

A GLOBAL CENTRE OF EXCELLENCE IN  
MARINE ENERGY TESTING AND RESEARCH

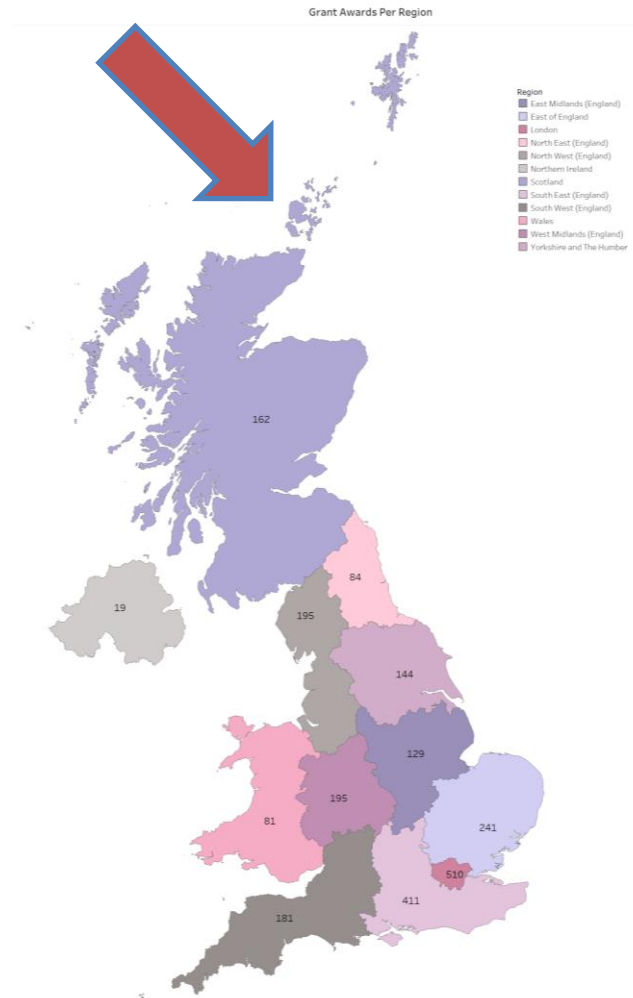
**EMEC**   
THE EUROPEAN MARINE ENERGY CENTRE LTD



# Orkney's progress

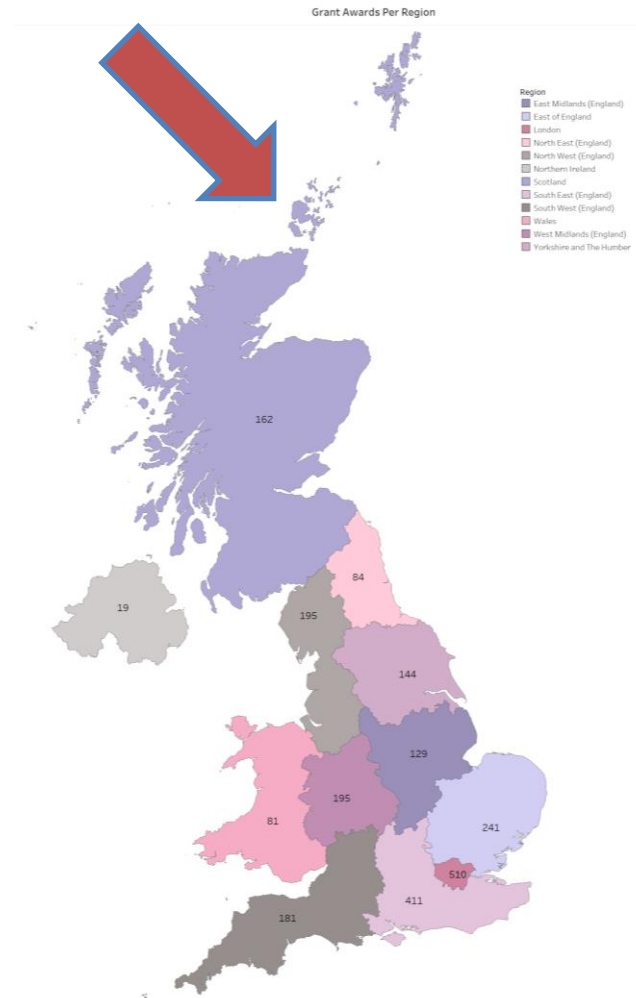
Neil Kermode  
Managing Director

# Orkney





# Orkney



# A story in four parts



- Technical progress in harvesting wave and tidal energy
- How EMEC came to hydrogen
- What is actually happening – NOW
- Are we doing the right thing?

# World leading test facilities



- £36m public funding
- Not-for-profit organisation
- Independent test laboratory

## VISION

A globally successful marine energy industry as part of a clean energy system

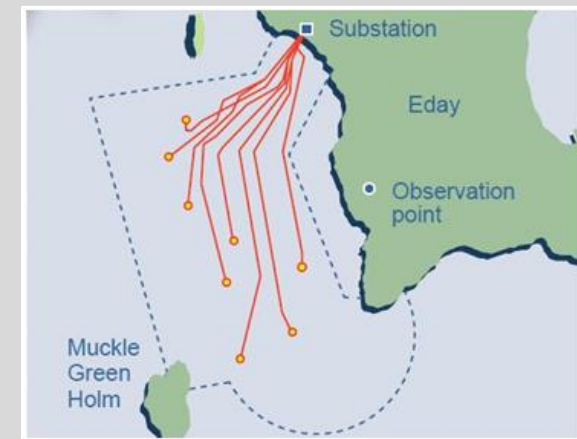
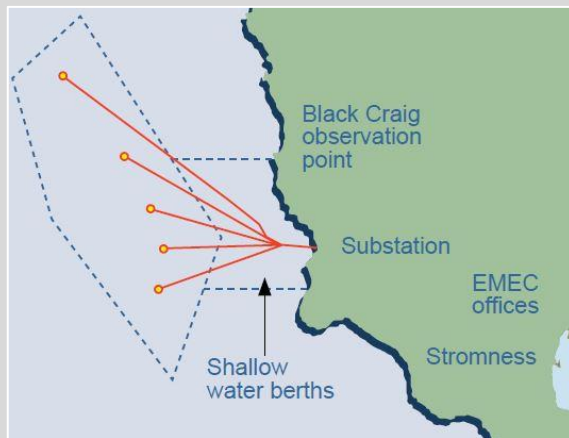
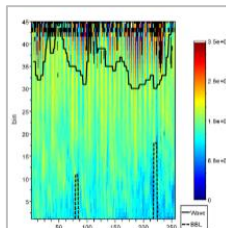
## MISSION

To **reduce the time, cost, and risk** associated with the development of marine energy technologies, maximising the use of our bespoke facilities, industry knowledge, and unprecedented experience





# World leading test facilities



A GLOBAL CENTRE OF EXCELLENCE IN  
MARINE ENERGY TESTING AND RESEARCH

**EMEC**   
THE EUROPEAN MARINE ENERGY CENTRE LTD



**31** • **20** • **11**  
**devices**      **developers**      **countries**





# Economic benefits



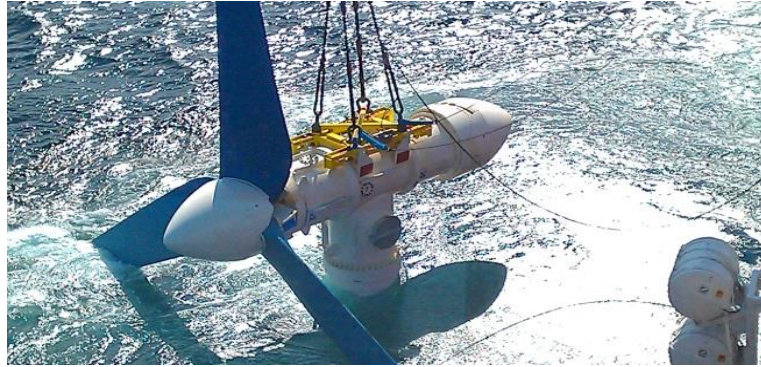


# Real-sea learning & innovation

## Installability +



## Survivability +



## Reliability +



## Maintainability +



## Operability



**= Cost effectiveness**

Wello





Corpower

**EMEC**   
THE EUROPEAN MARINE ENERGY CENTRE LTD



# Openhydro

**EMEC**   
THE EUROPEAN MARINE ENERGY CENTRE LTD



Neil Kermode



EMEC 2019



[www.emec.org.uk](http://www.emec.org.uk)



Corpower

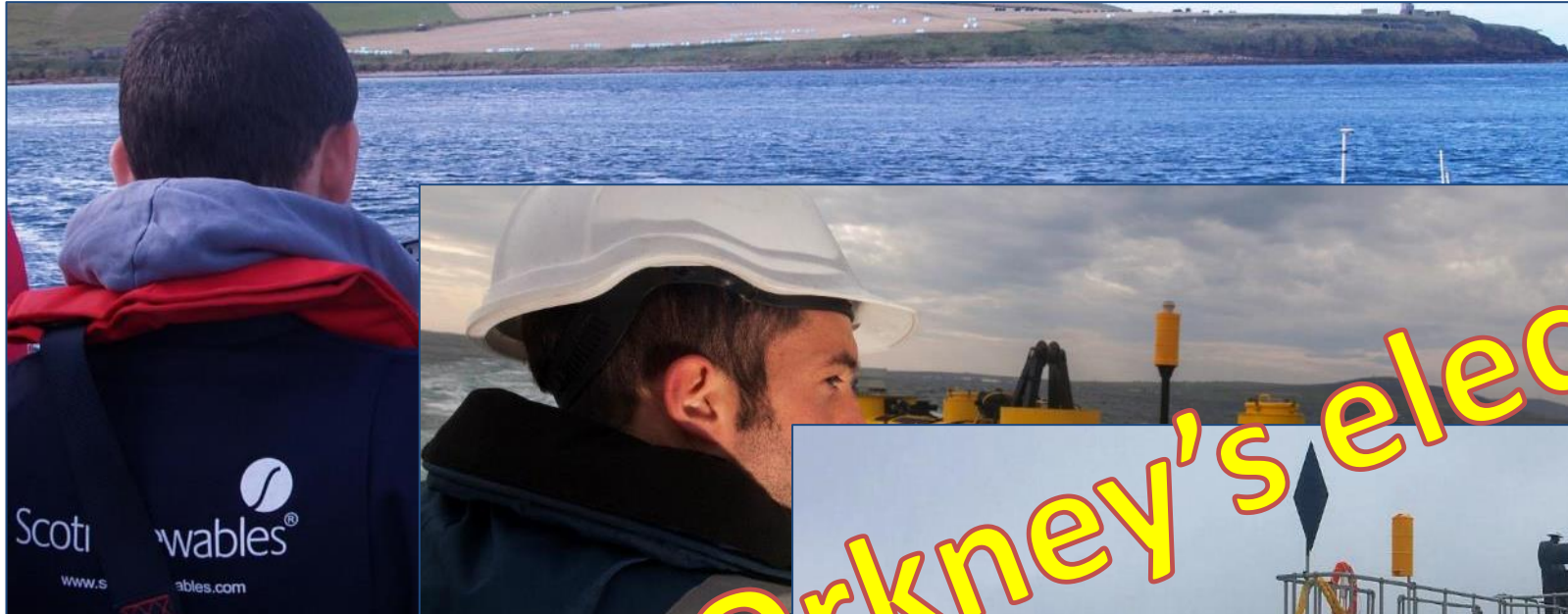
**EMEC**  
THE EUROPEAN MARINE ENERGY CENTRE LTD





# Orbital Marine Power

**EMEC**   
THE EUROPEAN MARINE ENERGY CENTRE LTD



7% of Orkney's electricity





# Microsoft/Naval Group

**EMEC**   
THE EUROPEAN MARINE ENERGY CENTRE LTD



# Real Jobs



**All at risk due to grid**

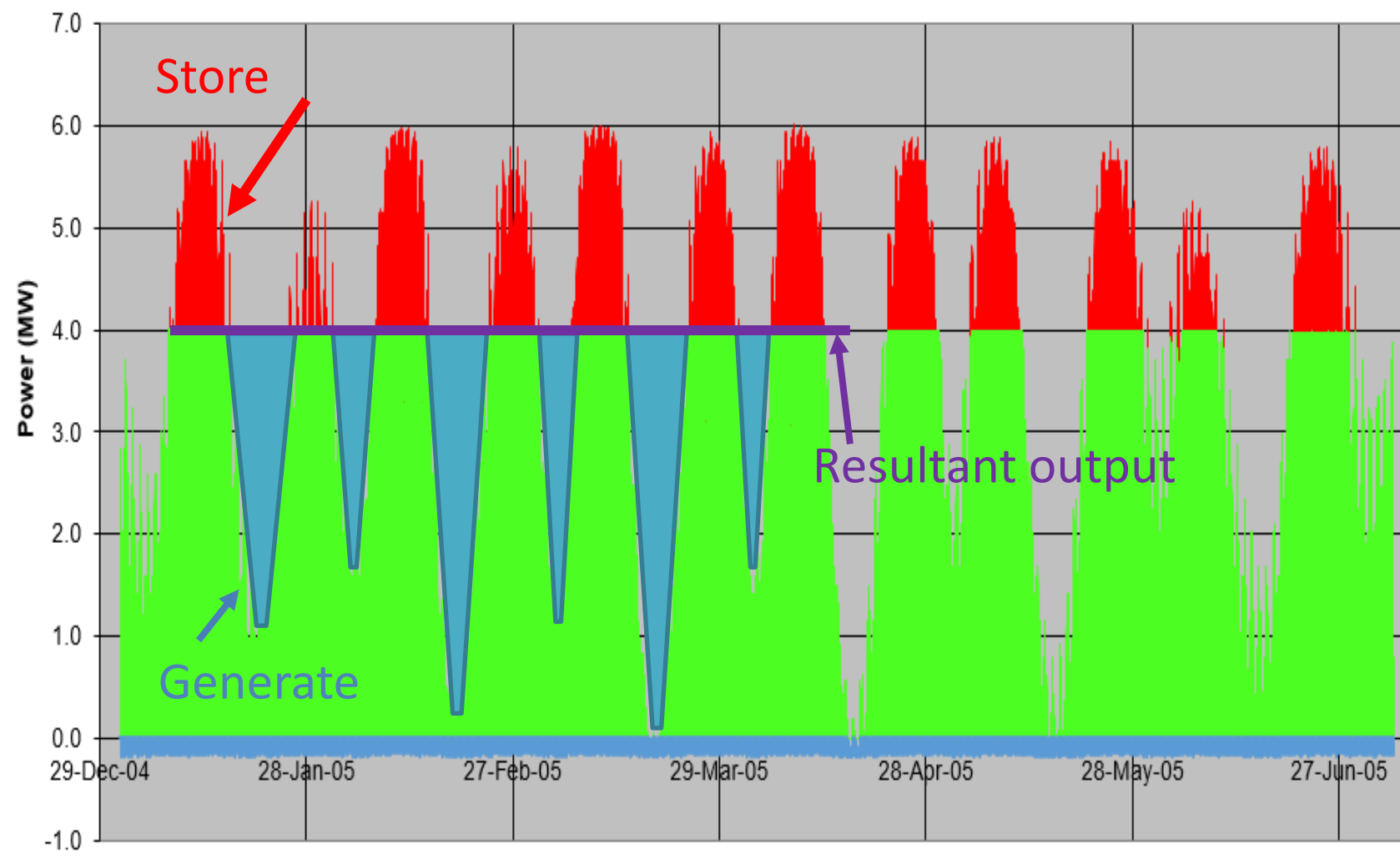


## Marine energy's 'Catch 22'

*'You need grid to prove your equipment  
but*

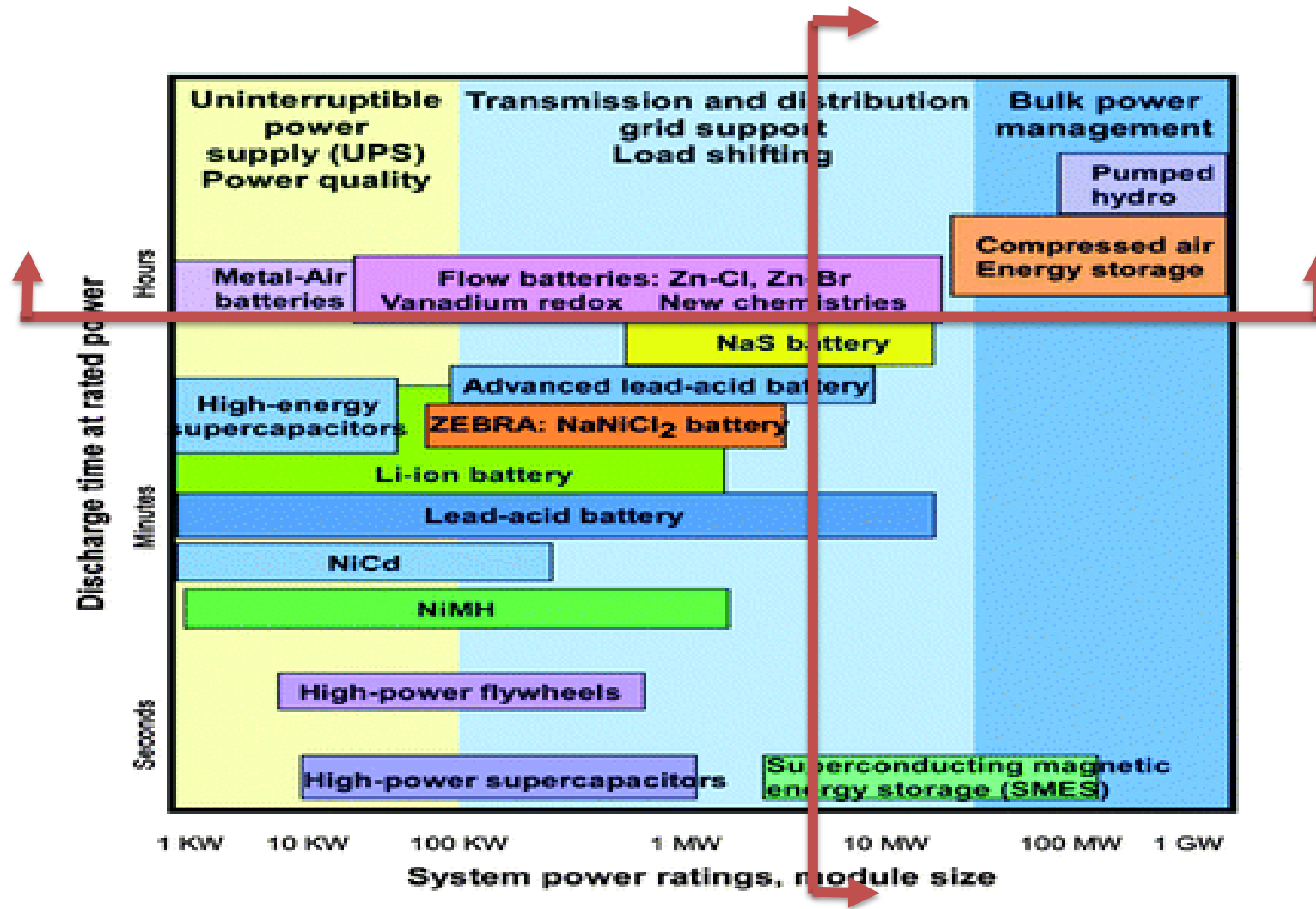
*You can't have any grid until you prove your equipment'*

# Is intermittency an opportunity?

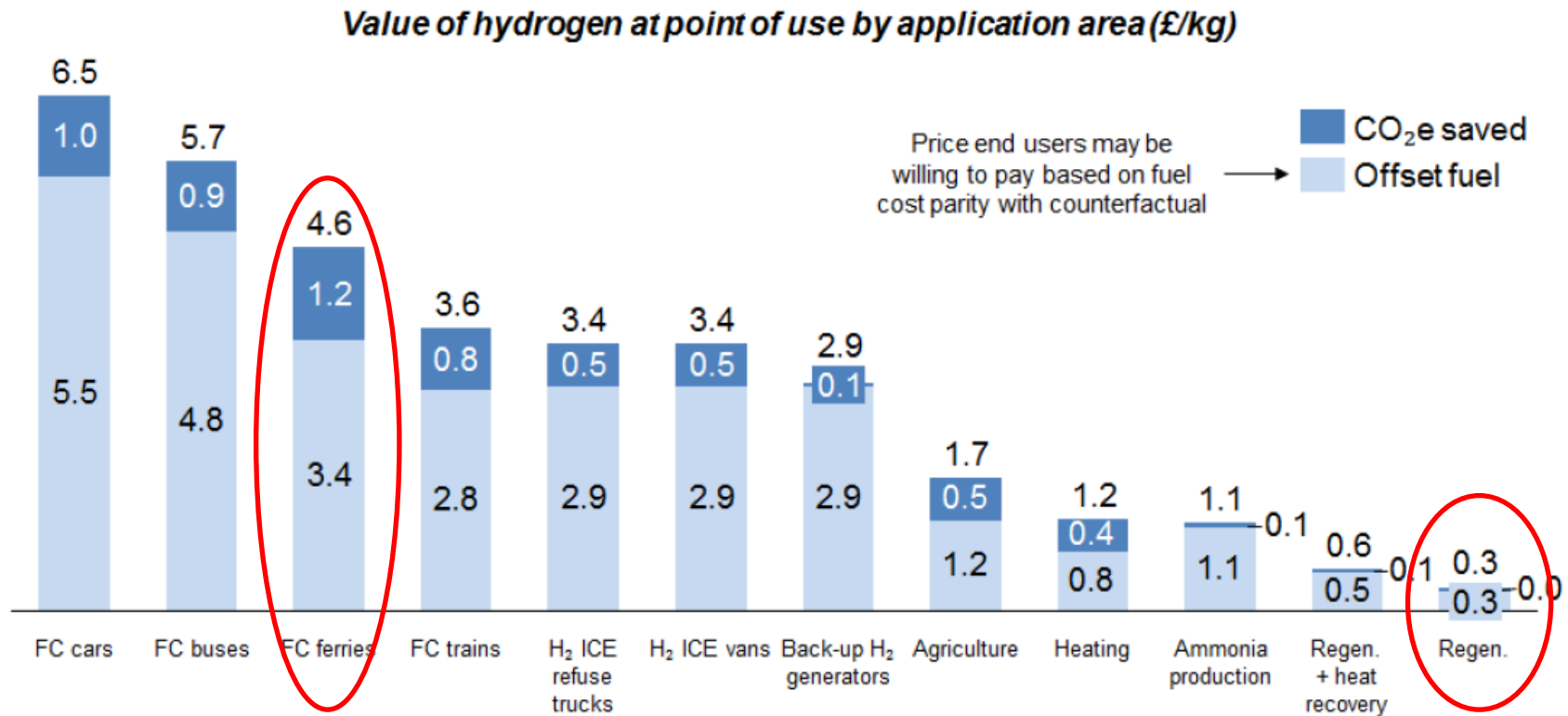




# Can we store?

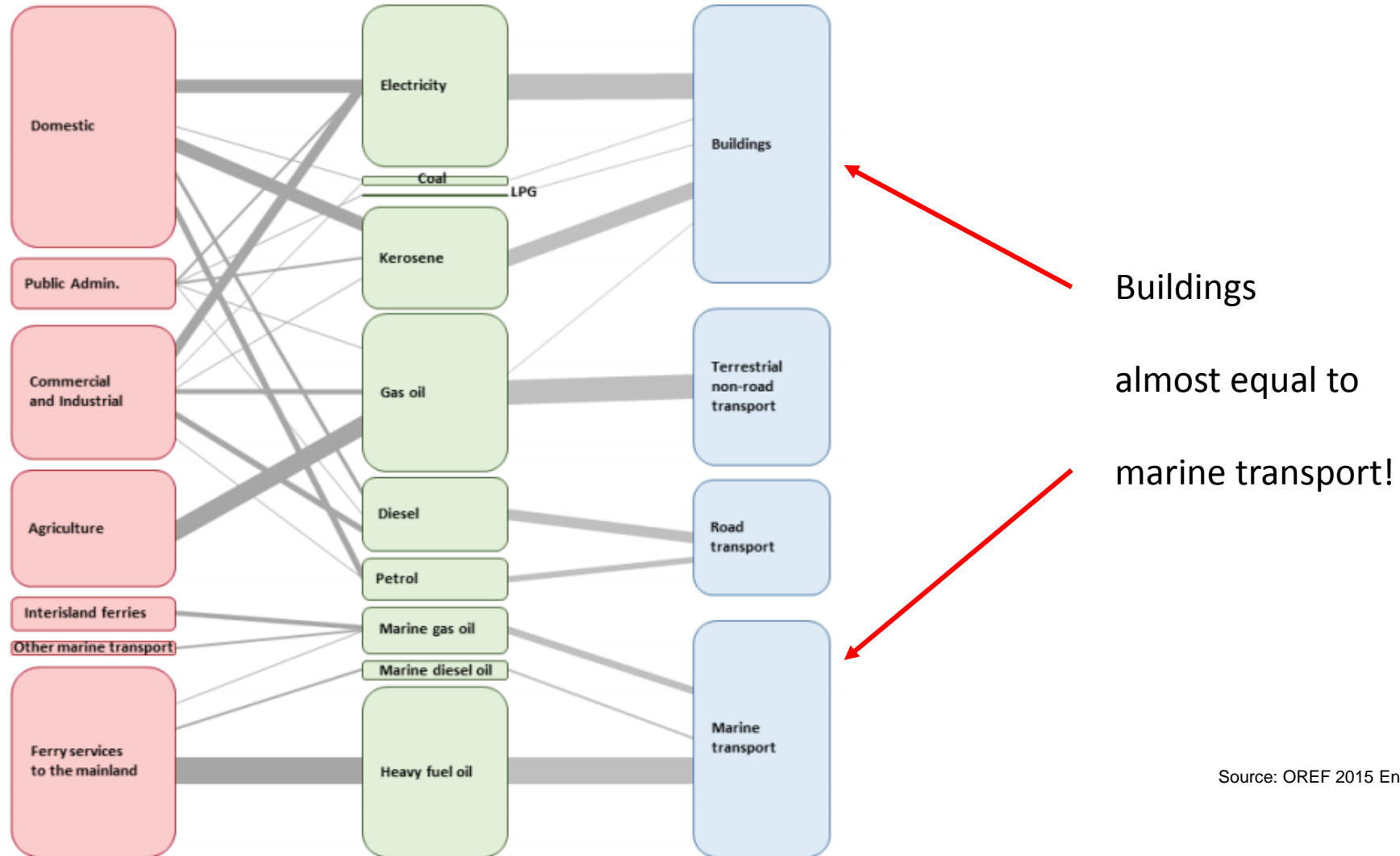


# Hydrogen as storage?





# Our energy use

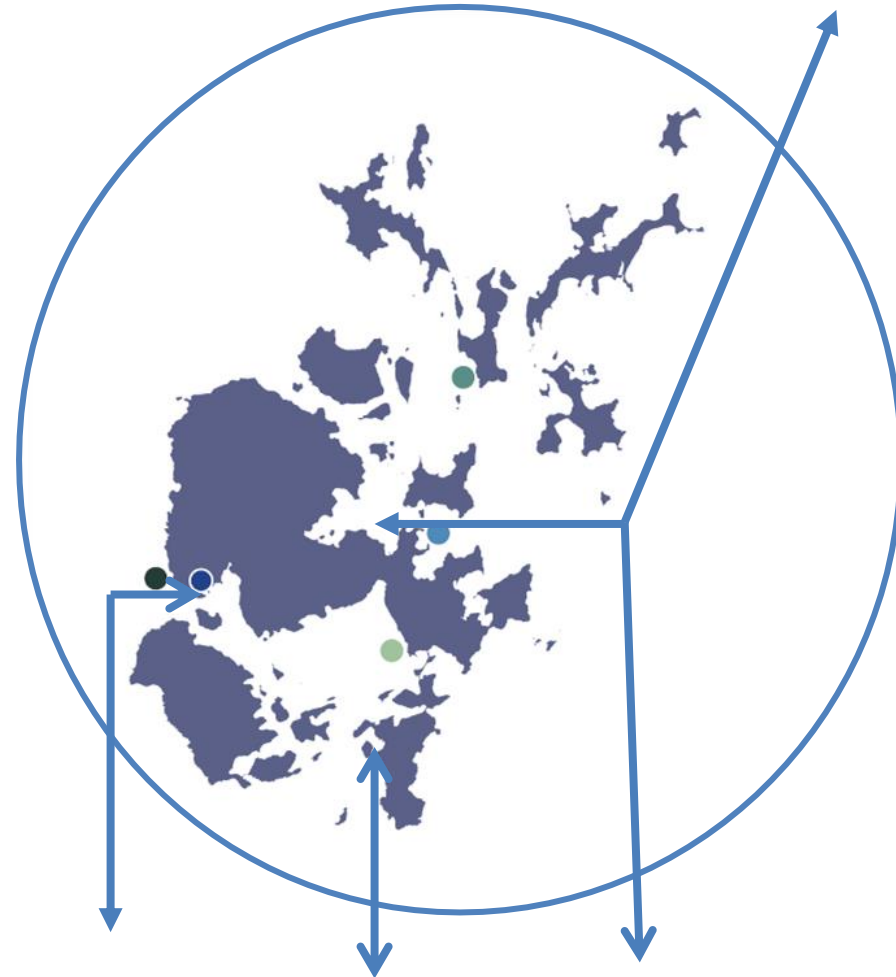


Source: OREF 2015 Energy Audit by Aquatera

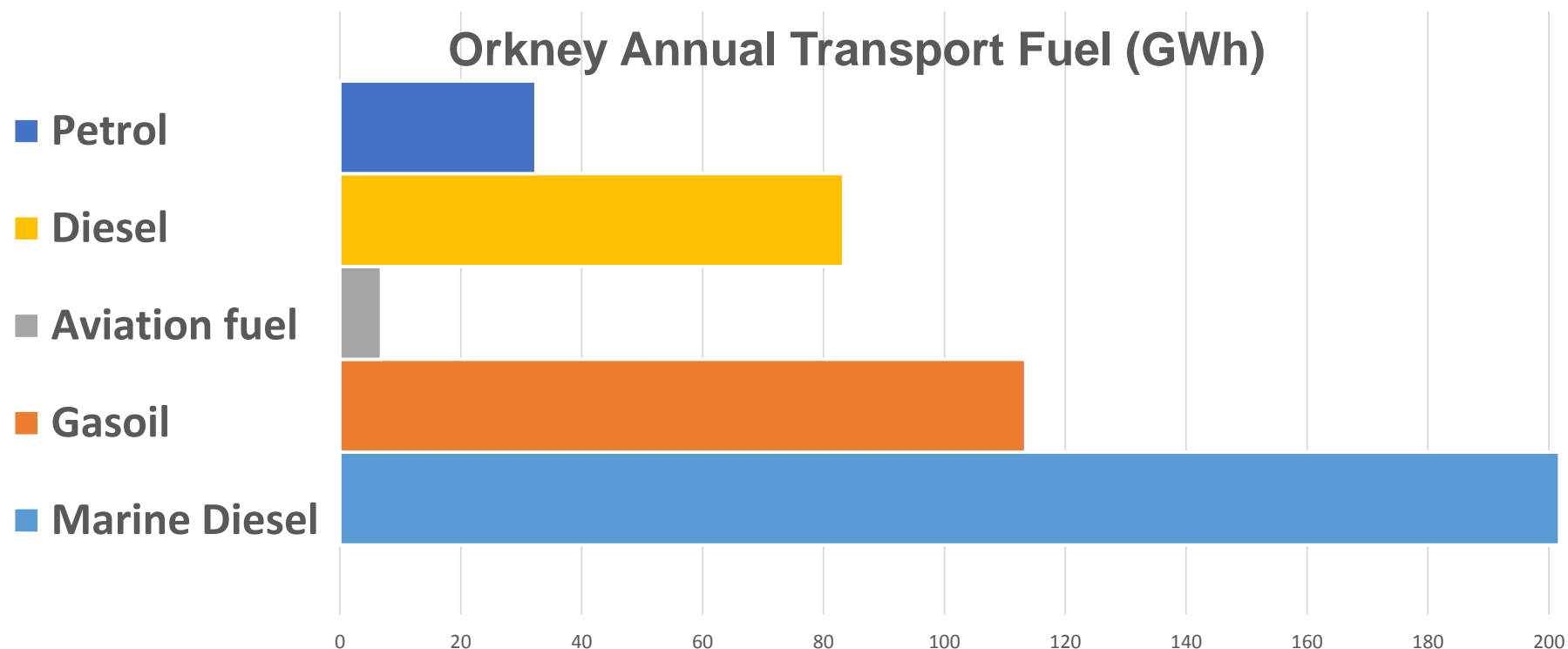
Note: Excludes peat and air travel

# Ferry routes

- 9 Internal routes
- 2 Pentland Firth
- 2 Aberdeen to Orkney
- 1 Orkney to Shetland







**Marine diesel ~57,500 Tonnes CO<sub>2</sub>e**

# Diesel replacement?

**16MWh of diesel  
a day**

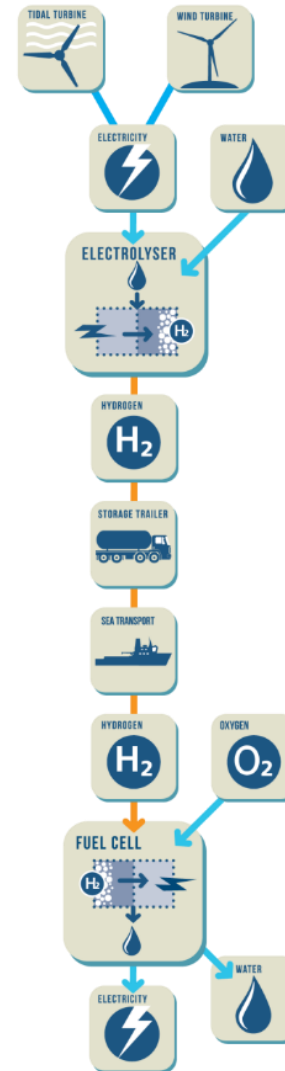
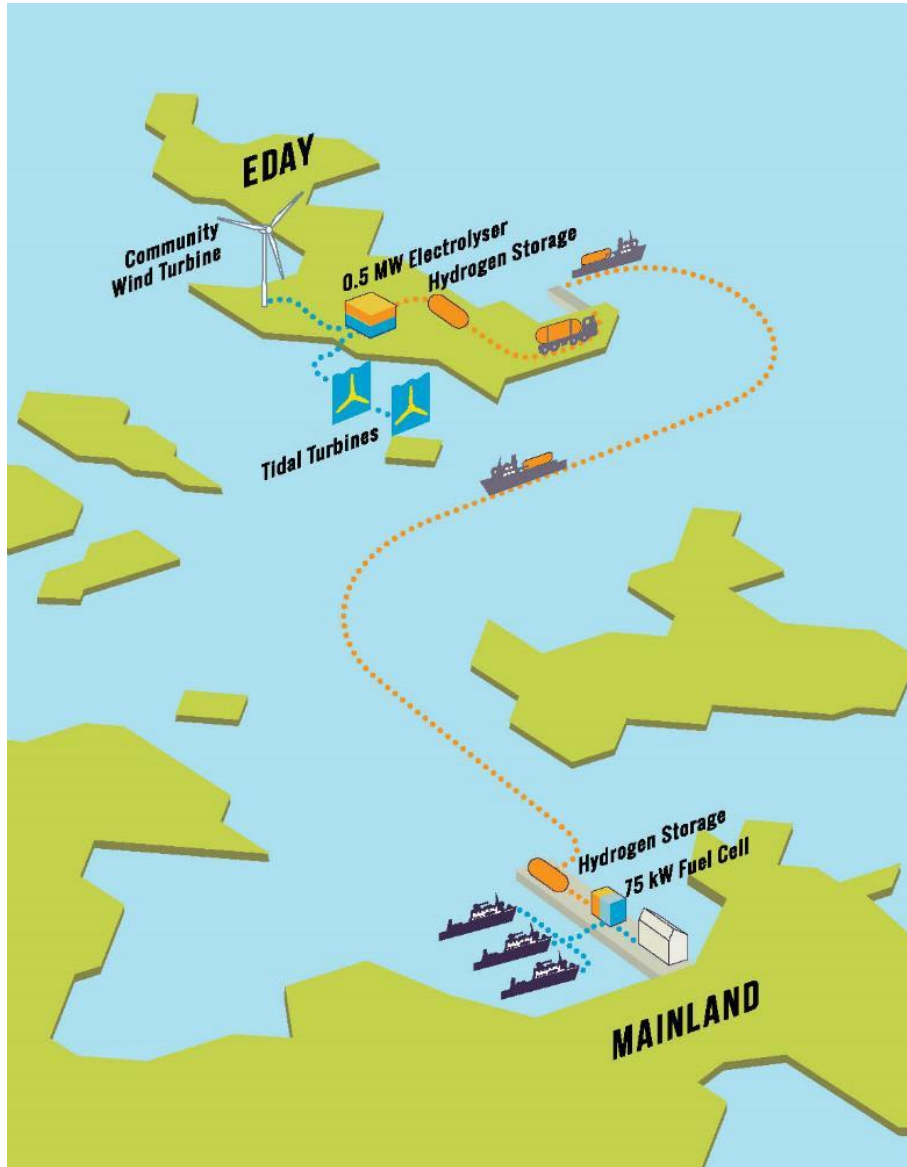




## Hydrogen's 'Catch 22'

*'You can't put hydrogen on a ship  
because no one wants to put hydrogen on a ship'*

# First hydrogen project





# Progress



Tidal energy



Electrolyser



Gas cylinders & mobile storage



Wind energy



Training



Gas shipment to Kirkwall

# Bringing it all together

Gas storage

Fuel cell

Hydrogen transport

- Heat for pier buildings
- Electricity for ferry in port





# Orkney Ferries (9)



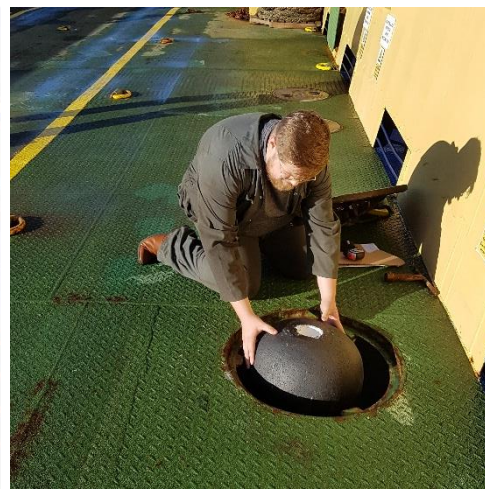


# HyDime project -MV Shapinsay

**EMEC**  
THE EUROPEAN MARINE ENERGY CENTRE LTD



Neil Kermode



EMEC 2019



© [www.emec.org.uk](http://www.emec.org.uk)



# Obstacles

- Maritime Legislation
- Hydrogen Logistics
- Generation
- Subsidy support
- Upfront Cost



# Hy-FLYER project

**EMEC**   
THE EUROPEAN MARINE ENERGY CENTRE LTD





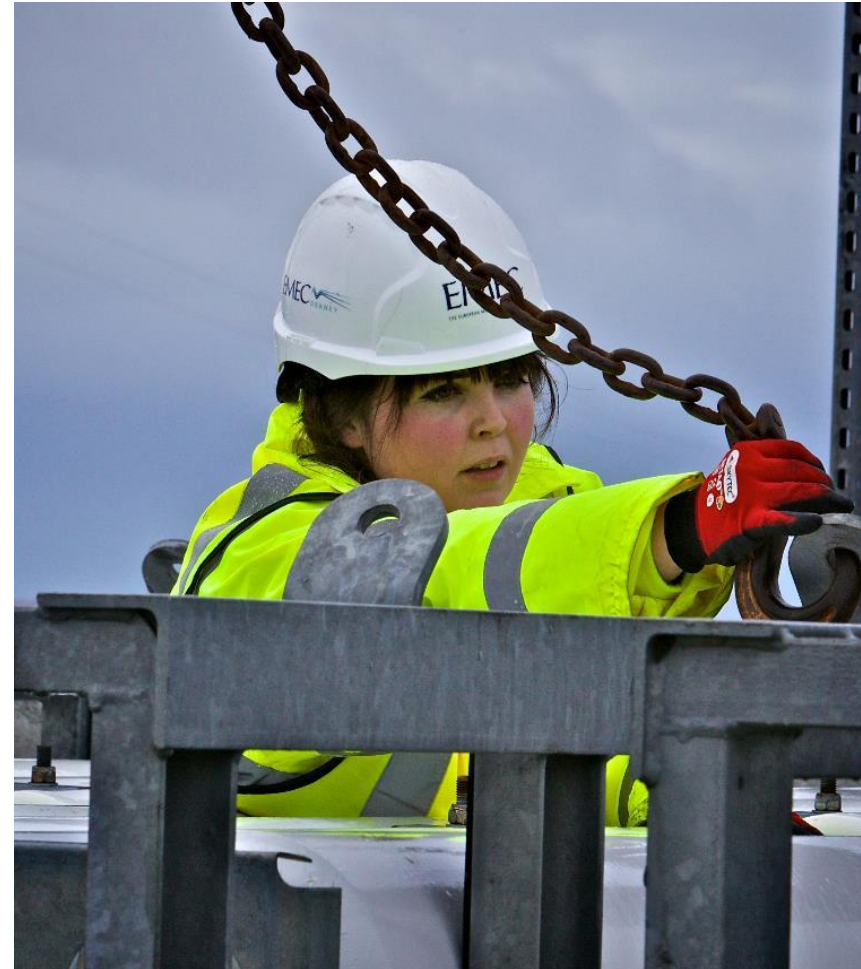
# Hydrogen projects

## Current projects

- Maritime, Aviation & Road transport
- Fuel Cells for Power
- Hydrogen Heating
- Distilleries

## Skills development

- Logistics
- Safe Operations
- Hydrogen Handling
- Training Courses



# Efficiency?



## MV Alfred

100 cars

16 kts

3MW

£15M

755l/hr

$\frac{1}{4}$  the capital cost  
 $\frac{1}{2}$  the energy consumption

‘Do we need better boats?’



## Glen Sannox

120 cars

16 kts

6MW

£50M

1500l/hr (ish)

*‘Nobody made a greater  
mistake  
than he who did nothing  
because he could do only  
a little.’*

Edmund Burke 1729-97

