Hydrogen for maritime – Is it the future?

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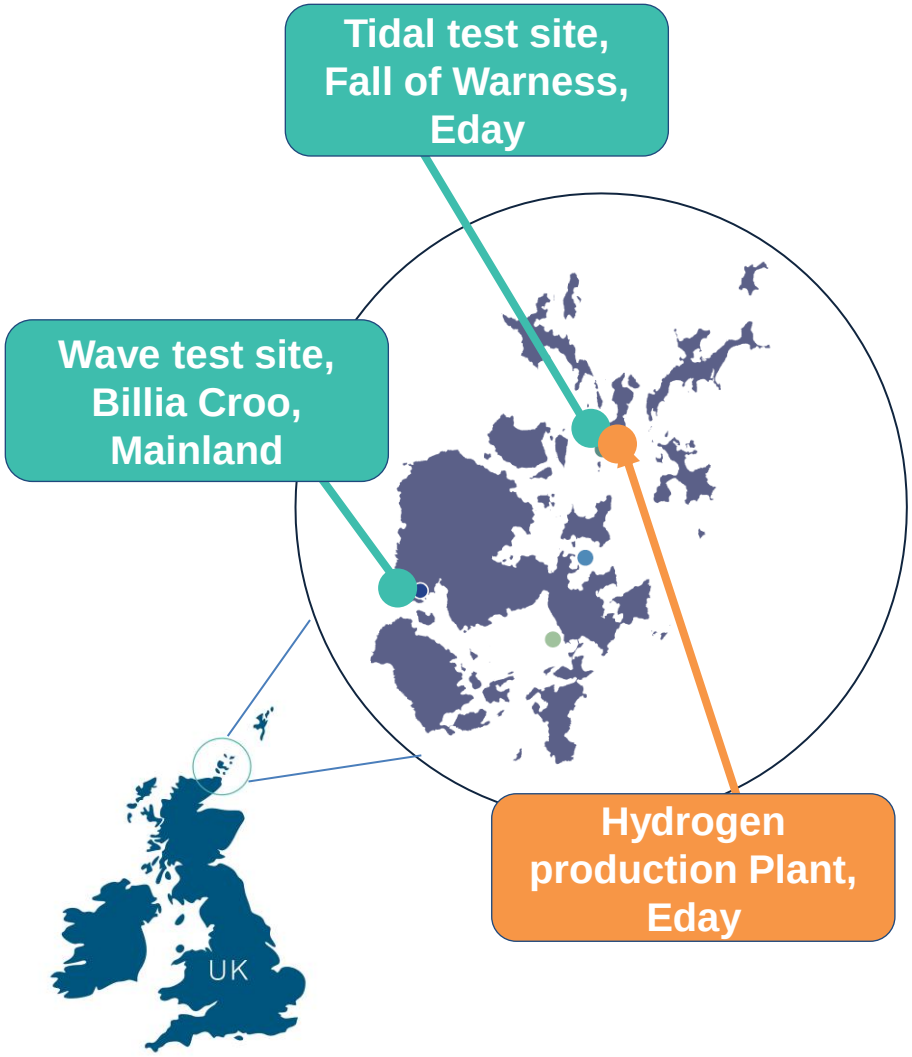
Introducing EMEC

EMEC HYDROGEN

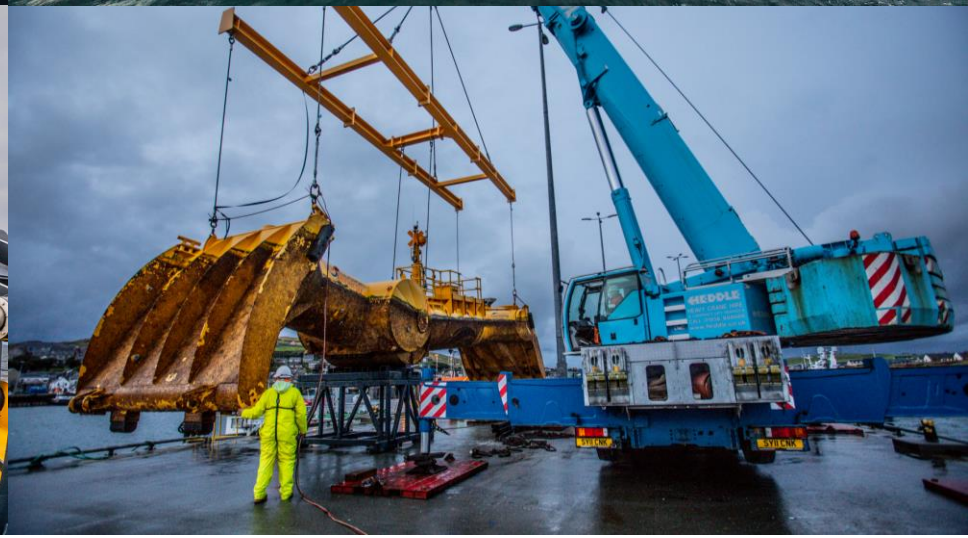


Billia Croo

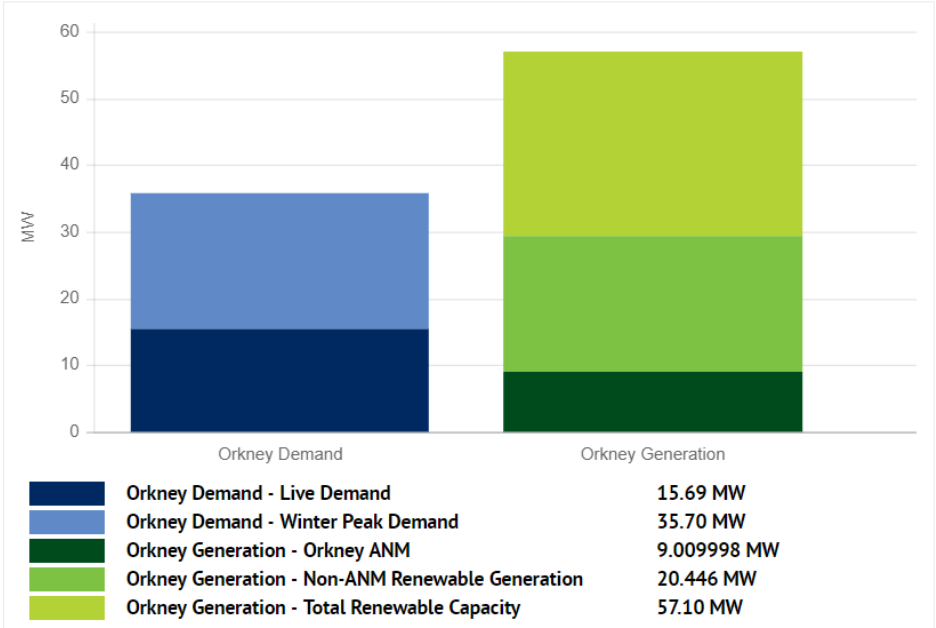
Eday

Wave and Tidal

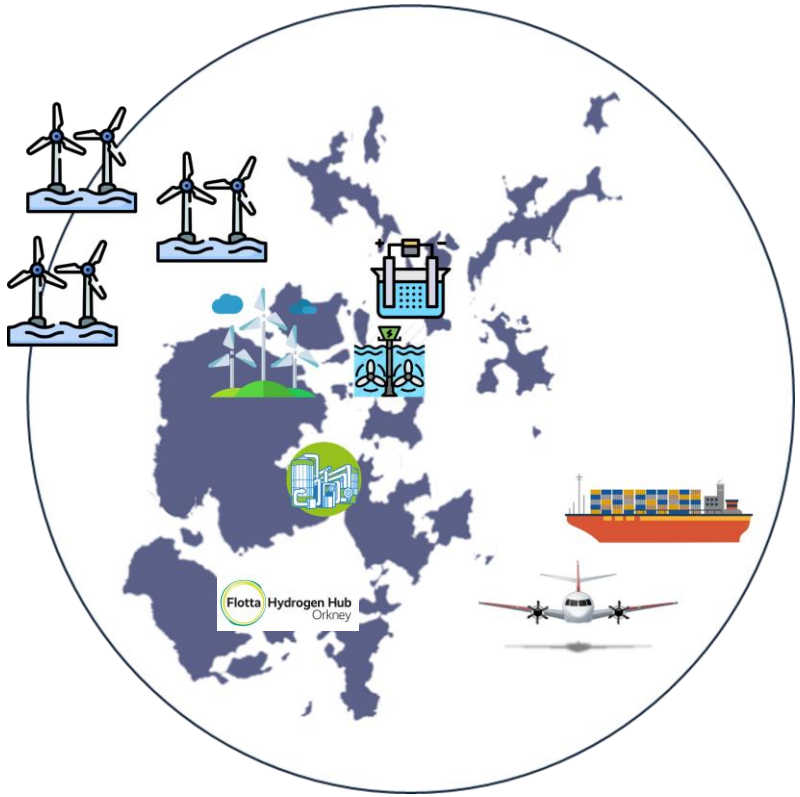
EMEC HYDROGEN



Why hydrogen?



- Heavy duty **transport** (ferries, aviation) and renewable **power** integration are particularly relevant applications in islanded contexts



- Hydrogen first gained traction as a means of storing renewable **power** which would otherwise be **curtailed**
- Once produced, hydrogen can be used to tackle **decarbonising energy intensive applications**

Hydrogen R&D Programme

EMEC HYDROGEN

1. Producing hydrogen via electrolysis

We power our electrolysers using **tidal and wind** generation co-located at our test sites

2. Storing and handling hydrogen

We have demonstrated inter-island transport of hydrogen, and developed **state-of-the-art mobile refuelling** equipment

3. Developing hydrogen use cases to support decarbonisation activities

Our projects have tested new ways of using hydrogen, including in **transport**, in **vans, ferries and aeroplanes**, in industrial **heat**, investigating feasibility for use in **distilling**, and in providing auxiliary **power** to **ferries** while quayside

1. Hydrogen production

- On our Eday site we operate with both tidal and wind power inputs, and will shortly integrate a flow battery system, alongside two electrolysers
- We are showing the way forward in *actually* operating an **integrated**, and **decentralised** energy system, and in the role for hydrogen production in this

2. Hydrogen transport

- **Inter-island** transport of hydrogen
- Safety training course for Crew
  - Orkney College UHI's Maritime Studies, supported by Orkney Ferries and EMEC





3. Hydrogen use - Orkney maritime opportunity

- Inter-island fleet - 9 vessels = 2,800,000 litres of Gas Oil per year







UK Clean Maritime Plan

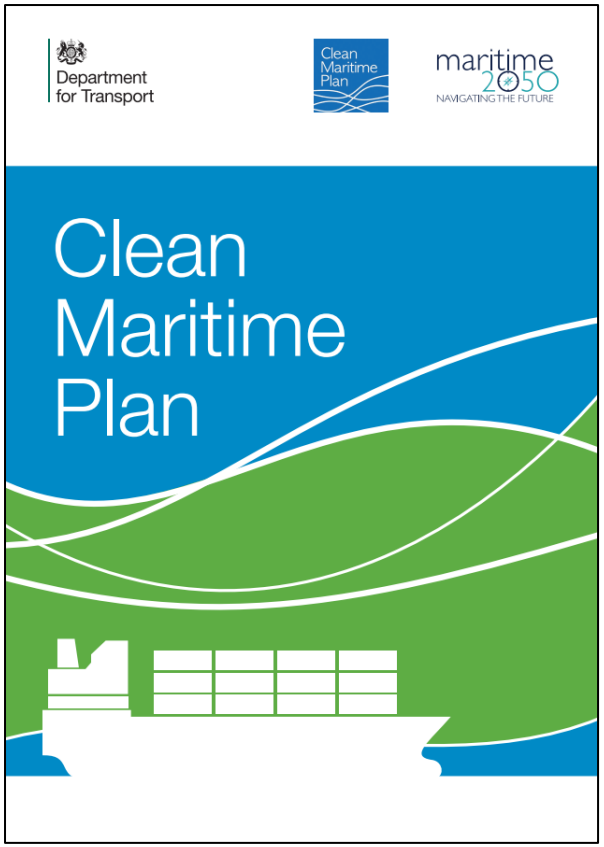
76. In order to reach this vision

By 2025 we expect that:

i. All vessels operating in UK waters are maximising the use of energy efficiency options. All new vessels being ordered for use in UK waters are being designed with zero emission propulsion capability.

ii. Zero emission commercial vessels are in operation in UK waters.

iii. The UK is building clean maritime clusters focused on innovation and infrastructure associated with zero emission propulsion technologies, including bunkering of low or zero emission fuel.

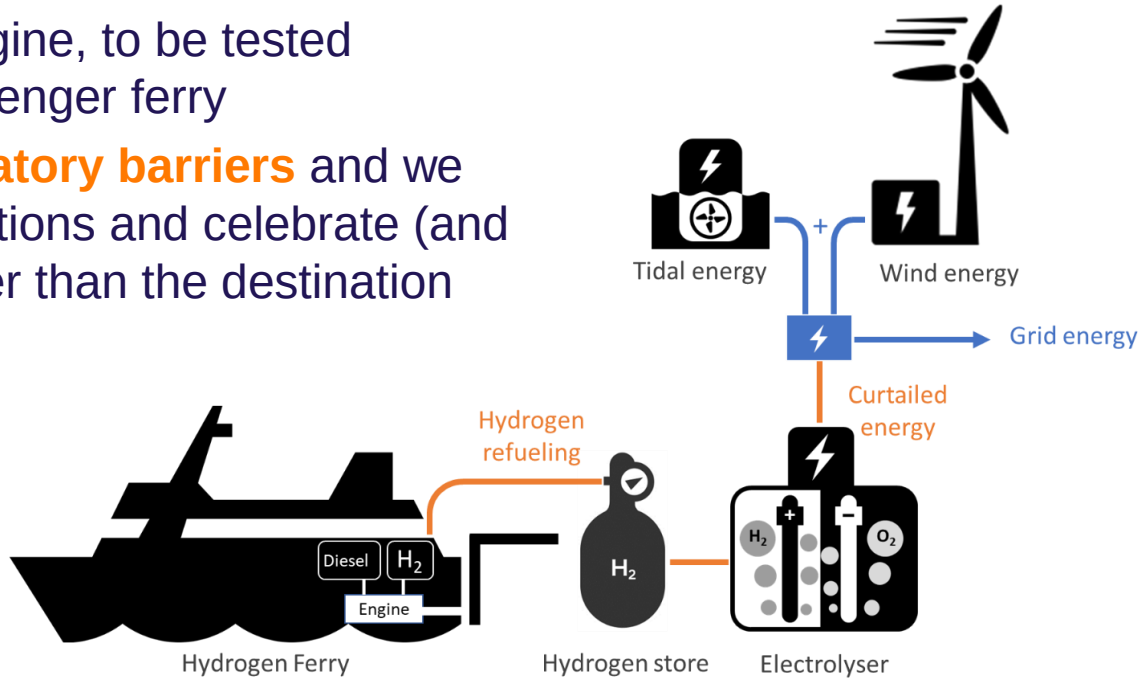


Clean Maritime Plan (publishing.service.gov.uk) [1]

Hydrogen use (HyDIME)

HyDIME: 'Hydrogen Diesel Injection in the Marine Environment'

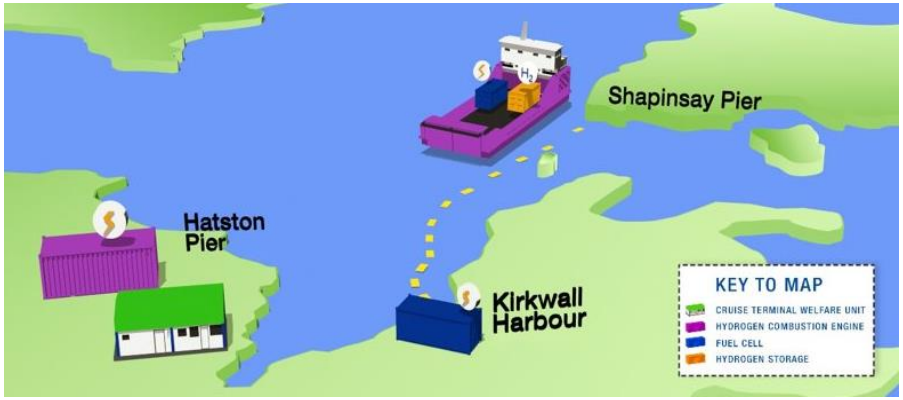
- Systems development for the **retrofit** of a 50:50 **hydrogen:diesel hybrid** engine, to be tested onboard an operational passenger ferry
- This project has faced **regulatory barriers** and we have had to scale back ambitions and celebrate (and learn from!) the journey rather than the destination



Hydrogen use (HIMET)

HIMET: ‘Hydrogen in an Integrated Maritime Energy Transition ’

- Project Scope:
  - Ex-situ testing of hydrogen combustion in a conventional vessel **propulsion engine**
  - **Harbour-side hydrogen engine** for powering a crew welfare unit
  - On-board demo of **hydrogen storage** and **fuel cell** for auxiliary power
  - Studying ‘Net Zero’ infrastructure requirements and **future fuel pathways & scenarios**

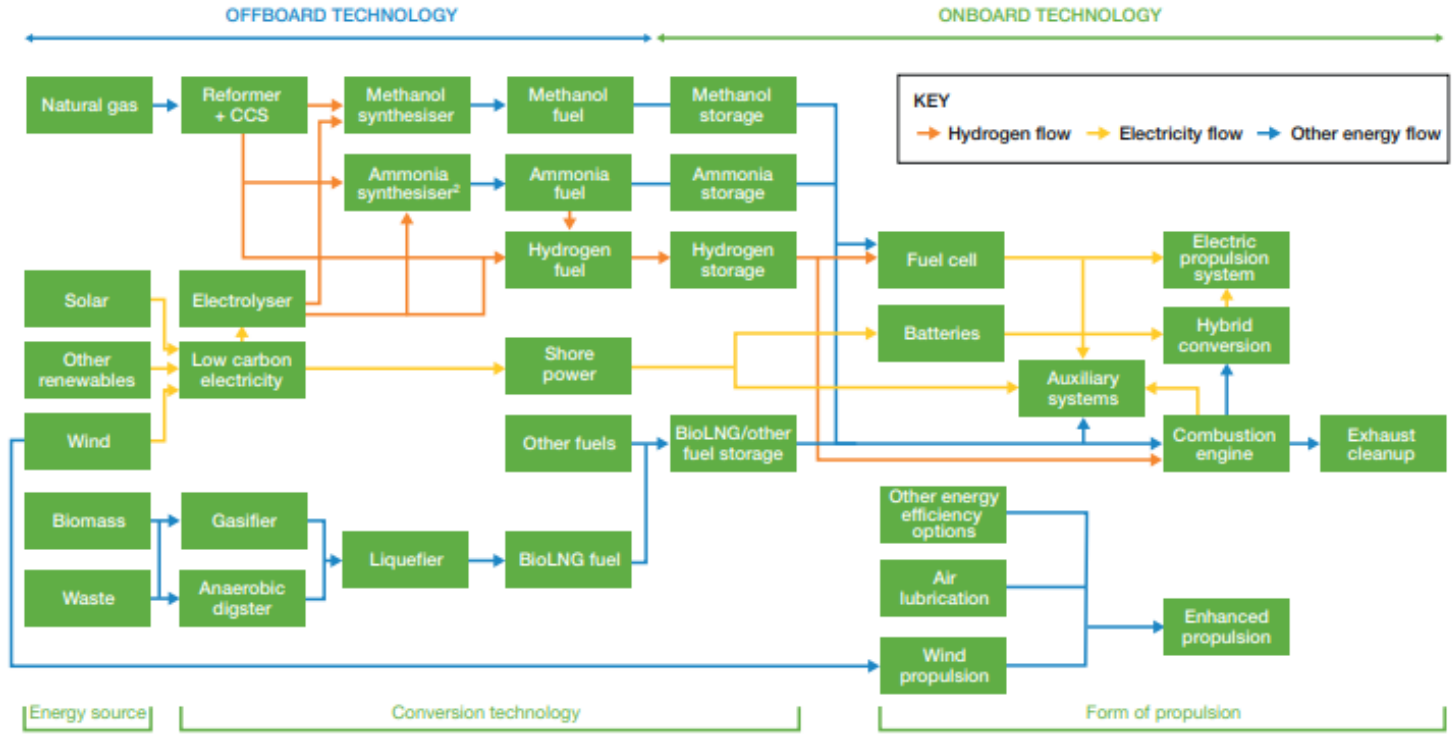


- Longer-term ambition:
  - Tackling **zero emission maritime** operations

- HSE
  - **Maritime Coastguard Agency engagement** – through the Maritime Future Technology Team
  - **Certification body** part of consortium
  - **H&S workshops** from design to delivery

Potential other fuels

- **Methanol**
- **Ammonia** – Green ammonia plant proposed for Orkney [2]



Clean Maritime Plan (publishing.service.gov.uk) [1]

Conclusion

Hydrogen for maritime – Is it the future?

- **Green Hydrogen** from tidal energy
- **Building Block** to decarbonising maritime sector
- **Collaboration** is key
- Ready to **support innovation**: ‘the creation and application of new knowledge to improve the world’ [3]

[3] Definition of innovation from UK Innovation Strategy

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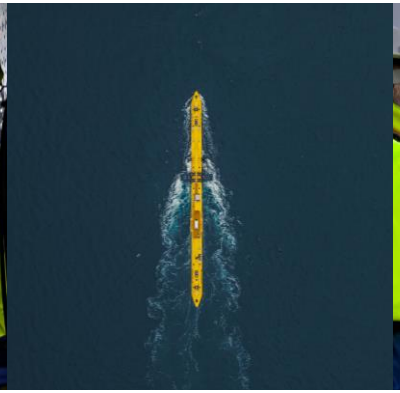

Thank you for listening!

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Orkney Islands Council · Highlands & Islands Enterprise · Scottish Enterprise · The Scottish Government · UKRI Innovate UK · Department for Business, Energy & Industrial Strategy · FCH Fuel Cells and Hydrogen Joint Undertaking

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Sources

- [1] Clean Maritime Plan (publishing.service.gov.uk), 2019
- [2] Green ammonia plant proposed for Orkney - Ammonia Energy Association, 2020
- [3] UK Innovation Strategy, 2021