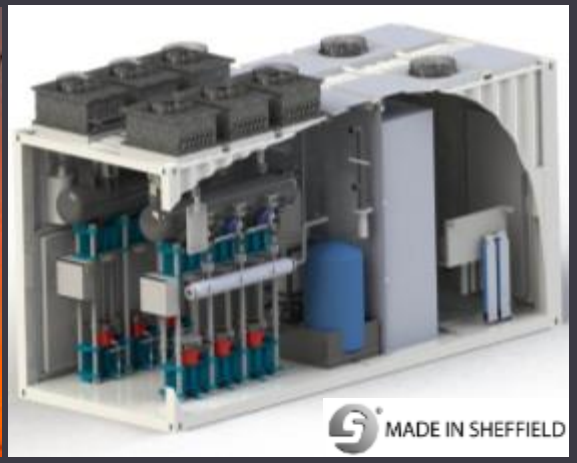
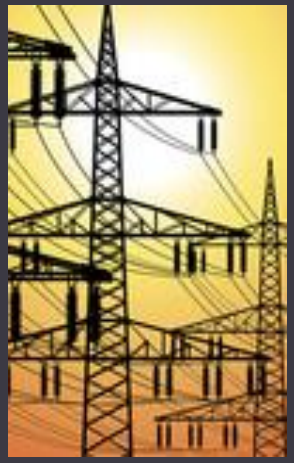
ITM POWER INC.
ENERGY STORAGE | CLEAN FUEL
USING RENEWABLE ENERGY TO PRODUCE NH3

SEPTEMBER 23, 2014





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Energy Storage | Clean Fuel

ITM POWER INC.
ENERGY STORAGE | CLEAN FUEL

Contents:

- Introduction to ITM Power Inc.
- Hydrogen Energy Storage, Renewable Chemical Feedstock and Clean Fuel production
- Using Renewable Energy to Produce NH3
- Energy Storage and Fertilizer Projects
- Clean Fuel Projects
- Standard platforms

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ITM Power Introduction

- First AIM listed fuel cell & hydrogen company
- 2004 IPO
- Expansion in USA and Germany
- 2011 Established ITM Power GMBH
- 2012 Established ITM Power Inc.
- Two facilities in Sheffield | 70 staff
- Manufacturing business model

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ITM POWER INC.

The Team so far…….

Graham Cooley

Graham joined ITM Power as CEO in 2009. Before that Graham was Business Development Manager in National Power plc and spent 11 years in the power industry developing energy storage and generation technologies. Before joining ITM Power Graham was CEO of Sensortec Ltd, Metalysis Ltd and Antenova Ltd.

Steve Jones

Steve has been with ITM since 2005 and has worked within core research, product testing and product development. Steve now heads up ITM's business development function and is MD of ITM Power Inc.

Geoff Budd

Geoff since August 2012 as ITM's North American Representative has focused on business development activities in the USA. Prior to that he spent 13 years with Ballard Power Systems in various roles, the last of which was as the Business Development Director in Europe. Geoff holds a BSc and a MBA.

Robert Rose

Robert Rose is executive director of the Breakthrough Technologies Institute, Inc. (BTI), and has been a member of the Secretary of Energy's Hydrogen and Fuel Cells Technical Advisory Committee since 2007. He also serves on the board of the American Councils for International Education.

Alan Lloyd

Alan Lloyd has served as the President of the International Council on Clean Transportation (ICCT) since 2006. He served as the Secretary of the California Environmental Protection Agency from 2004 through February 2006 and as the Chairman of the California Air Resources Board (CARB) from 1999 to 2004.

INTRODUCTION

HYDROGEN FOR ENERGY STORAGE, RENEWABLE CHEMICAL FEEDSTOCK AND CLEAN FUEL PRODUCTION

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ITM enables the supply of RENEWABLE HYDROGEN

Significant emerging market segments

Energy Storage:

- Follows the deployment of renewables
- Adds value to RE and balances the grid
- Boston Consulting estimates a cum. global market to 2030 of c. $370bn

Renewable Chemical Feedstock:

- Fertilizer and SCR

Clean Fuel:

- Fuel is the largest global market (91m barrels per day)
- Hydrogen from renewable power offers fuel independence
- Fuel security a key political issue

Energy Storage and Chemical Feedstock

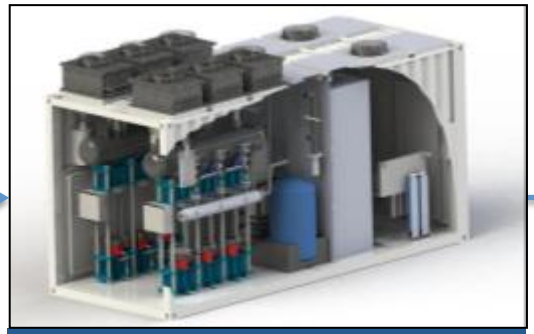
Clean Fuel

RAPID RESPONSE ELECTROLYSER

Available in 1MW modules | Responds in 1sec | Self pressurises to 80bar

Wind & PV Power

Grid



ITM Electrolyser

Energy Storage and Chemical Feedstock

Clean Fuel

RAPID RESPONSE

HYDROGEN ENERGY SYSTEMS

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USING RENEWABLE ENERGY TO PRODUCE NH3

FUEL
FERTILIZER
SCR
ENERGY STORAGE

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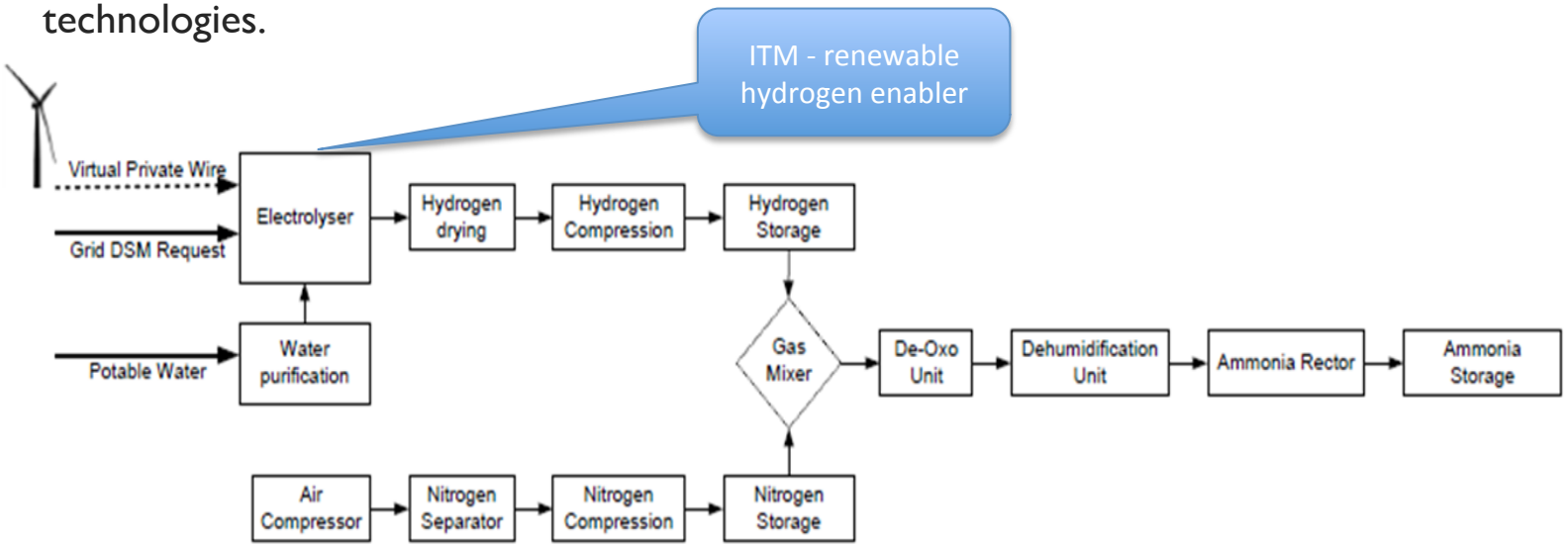
RENEWABLE AMMONIA

- Global sales of NH_3 exceed $100 billion annually
- 67% of world production is based on H_2 from natural gas.
- NH_3 is responsible for 5% of the world's natural gas consumption.
- Alternative - use renewable energy sources at a distributed scale and integrate existing technologies.



RENEWABLE AMMONIA APPLICATIONS

- As a fuel - Ammonia has a long history of use as a fuel. Examples from World War II to power transport and to power the Reaction Motors XLR99 rocket engine of the X-15 hypersonic research aircraft.
- As an energy storage medium – remote energy storage in distributed renewable power generation.
- As a fertilizer – from aqueous ammonia to urea. The latter of which represents important future pathway for the utilization of waste CO_2 to support EU Climate Action objectives.
- As a reductant – selective catalytic reduction (SCR) technology to reduce nitrogen oxides (NOx) emissions from coal-fired power plants. On-site production of NH_3 improves security of supply.

ITM not active in projects. ITM active in projects. ITM active but not with NH3 yet.

ENERGY STORAGE AND FERTILIZER PROJECTS

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P2G PLANT & VISITOR CENTRE

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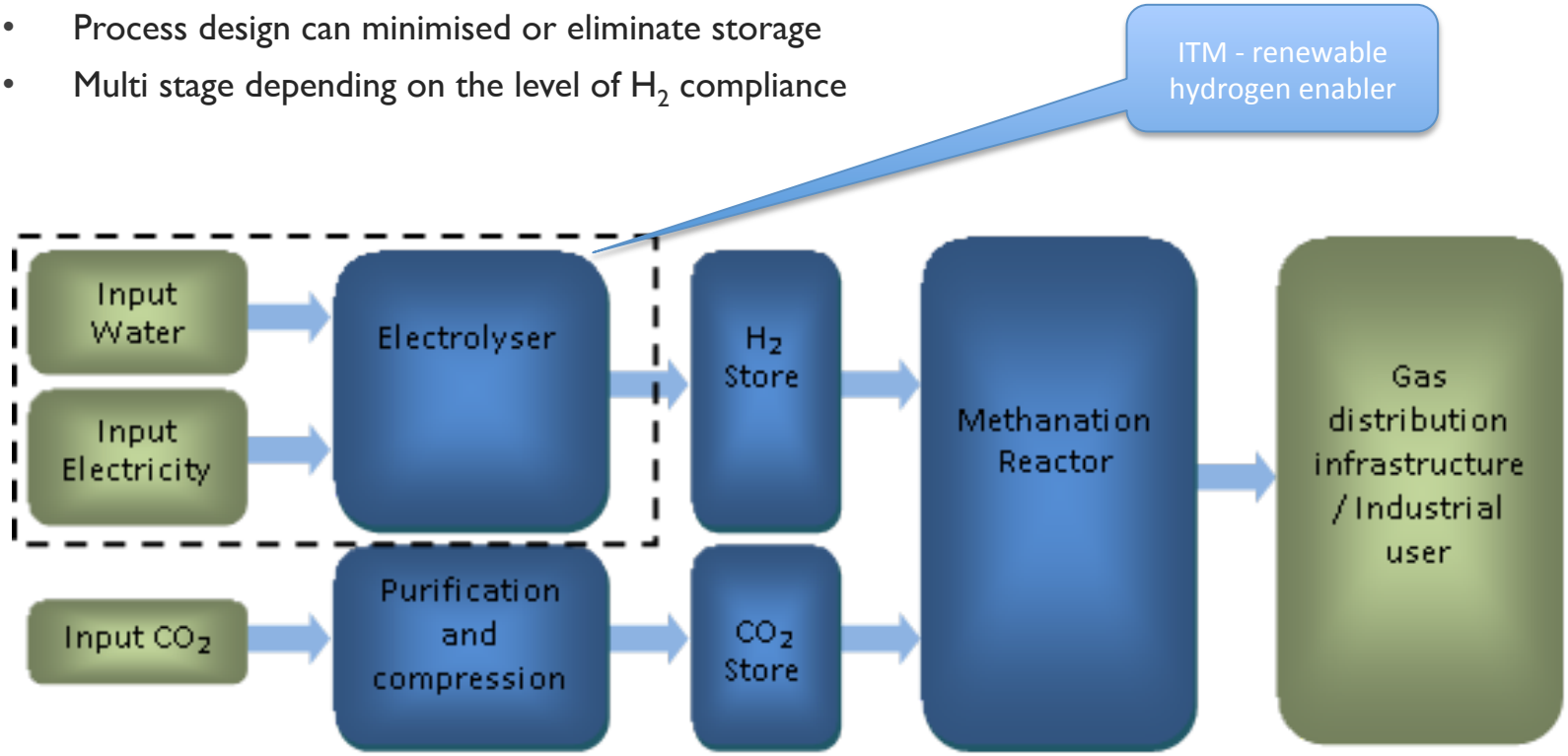
METHANATION

Production of RNG from Renewable Hydrogen and CO_2

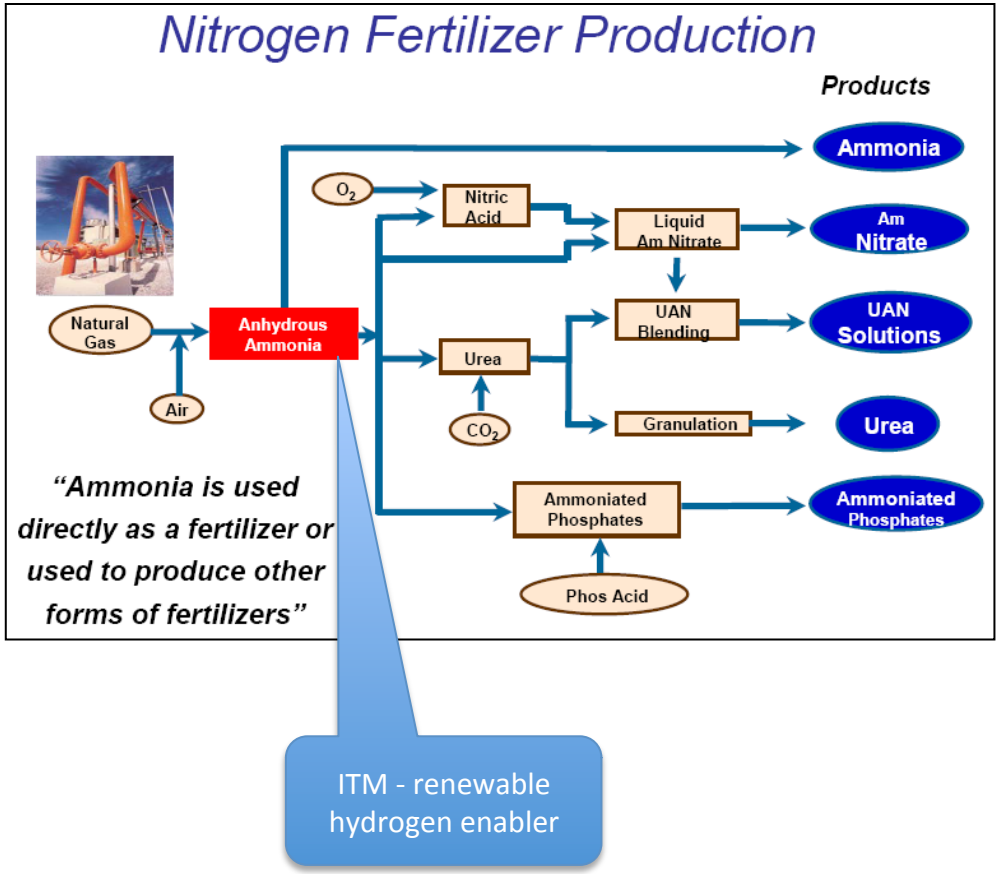
- Need to source pure CO_2
- Process design can minimised or eliminate storage
- Multi stage depending on the level of H_2 compliance



RENEWABLE UREA

Production of Urea from Renewable Hydrogen and CO_2

- Partner Waitrose. Grocery chain and farm owner
- Funded by the UK Technology Strategy Board
- In conjunction with the University of Sheffield.



CLEAN FUEL PROJECTS

CHINO CA
RIVERSIDE CA
ISLAND HYDROGEN
HYFIVE

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FIRST STATION LED BY H_2FRONTIER

100% Renewable

- Located at Hyundai, Chino, LA
- 100kg per day
- Grant value $3.0mio
- Operational in October 2014

CALIFORNIA REFUELLING STATIONS

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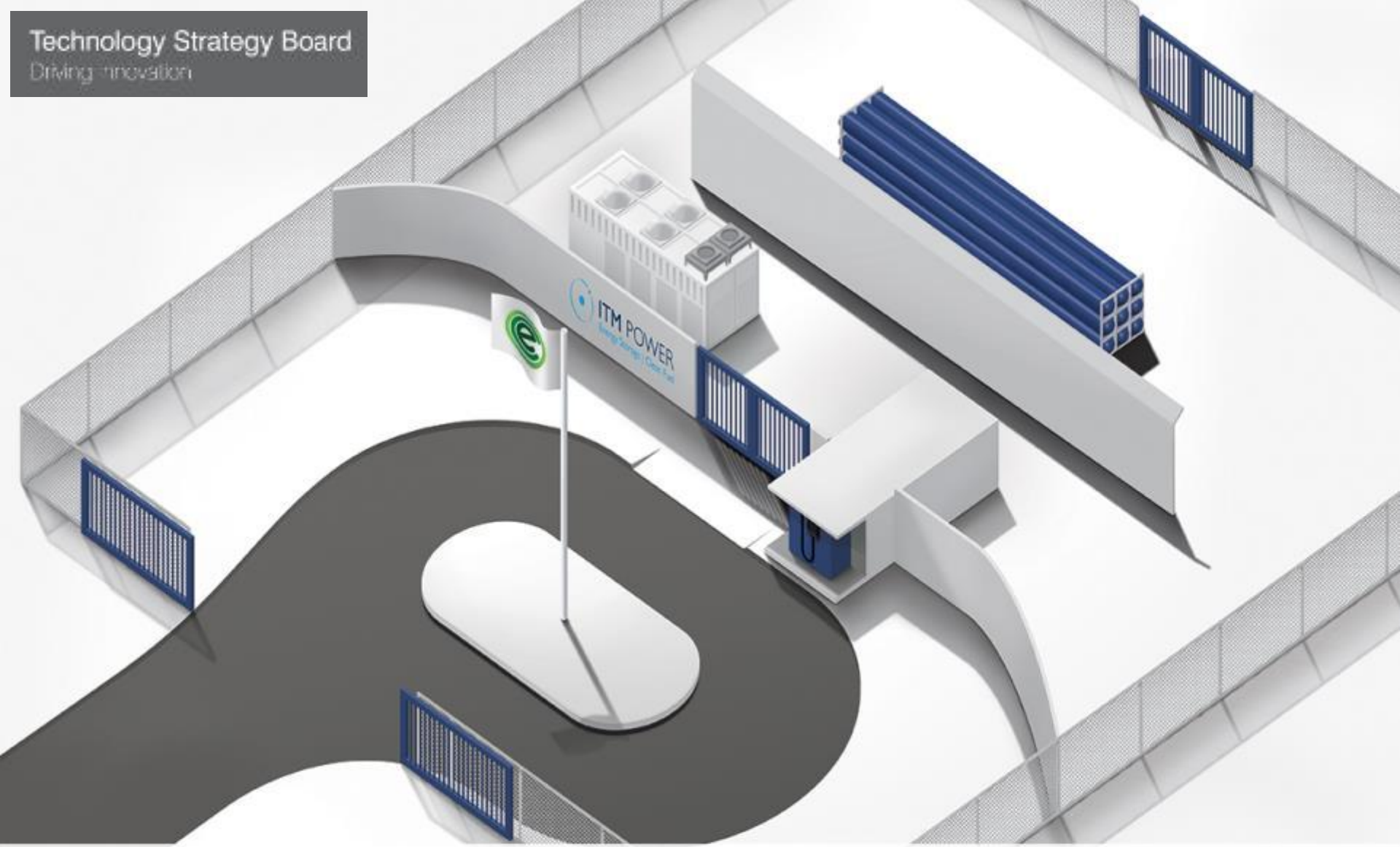
Technology Strategy Board
Driving innovation



ecoisland
www.eco-island.org

CHEETAH MARINE CATAMARANS

SSE

IBM

vodafone

arcola

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The University of Nottingham
UNITED KINGDOM · CHINA · MALAYSIA

University of South Wales Prifysgol De Cymru

NPL
National Physical Laboratory

TOSHIBA

RENEWABLE AMMONIA FUEL

Seeking local project partners

STANDARD ITM-POWER PLATFORMS

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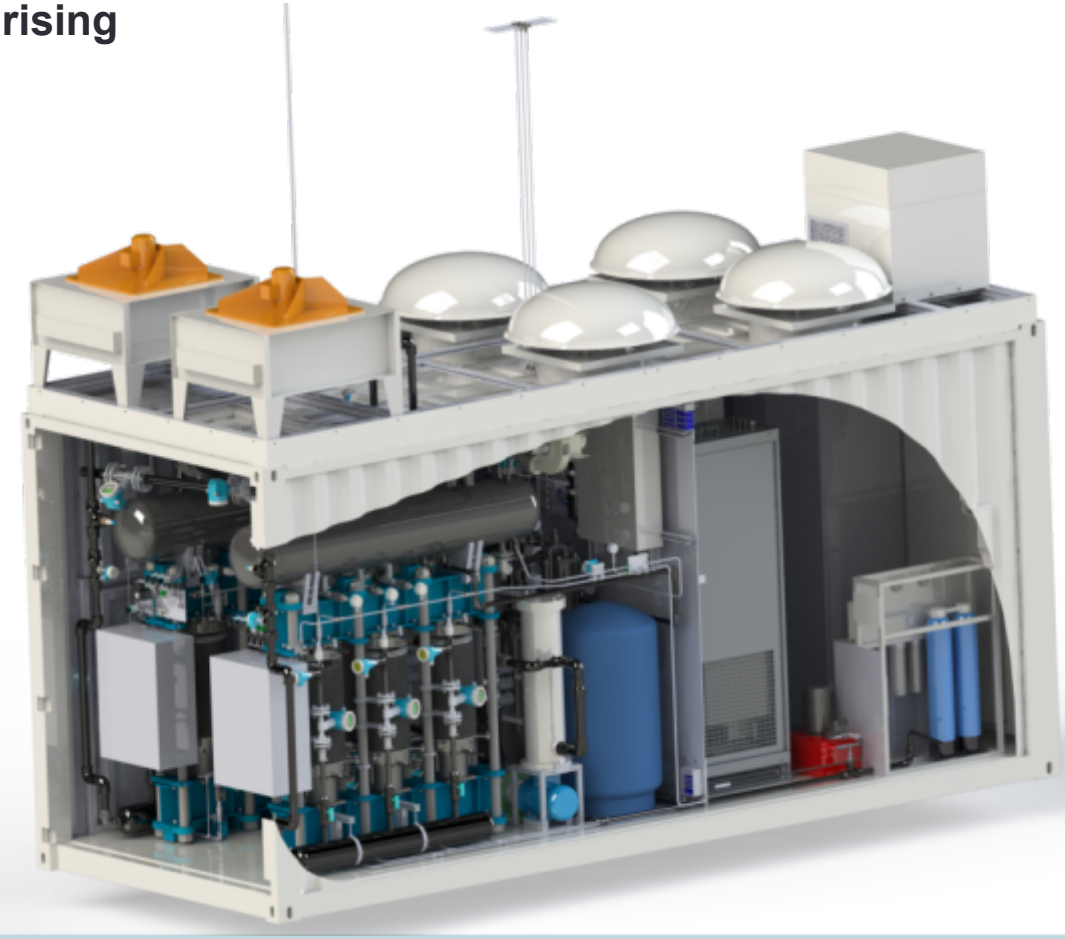
WHAT'S UNIQUE ABOUT ITM ELECTROLYSERS?

Rapid response | Self pressurising

- State of the art PEM technology.
- 1 second response time
- 80bar self pressurising
- Modules up to 1MW



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AEG
POWER SOLUTIONS

360KW POWER-TO-GAS MODULE

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STANDARD PLATFORMS – LARGE PRODUCTS

Standardisation to minimise NRE

- Four platforms offered

Metric	HGas60		HGas180		HGas360		HGas1000	
	Nom.	Max.	Nom.	Max.	Nom.	Max.	Nom.	Max.
Number of stacks	1		3		6		12	
Output (kg/24hr)	25	37	80	104	165	212	462	555
System Power (kW)	66	93	186	238	360	475	1029	1229
System efficiency (kWhr/kg)	61	59	54	55	52	53	53	53
Container size (ISO)	1x 10ft		1x 20ft		1x 20ft*		1x 40ft**	

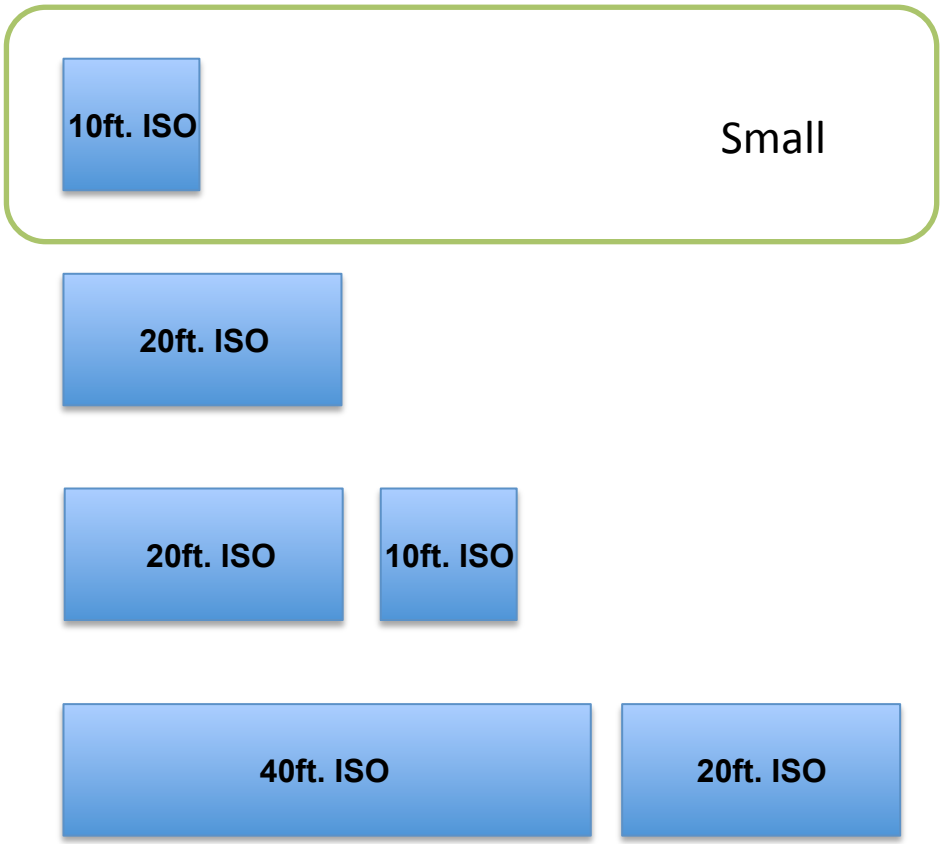
*Plus 1x 10 foot depending on options

** Plus 1x 20 foot depending on options

STANDARD PLATFORMS

Small – City of Riverside

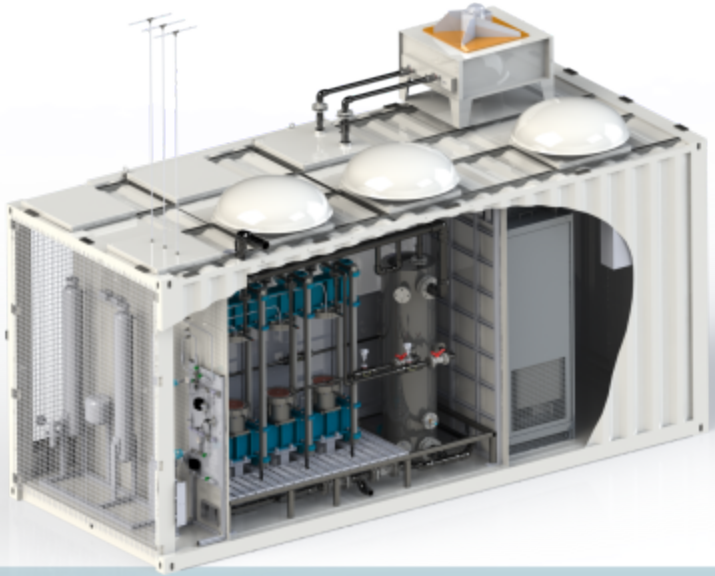
- 25 – 37kg/day
- Single 10ft ISO
- Drier & chiller sited externally

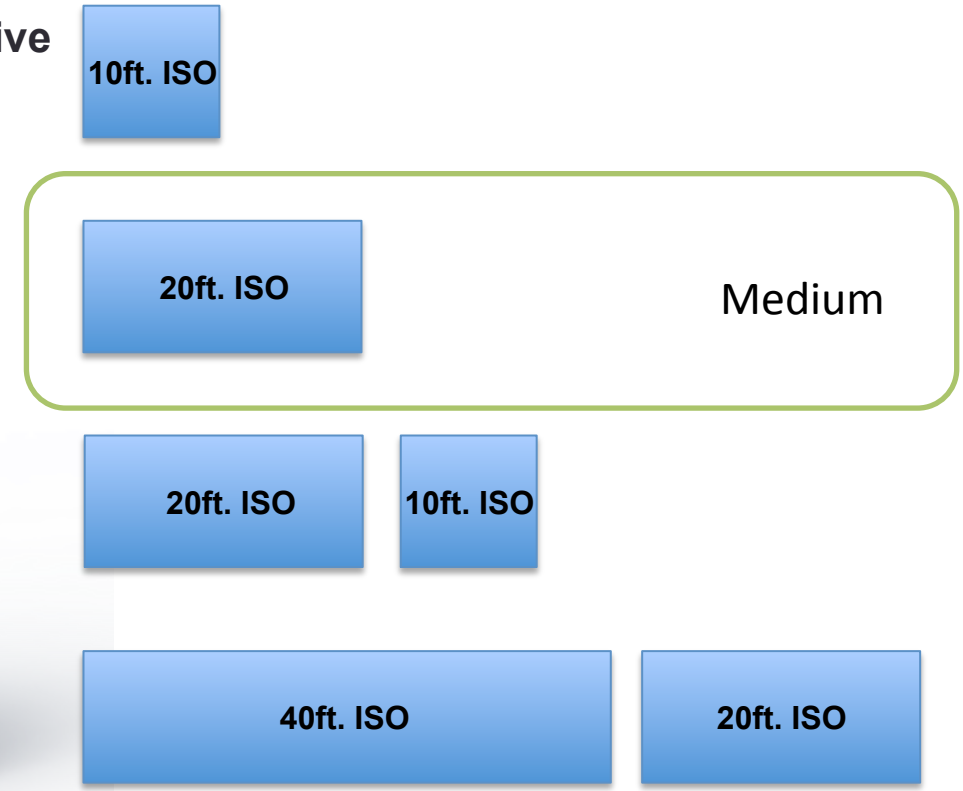


STANDARD PLATFORMS

Medium – Chino, Island Hydrogen & HyFive

- 80 – 104kg/day
- Single 20ft ISO
- Drier internal to container
- Chiller sited externally

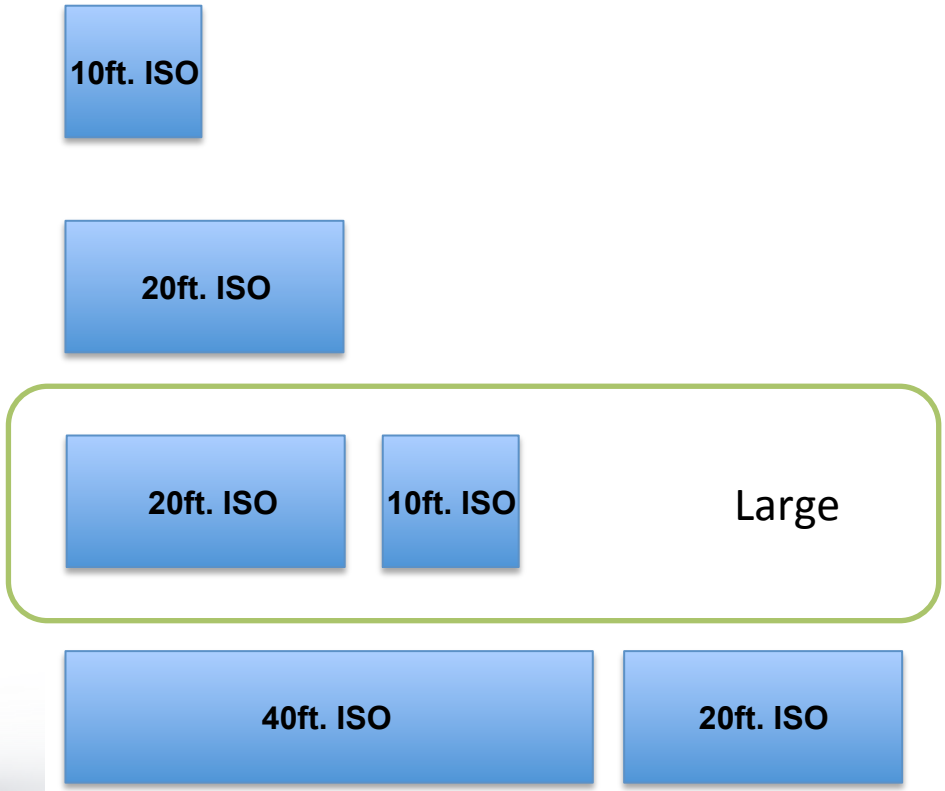




STANDARD PLATFORMS

Large – Mainova

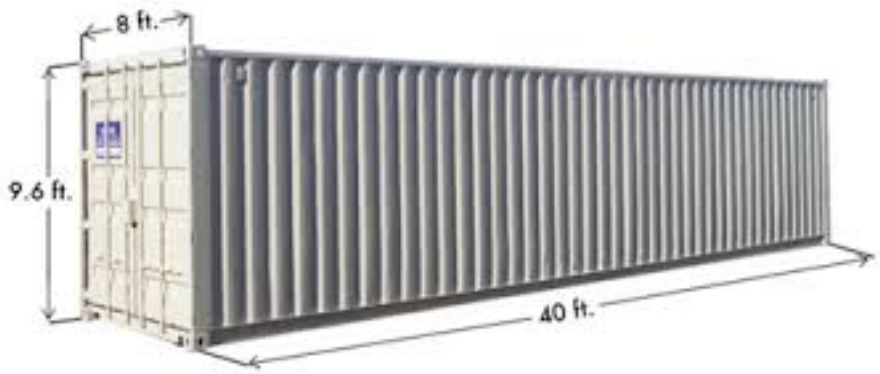
- 165 – 212kg/day
- Single 30ft ISO or 20ft + 10ft ISO option
- Drier & chiller sited externally

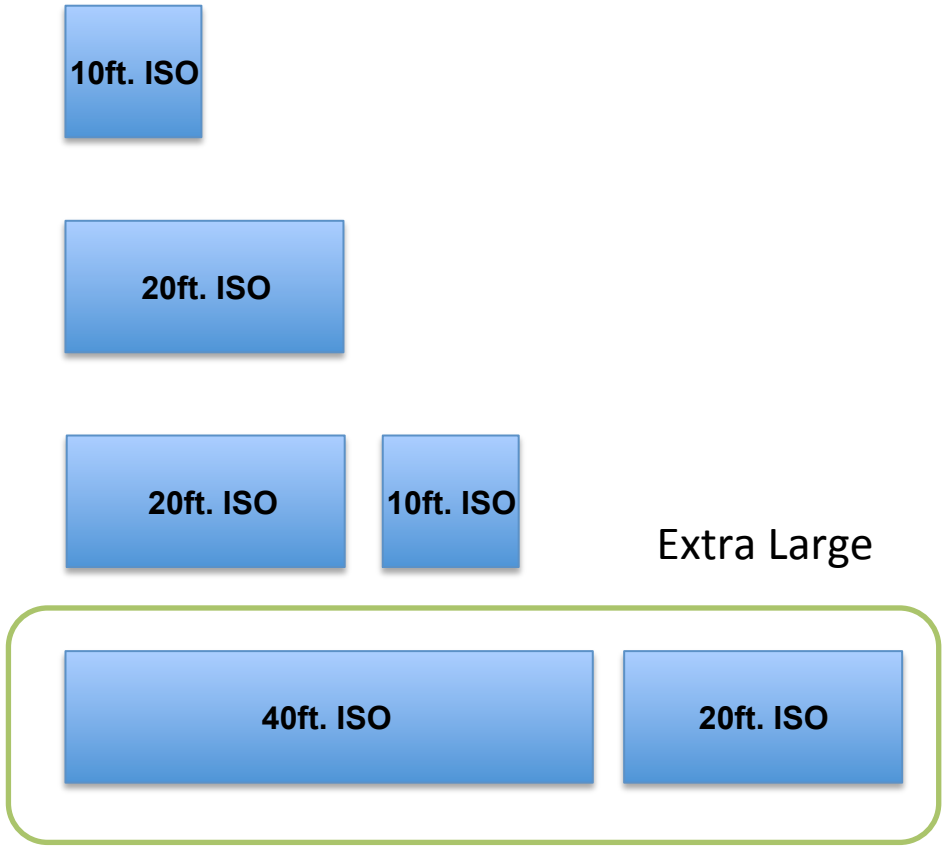


STANDARD PLATFORMS

Extra Large

- 462 – 555kg/day
- 40ft ISO
- Power conversion & control in 20ft ISO
- Drier & chiller sited externally





COST REDUCTION

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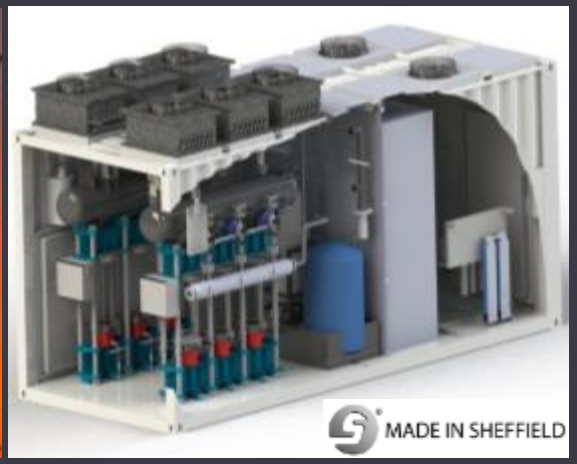

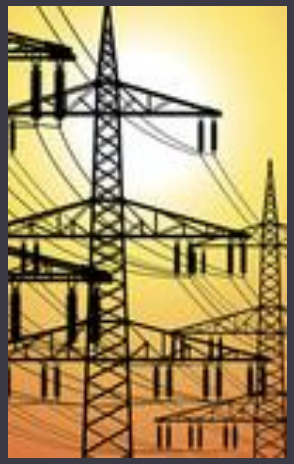

THANK YOU FOR YOUR ATTENTION

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