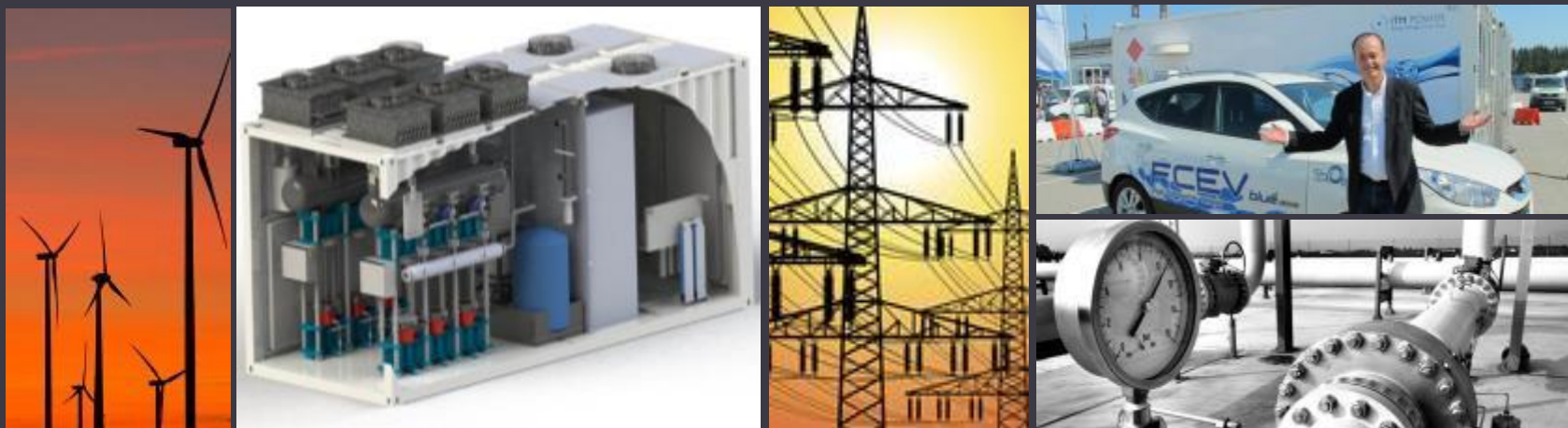


H₂ AND FUEL CELLS FOR STATIONARY APPLICATIONS AND H₂ INFRASTRUCTURE – HYDROGEN BUNKERING

ITM POWER

16/6/17 | VALENCIA



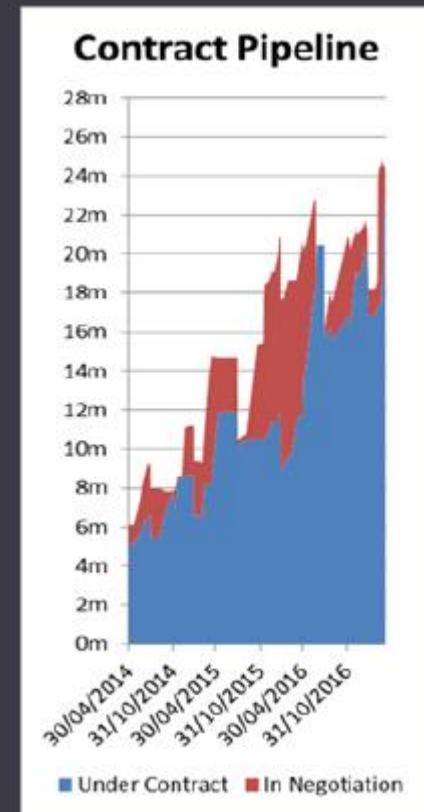
DR KRIS HYDE
TECHNOLOGY MANAGER, ITM POWER

kbh@itm-power.com
@H2KH

ITM POWER

SUMMARY

- Manufacturer of electrolysis equipment
- Offer turn-key solutions
- Two sites in Sheffield
- IPO in 2004:
- £7.5m investment by JCB
- ~75 employees
- Key markets are hydrogen refuelling and power to gas
- Rolling out 11 UK hydrogen refuelling stations
- Two power to gas plants in Germany



£23.02m of projects under. £4.16m in negotiation. Total pipeline of £27.18m*

*Correct at 5/6/17



Dr G Cooley
Chief Executive Officer

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, founding CEO of Metalysis Ltd, a spin out of Cambridge University and founding CEO of Antenova Ltd.



Dr Simon Bourne
Chief Technology Officer

Simon joined ITM in 2002 as a Technical Manager and has been one of the leading scientists involved in the development of ITM's suite of patented membrane materials.

Before joining ITM, Simon was a project engineer with Sonatest Plc and a researcher with the Ministry of Defence. Simon has a BSc Hons in Materials Science from UMIST and a PhD from Cranfield University.



Andy Allen
Company Secretary and CFO

Andy graduated from the University of Sheffield in 2004. He went on to qualify as a chartered accountant with Barber Harrison & Platt in Sheffield. His first move into industry was to Manheim Auctions head office as Finance Manager, before joining ITM power as Financial Controller in March 2011.



Dr Rachel Smith
Executive Director

Rachel has worked for ITM since its incorporation in 2002. Starting as a research scientist Rachel has a solid background in ITM materials and their use in electrochemical cells.

She has worked on and managed various externally funded projects and now acts as the funding co-ordinator for ITM's activities. Rachel also manages ITM's patent and trademark portfolio.



Prof R Putnam
Non-Executive Chairman

Roger Putnam is a former Chairman of Ford of Britain, ex-President of the Society of Motor Manufacturers & Traders and a member of the Government's Energy Review Partnership and Automotive Innovation and Growth Team.

The Partnership will report to the Chancellor on the country's future energy strategy and the AIGT to the Prime Minister on alternative fuels and transport.



Peter Hargreaves FCA
Non-Executive Director

Peter joined the board of ITM in February 2004 as a Non-Executive Director. After qualifying as a chartered accountant he was employed by KPMG, Unisys and Whitbread and Company Limited. In 1981 he founded the national investment brokerage Hargreaves Lansdown Plc where he remains an Executive Director.



Sir Roger Bone
Non-Executive Director

Sir Roger was President of Boeing UK from 2005 to 2014. He is a non-executive director of F and C Investment Trust plc, and a non-executive director and trustee of the National Centre for Universities and Business. He was one of the Prime Minister's honorary Ambassadors for British Business from 2009 to 2015. Previously he has been British Ambassador to Brazil and to Sweden and was an Assistant Under Secretary of State in the Foreign and Commonwealth Office.



Lord Roger Freeman
Non-Executive Director

Lord Freeman is a member of the House of Lords and is a member of the Advisory Boards of Thales S.A. and PricewaterhouseCoopers (UK).



Robert Pendlebury
Non Executive Director

Bob has worked in senior management positions in both Ford Motor Company and JCB. Joining JCB in 1991, he became their Engineering and Research Director. He remains a consultant to JCB, Associate Engineering Director to the JCB Academy and a Visiting Professor to Loughborough University. He is a Mechanical Engineering graduate of Leeds University, Chartered Engineer and Fellow of the Institution of Mechanical Engineers.

THE EXECUTIVE AND NON-EXECUTIVE TEAM

HYDROGEN ENERGY SYSTEMS

ORDERS OF
£15.68m
OVER THE LAST
12 MONTHS



DEAL PIPELINE OF
£21m



LOSSES
DECREASED
BY



HEAD COUNT
UNCHANGED



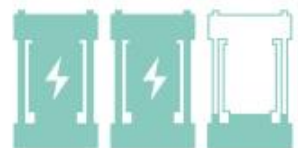
ACHIEVED



LONG RUN
COST TARGET
€1m/MW



SOLD
5.25MW



OF LARGE SCALE
ELECTROLYSERS

1st
UK

POWER-TO-GAS
CONTRACT WITH

nationalgrid



OPENED **THREE**
NEW REFUELLING
STATIONS IN UK



AND **ONE** IN USA

FUEL CONTRACTS
WITH



TOYOTA



HYUNDAI



COMMERZBANK

GROUP



arcola
energy



ARVAL
BNP PARIBAS GROUP

Europcar



ANGLO
AMERICAN



Shell



REFUELLING STATION
ON SHELL FORECOURT

ACHIEVEMENTS IN THE LAST 12 MONTHS
HYDROGEN ENERGY SYSTEMS

RAPID RESPONSE ELECTROLYSER

Available in 10MW modules | Responds in 1 sec | Self-Pressurises to 50 bar



RAPID RESPONSE
HYDROGEN ENERGY SYSTEMS

PRODUCTS



MARKET OFFERING

Rapid Response | High Pressure | High Efficiency | MW scale

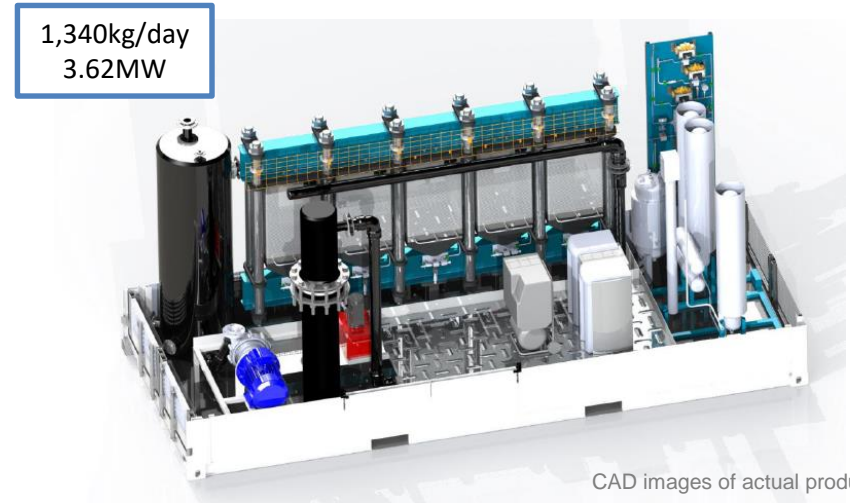
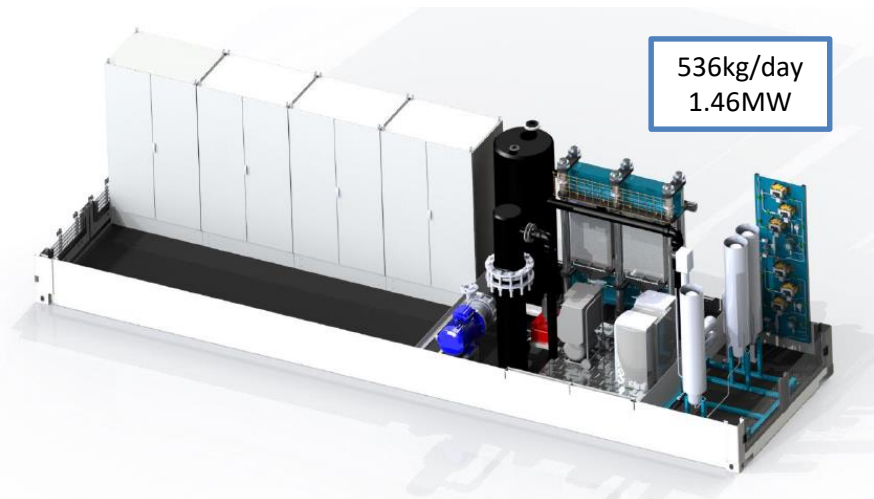
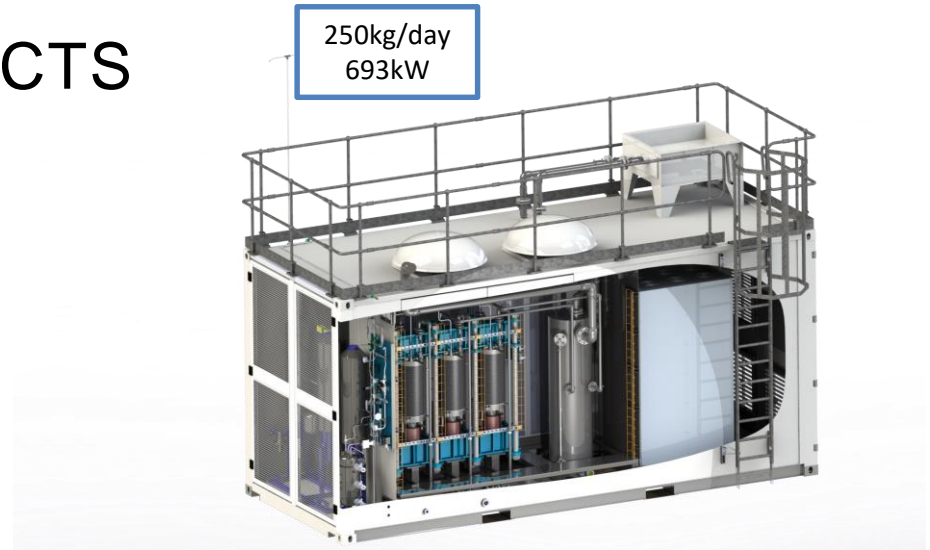
- Rapid response: less than 1s; for primary grid balancing
- High pressure: up to 50bar;
- High efficiency: 77% measured by Thuga Group; 86% measured by RWE (with heat recovery)
- Large scale: 10MW modules available today
- Compliant: EU and USA
- Operations: Large PEM: >3yrs in the field



MARKET OFFERING

ENERGY STORAGE | CLEAN FUEL

CONTAINERISED PRODUCTS



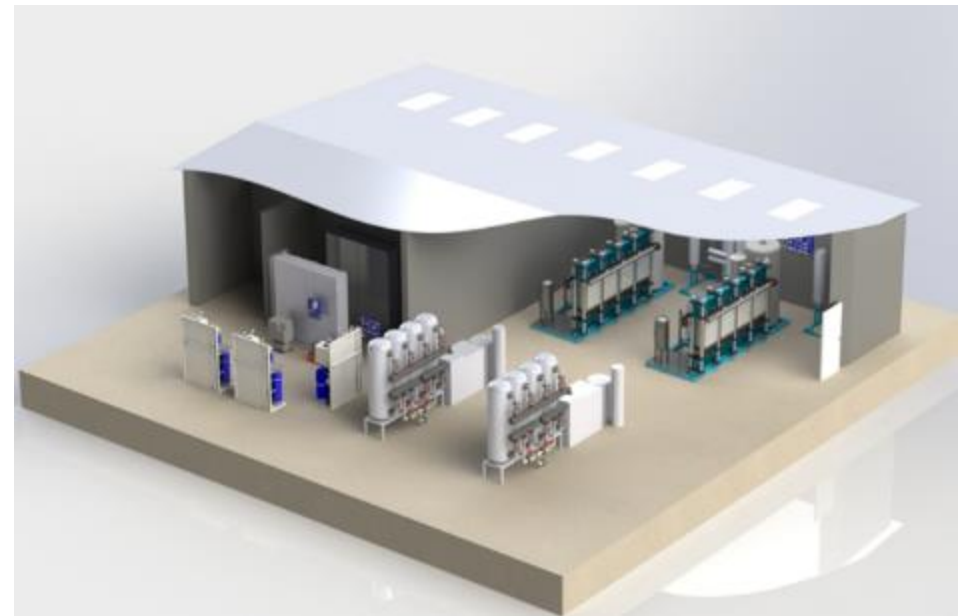
CAD images of actual product

MARKET OFFERING
ENERGY STORAGE | CLEAN FUEL

BUILDING SOLUTIONS

Tailored to suit customer requirements

- Sized for hydrogen large schemes
- Rapid response for grid balancing
- Larger stack platform enables smaller footprint
- Skid mounted options for use indoors
- Multiple modules can be operated together



Metric	L	XL	XXL
Number of Stacks	3	4	15
Max Output (kg/24hr)	805	1,075	4000
System Power (MW)	2.00	2.69	10.0
System Efficiency (kWhr/kg)	53 - 60	53 - 60	53 - 60
Footprint	Custom	Custom	Custom

PEM OFFERING
HYDROGEN ENERGY SYSTEMS

LARGE APPLICATIONS

1MW to 10MW

- Bus / train refuelling stations
- Small P2G demonstrations

10MW to 60MW

- Large transport schemes
- Power-to-Gas installations
- Chemicals Industry

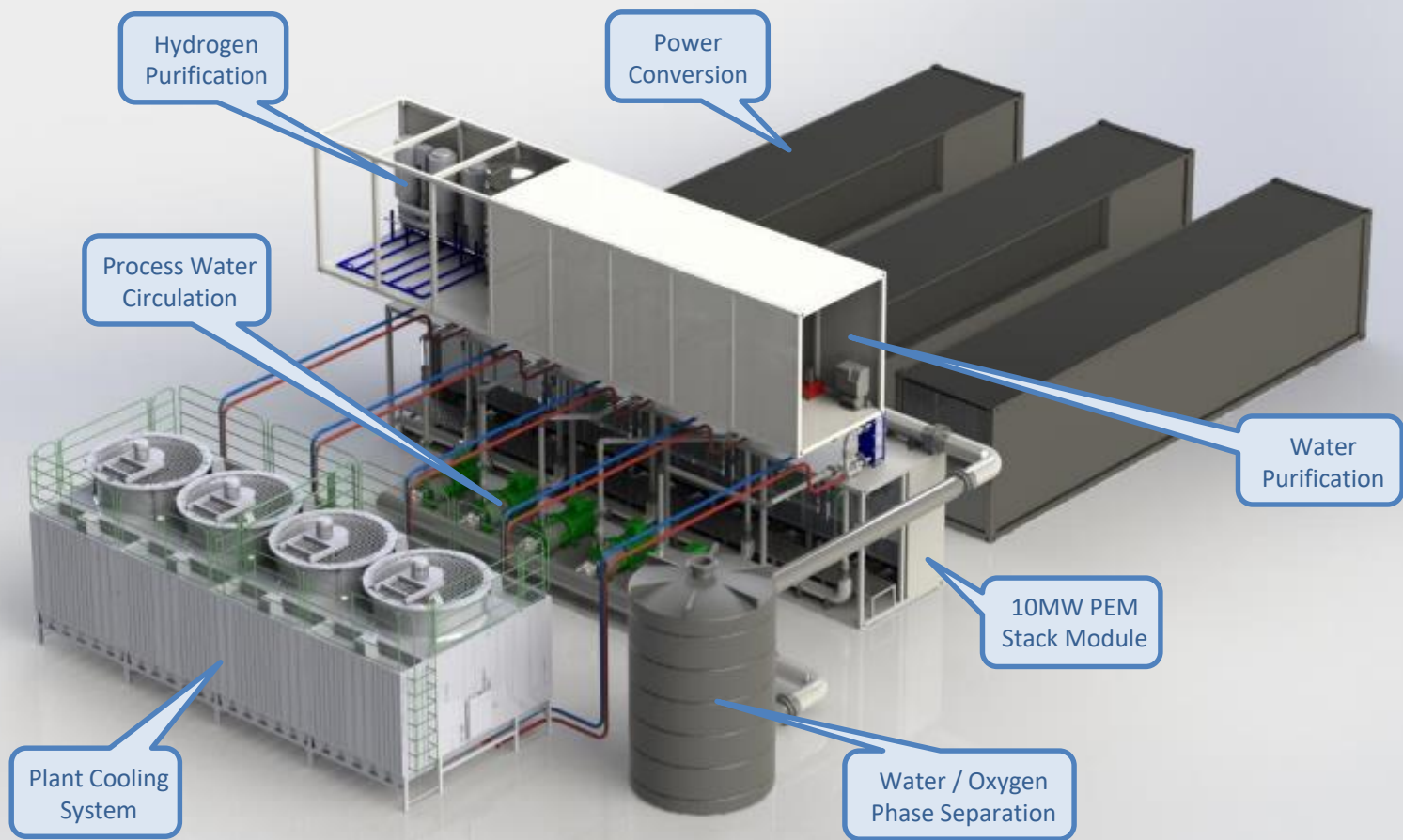
60MW to 100MW

- Power-to-Gas installations
- Chemicals Industry
- Refineries

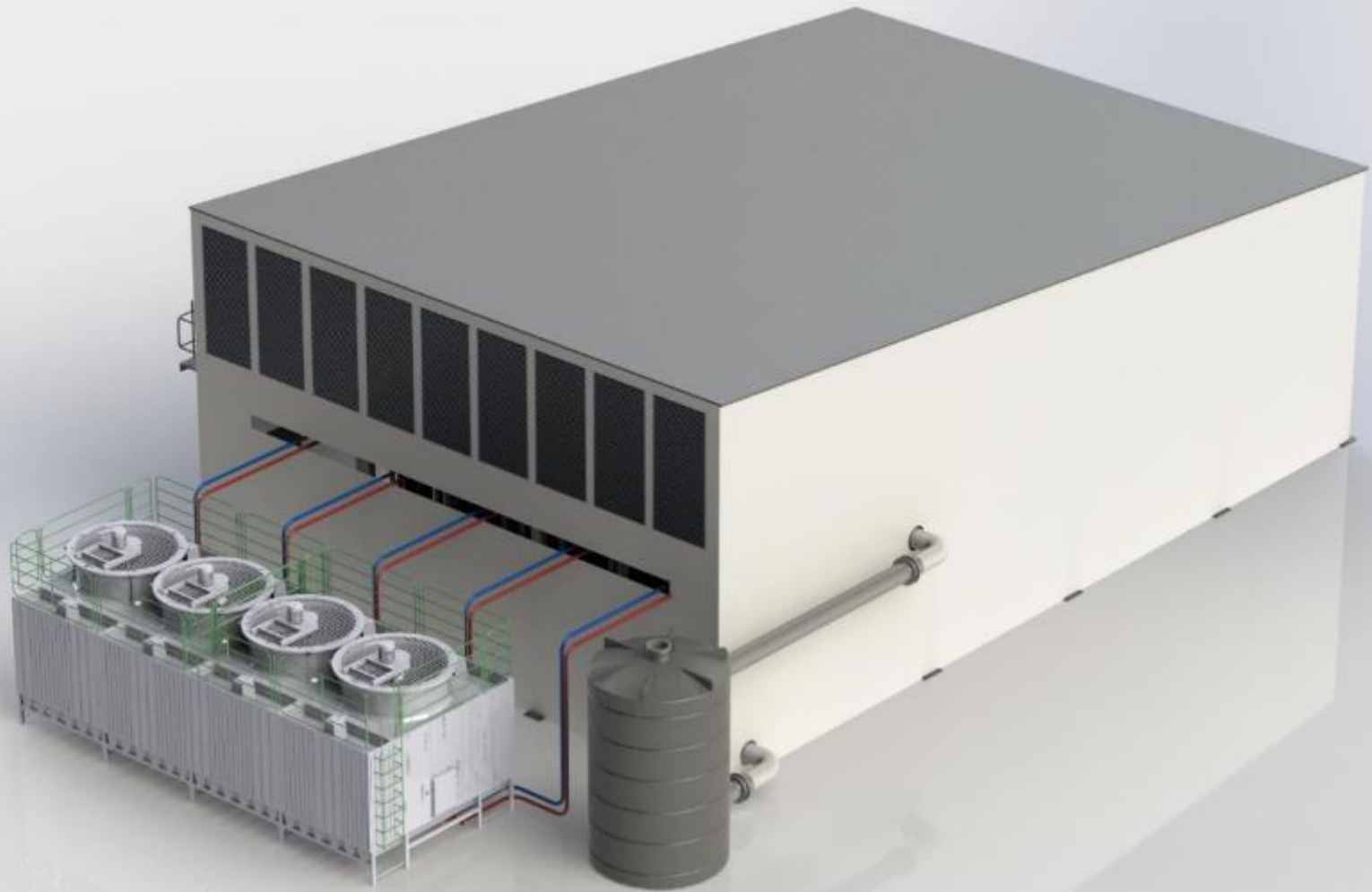


Stock image

LARGE APPLICATIONS
HYDROGEN ENERGY SYSTEMS



10MW TURN KEY SOLUTION HYDROGEN ENERGY SYSTEMS

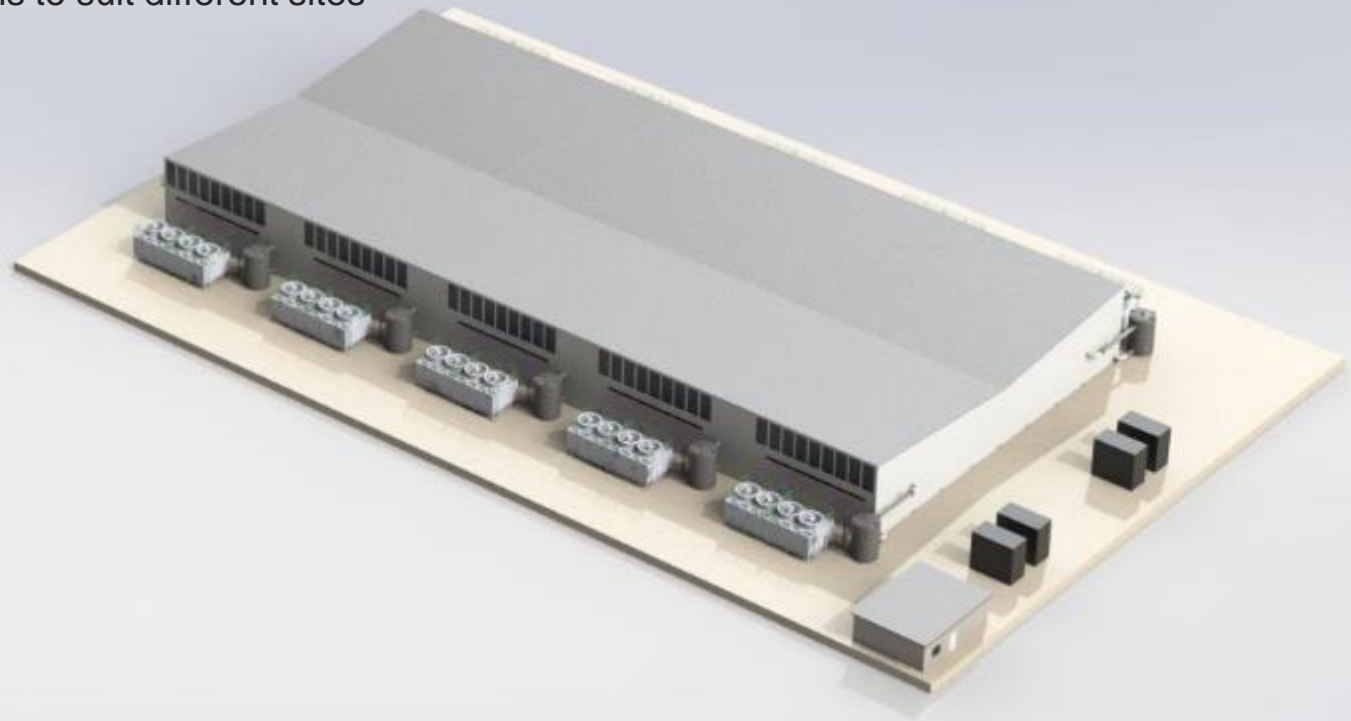


10MW TURN KEY SOLUTION HYDROGEN ENERGY SYSTEMS

100MW SYSTEM

Scale up through replication

- Replication maintains standardisation
- Multiple layout options to suit different sites
- 40 x 87m building

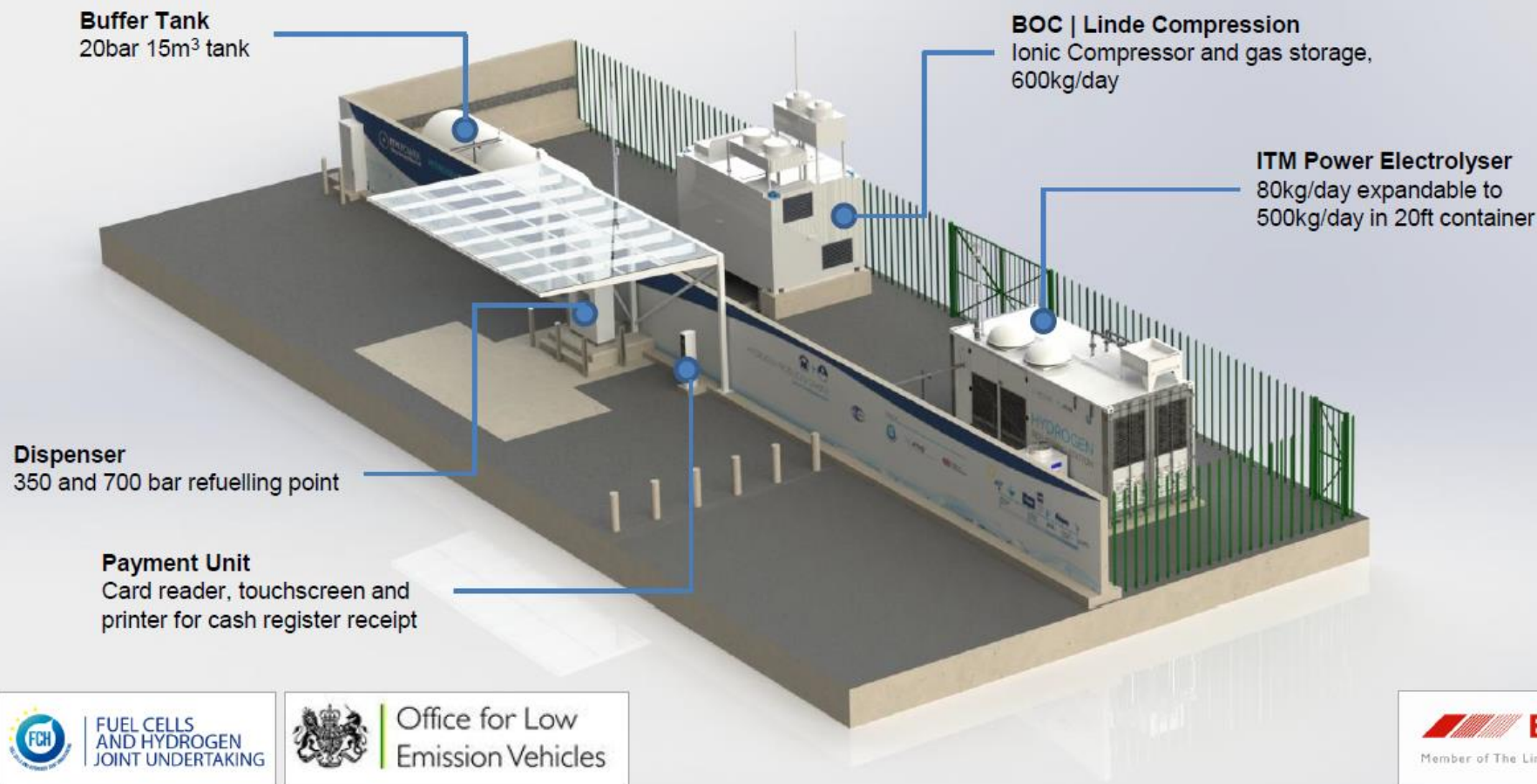


100MW ELECTROLYSER PLANT DESIGN
HYDROGEN ENERGY SYSTEMS

H₂ REFUELLING EXPERIENCE



WHAT IS AN FCEV REFUELLING STATION?



FCEV REFUELLING STATION
VEHICLES | ROLL OUT

ITM POWER | FUEL CONTRACTS

UK stations | £10/kg | dispensing 1tonne/day by the end of 2018



ITM POWER | FUEL CONTRACTS

ENERGY STORAGE | CLEAN FUEL



ITM POWER HRS SITES

Four FCH JU projects that define UK hydrogen fuel

- Build | Own | Operate model
- 4 operational HRS and 2 in production
- Siting collaboration with Shell
- Dispenser collaboration with BOC Linde

HyFive

3 HRS

H2ME

2 HRS

H2ME2

3 HRS

BIG HIT

1 HRS



ITM POWER HRS SITES
ENERGY STORAGE | CLEAN FUEL



HYFIVE | LONDON

FCH JU Project number: 621219

- NPL Teddington London Opened May 2016
- CEME Rainham London Opened Oct 2016
- Cobham M25 Shell forecourt Opened Feb 2017



Company images

HYFIVE | LONDON

ENERGY STORAGE | CLEAN FUEL



HYFIVE | LONDON

FCH JU Project number: 621219

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- Cobham M25 Shell forecourt Opened Feb 2017



Company images

HYFIVE | LONDON

ENERGY STORAGE | CLEAN FUEL



H2ME | UK

FCH JU Project number: 671438

- Beaconsfield M40 Shell Forecourt Opening Q2 2017
- Gatwick M23 Shell Forecourt Opening Q3 2017
- Forecourt integration with dispenser under the main canopy



Beaconsfield M40



H2ME | UK

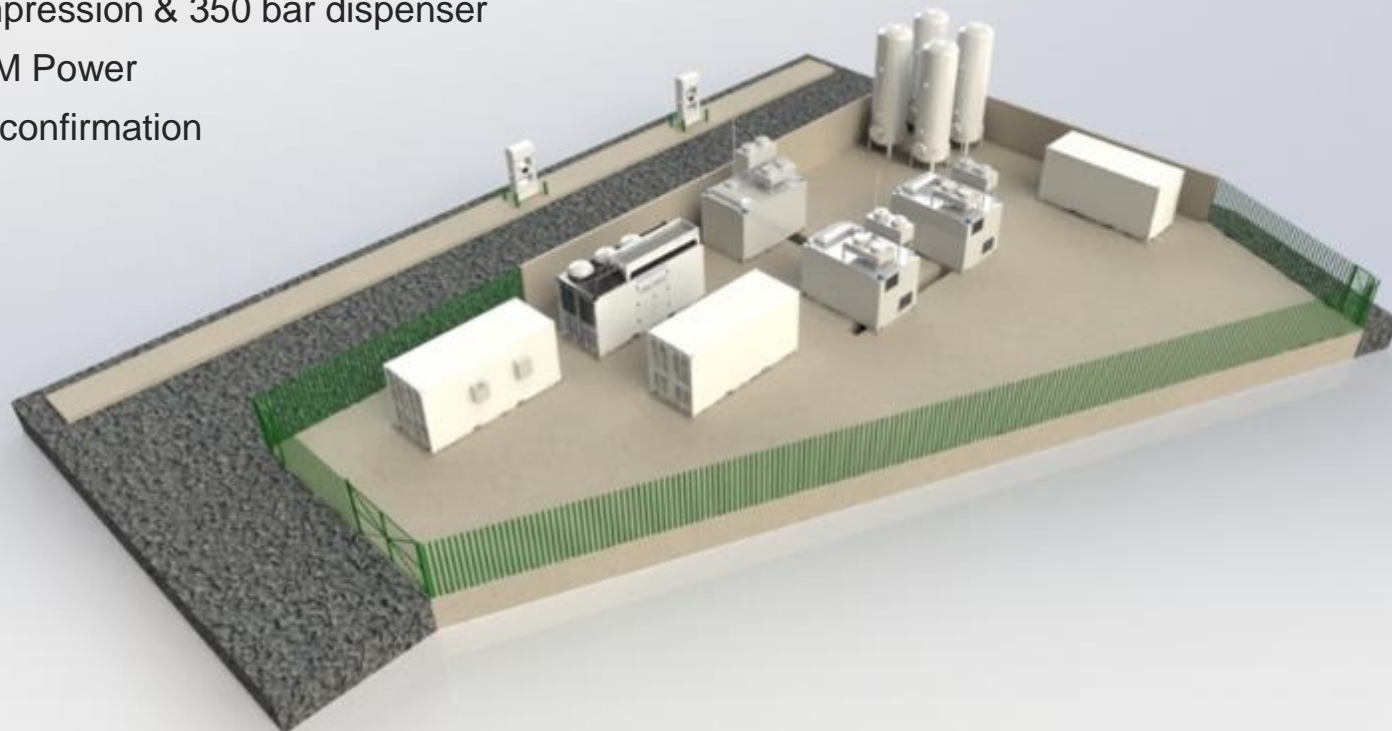
ENERGY STORAGE | CLEAN FUEL



BIRMINGHAM SUBJECT TO FINAL CONFIRMATION

Tysley Energy Park | 3MW | 1,500kg/day

- 3MW Grid Balancing Electrolyser
- Linde ionic compression & 350 bar dispenser
- Grant led by ITM Power
- Subject to final confirmation



BIRMINGHAM
BUS REFUELLING STATIONS

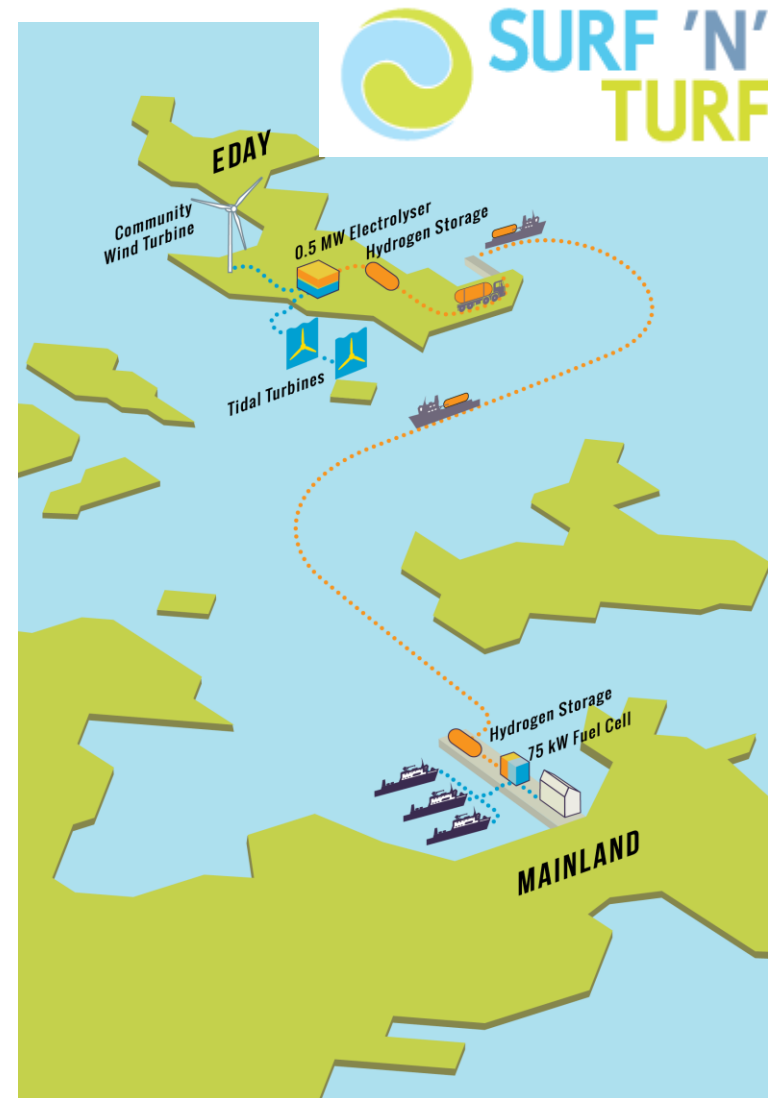
HYDROGEN SHIPPING



SURF N TURF:

Project funded by Natural Scotland through Local Energy Scotland:

- Utilise EMEC's hydrogen
- Bring benefits to Orkney



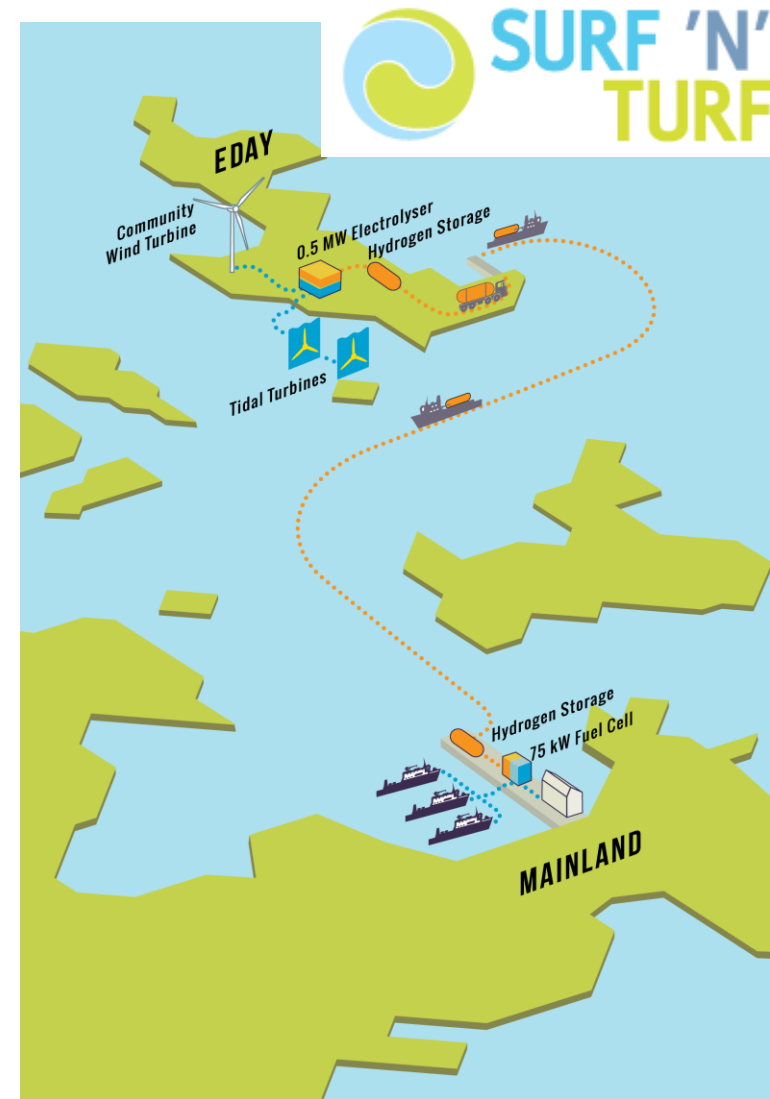
SURF N TURF

ORKNEY HYDROGEN PROJECTS



SURF N TURF:

- In UK crews can not work on H₂ vessels without familiarisation training. No vessels on which to train.
- 75kW FC designed to DNV standards
- Set up training course for H₂ ships' crews



SURF N TURF

ENERGY STORAGE | CLEAN FUEL

DUAL Ports

Decarbonising port business today

What is DUAL Ports?

DUAL Ports is a €5.2m project, 50% co-funded by the European Union and the European Regional Development Fund through the Interreg North Sea Region Programme 2014 – 2020, Eco-innovation priority. The project runs from 10th of November 2015 till 30th of June 2019.

The objective of DUAL Ports is

reducing the environmental footprint of regional entrepreneurial ports,
improving the sustainability of port operational and administration resources,
promoting responsible growth and supporting eco-innovation oriented development.



DUAL Ports

Decarbonising port business today

Partners

The Port of Oostende leads a consortium of 10 Flemish, Scottish, Danish, German and Dutch harbour authorities and organisations:

The ports of Oostende (Lead Partner), Zwolle (with Kampen and Meppel), Vordingborg, Emden and Skagen (future).

The private/public organisations; Fair Winds Trust, ITM Power, Orkney Islands Council, HWWI GmbH and Vordingborg Erhverv.

The participating ports and local authorities are expected to implement initiatives that will reduce carbon emission. This implementation will be tangible through eight different pilots projects.



DUAL Ports

Decarbonising port business today

Pilots

- Building a business case for alternative, non-conventional energy sources systems: e.g. liquefied natural gas and hydrogen,
- Developing low carbon logistic products, bridging old and new technologies: a Sailcargo trading network through port facilities' eco-adaptation,
- Testing environmentally friendly equipment in ports: an intelligent LED lighting network,
- Piloting new ways of sustainably managing the port environment: soil treatment; sustainable space use and port management through co-siting/dockland;
- Sharing technology/processes/plans for resource efficient management: Green officer + sustainability management system;
- Sharing resources for low carbon management & processes in ports: low carbon planning & management.



DUAL Ports

Decarbonising port business today

ITM Power's Task

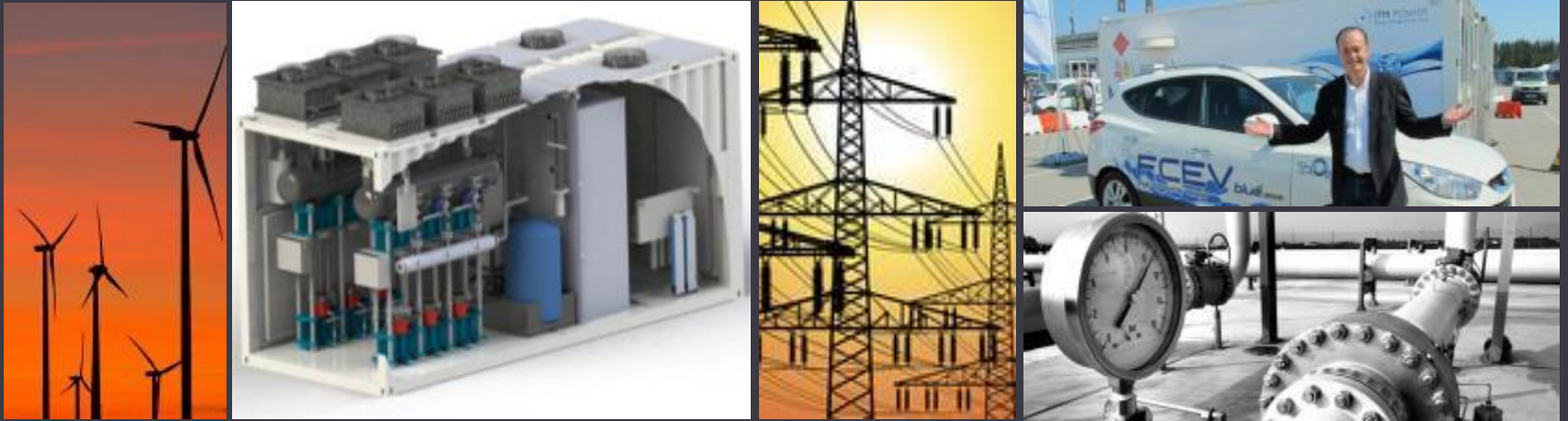
- Design of a hydrogen bunkering system for ferry's and large vessels
- Design general system, but apply to Orkney
- Consider boat requirements (pressure, mass H₂)
- Model different bunkering methods (cascade, direct fill)
- Link with IMO, MCA and certifying authorities



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