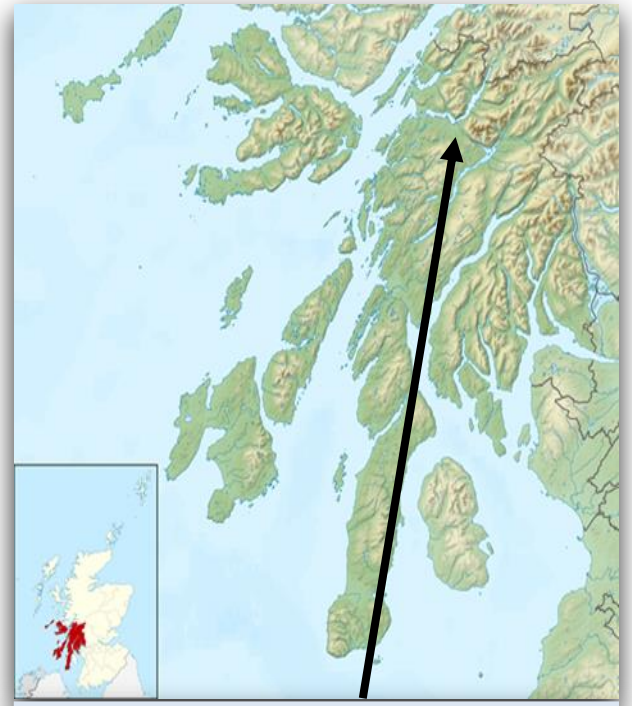
- Bench scale tests worked well
- How to bridge the gap from small to "real" scale?
- Grant supported by the (then) TSB – SMART R&D Prototype
- Value ~ £160,000 – a godsend for an SME
- Late 2012 – 2013, Alginate Pilot Plant based in Ayr
- TSB very supportive throughout – even when things went "off-piste" – flexibility when needed

Potential major new Alginate use area – Oil & Gas



WHERE WE ARE TODAY

- Moving to full scale
- Alginate plant in N Argyll
- Raising investment - £7.5 m
- Almost there (touch wood!)
  …but if you have a cheque book
- Operational at end 2015
- Phase 1 only – potential to develop to a > £50 m pa site
- Routes to other seaweed components already identified



GPS coordinates of Barcaldine
Latitude : 56.4611 N
Longitude : -5.3667 W

Potential major new Alginate use area - Bread

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OUR BIGGEST CHALLENGE

- Raising investment!
- Raising investment!
- Raising investment!
- Persuading investors that "making things is OK!" (and makes money)
- De-risking a real challenge – especially for a "start-up"
- Could there be new investment funds with a real manufacturing focus?

Potential major new Alginate use –Li Ion battery

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Nick Van Dijk

Research Director, ITM Power

ITM POWER
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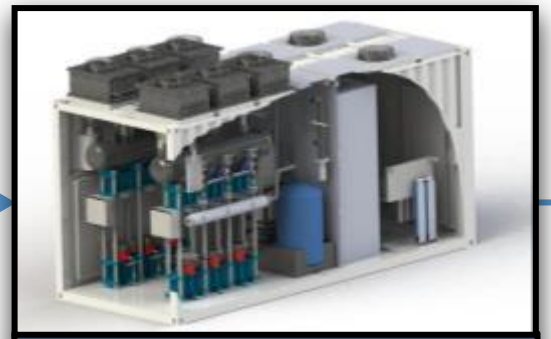
RAPID RESPONSE ELECTROLYSER

Scalable| Rapid Response | Self pressurising

Wind Power

Grid



ITM Electrolyser

Energy Storage

Clean Fuel

ITM POWER
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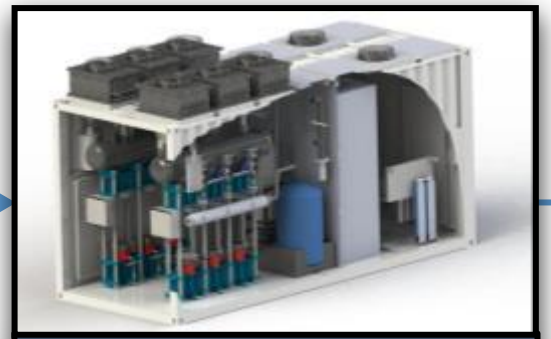
RAPID RESPONSE ELECTROLYSER

Energy Storage Sale: **The Thuga Group | Germany**
Clean Fuel Bid: **California Energy Commission**

Wind Power

Grid



ITM Electrolyser

P2G Thuega

HRS H_2USA

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17 October 2013 Last updated at 11:23

Share

Air pollution causes cancer - WHO

Smog in Singapore caused by fires in nearby Sumatra

Pollutants in the air we breathe have been classed as a leading environmental cause of cancer by the World Health Organization.

It said **the evidence was clear** they cause lung cancer.

Sources of pollution include car exhausts, power stations, emissions from agriculture and industry - as well as heating in people's homes.

The WHO said the classification should act as a strong message to governments to take action.

The International Agency for Research on Cancer (IARC), a part of the WHO, has now classed air pollution in the same category as tobacco smoke, UV radiation and plutonium.

Related Stories

Air pollution 'still harming health'

Air pollution 'hits failing hearts'

China steps up fight on pollution

The Telegraph

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Scottish wind farms paid £1 million to shut down one day

Wind farm companies operating in Scotland were paid more than £1 million to shut down their turbines for a single day last month, it has emerged.

Wind farm companies receive constraint payments to switch off their turbines when supply exceeds demand Photo: PA

By Simon Johnson, Scottish Political Editor

12:38PM BST 05 May 2013

Print this article

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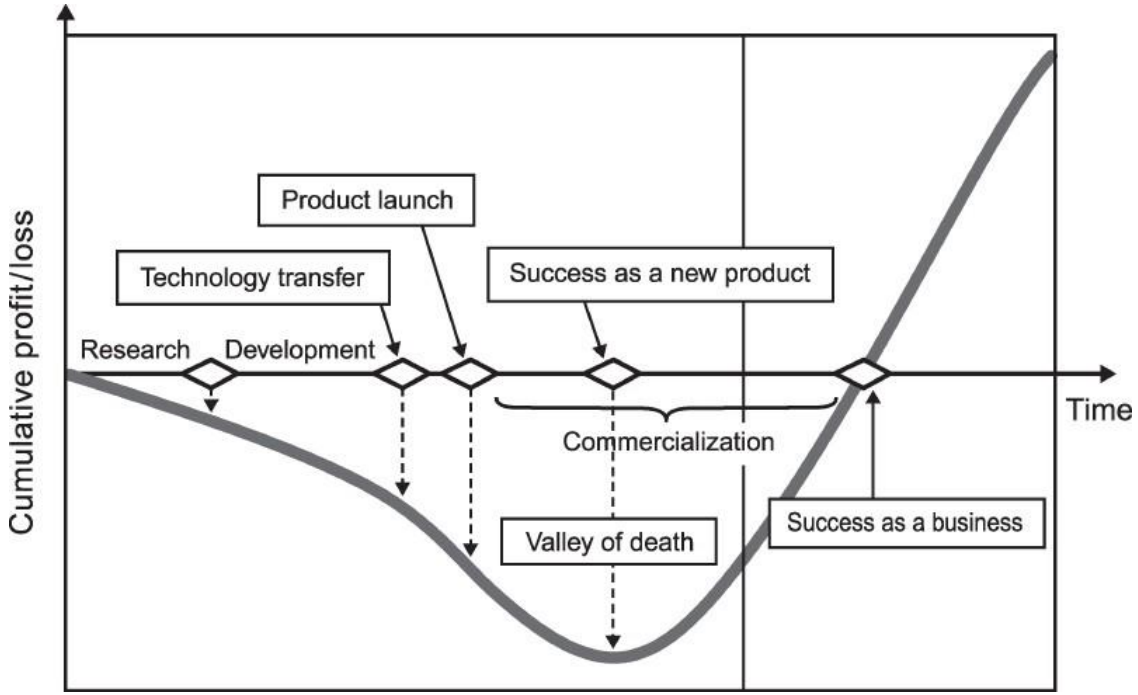
BARRIERS TO SUCCESS

- Understanding ***innovation*** is not just about new products or services
- Being a ***market leader*** and developing the market
- ***Manufacturing*** expensive, high-end products
- ***Money/ Sales***



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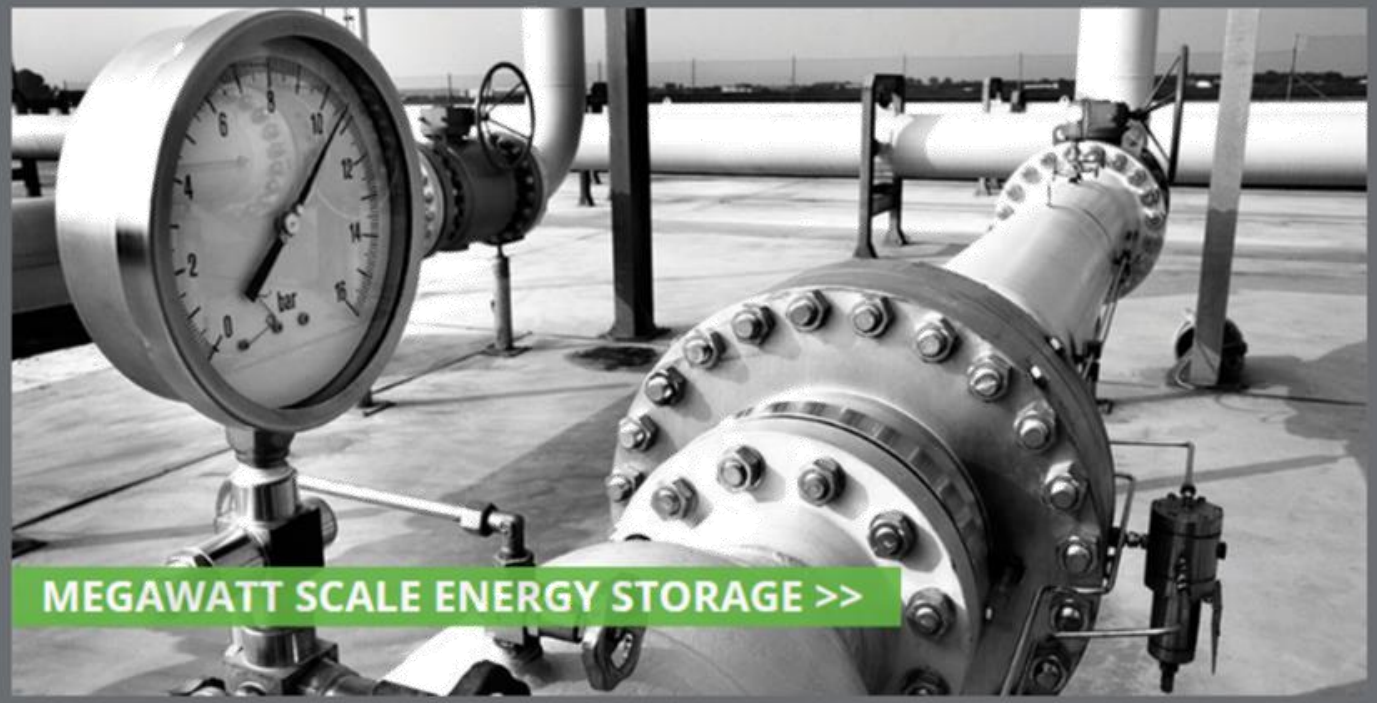

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Driving Innovation

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Hydrogen Energy Storage Smart Grid

- £2.4m TSB consortium grant
- Installation of 100kg/day & 15kg/day refuellers
- Fleet of vehicles (HICE and FC)
- Marine refueller for H_2 vessels
- Hydrogen energy storage system
- Balancing supply and demand

ECOISLAND PARTNERS

SSE	Arcola
Cheetah Marine	IBM
Vodafone	Ecoisland Partnership CIC
University of Nottingham	University of South Wales
NPL	Toshiba

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RENEWABLE FERTILIZER PRODUCTION

- 50% of current global food production relies on use of NH3 based fertilizers
- Urea production represents important future pathway for the utilisation of waste CO_2 to support EU Climate Action objectives
- Carbon negative cradle-to-grave process for ammonia production
- Integration of existing technologies into small footprint intensified process

fera

bpe

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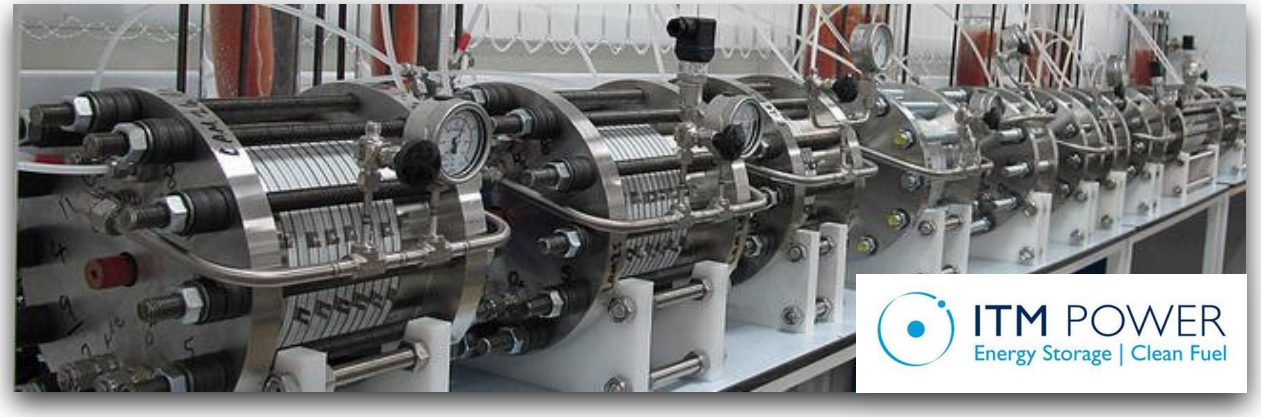
Waitrose

SUMMARY

- We are ***developing new markets*** with one modular product
- ***Innovations*** around ***manufacture*** of core components and QC processes are needed
- We are moving from batch manufacture to an ***assembly line*** model
- We are slowly being recognised as ***world leaders***



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