

Thursday, December 2, 2021

Connected Places Catapult

Maritime and Ports
Hubs of Innovation

Tom White
Maritime & Ports

CATAPULT
Connected Places

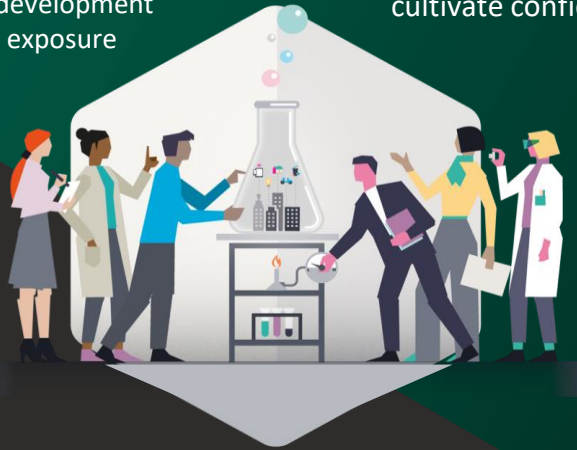
Our Role in the Market

Increasing the **SUPPLY** of innovative products and services that meet market demand

by helping companies to commercialise innovation through demonstration, testing, development of standards and market exposure

Boosting **DEMAND** for innovation from intelligent customers

By improving methods of modelling demand, and supporting tools, resources and platforms that cultivate confidence and capability among buyers



Identifying new areas for **MARKET MAKING** and **DISRUPTION**

by stimulating richer engagement between academics and businesses, access to data and partnerships with government and regulators

DOMAIN



Decision making and institutions: The processes that determine how decisions are made, including land use and transport planning, and the institutional capabilities which enable effective place leadership



Built environment: Real estate, asset management and related activities / services



Mobility: The services and infrastructure by which people and goods move around a place, as well as to and from it



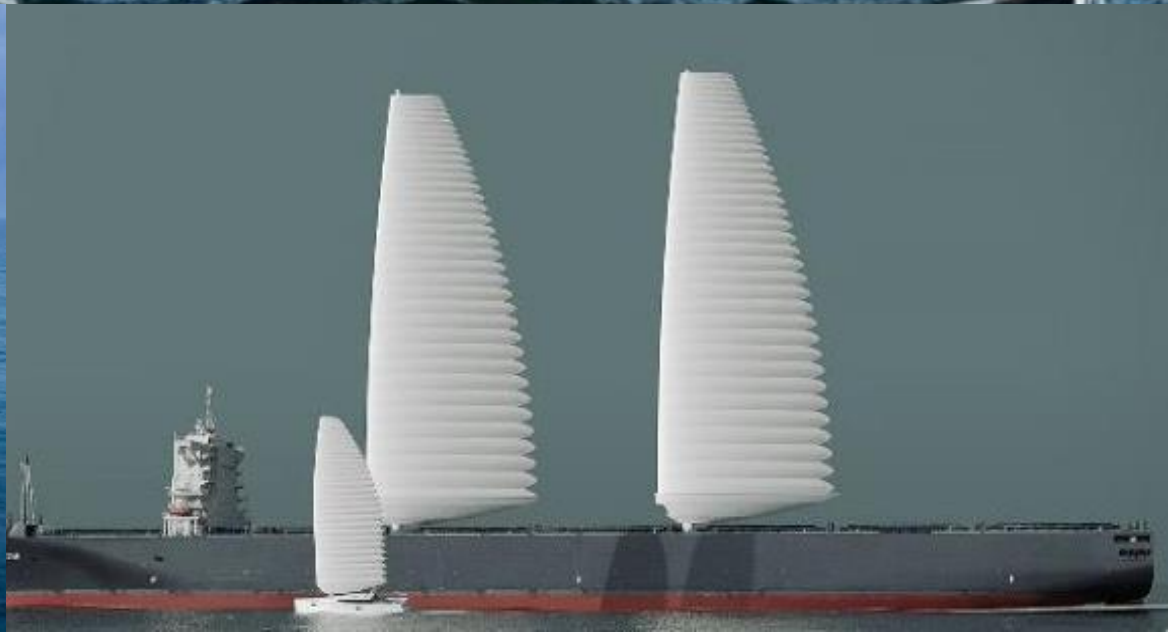
Public space: What happens on the streets, in shared spaces and the public and private services which support their effective functioning



Wellbeing: The layer of services and systems which enable human wellbeing in a place, including health and social care, community services and environmental factors



Critical infrastructure: The underlying services which support other layers to operate, including water, waste, power, digital connectivity.





Maritime
renewables (wind,
wave, tidal)

Autonomous and remotely controlled
survey and port service vessels

Inland waterways
connectivity and
last mile logistics

Assisted navigation
and mooring

Green shore power connectivity

Autonomous cargo
handling operations

Predictive maintenance of
critical port equipment

Zero emissions freight handling
equipment and mobile plant

Multi-modal
transport integration
and optimisation

Geospatial optimization of cargo
handling, flows and storage

Digital borders and
customs processes

Onsite renewables (wind,
solar) generation

Multi-modal future
fuels supply and
distribution

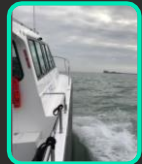
Predictive energy
demand and supply
systems

Fleet command and control
centres

A Multi-Systems Innovation Hub

Our work

Future Maritime and Ports Strategy



Maritime Autonomy Study



Innovation Hub 2050 Founding Partner

2019

Inland Waterways Passenger Study

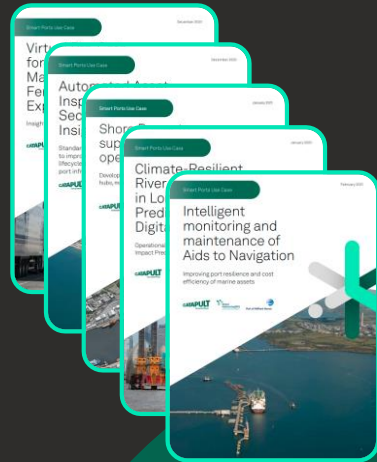
2020



DfT Ports of the Future Roadmap

3 Freeport Bids Supported

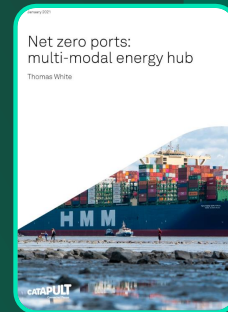
2021



Future Port Use Cases
Future Ports Launch Event



Freeport Playbook Launched



Ports as Energy Hubs



SpacePort Geospatial Study



Solent Maritime Gateway Launch



Clean Maritime

- Renewable microgrids
- Hydrogen
- Shore Power
- Vessel Retrofit

Multi-modal port energy hubs
Freeport innovation hubs
TradeTech and frictionless borders
Connected and autonomous logistics
Renewable shore power / microgrids
Future maritime fuels
Modal shift to waterways

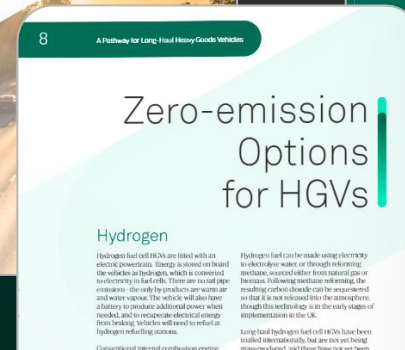
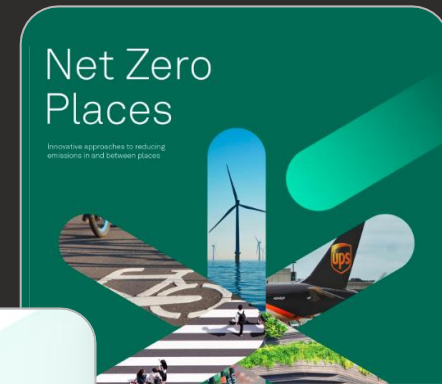
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Clean Maritime

The decarbonisation of the maritime sector is a global challenge, with global opportunities where the UK is building on our key strengths to maximise impact. Our ports have a vital role to play as future energy hubs in the decarbonisation of maritime, but also across multiple transport modes and communities

Ports as Energy Hubs

- As part of the Catapult Innovation Brief on Net Zero Places
- Ports role as multi-modal transport hubs to **stimulate** and **accelerate** adoption of future fuels across transport modes
- Opportunities building on growing offshore wind sector for **green energy** and **green fuel** generation and distribution through ports
- Potential for jobs and growth, stimulating **regional regeneration** and **growth** in port and coastal communities
- Potential to demonstrate whole systems concept as **energy hubs for the future hydrogen economy**
- Focus towards the need of large scale system demonstrators to **enable learning, build confidence** and **accelerate adoption**



Multi-Vector Renewable Port

- Develop the Green Port Blueprint and use cases through an enabling digital platform to manage supply and demand across multiple renewable energy vectors including offshore and onshore wind, solar, geothermal and tidal
- Explore future energy users and potential demand, including green H2 and derivatives, for stakeholders on land and at sea
- Trialling the underlying digital infrastructure
- The Catapult will establish the business case for the system based on the users study and trials experience, establishing a large scale demonstrator plan for 2022 that will include deploying physical elements of the system and working with future energy users (e.g. ammonia vessels and H2 HGV's)

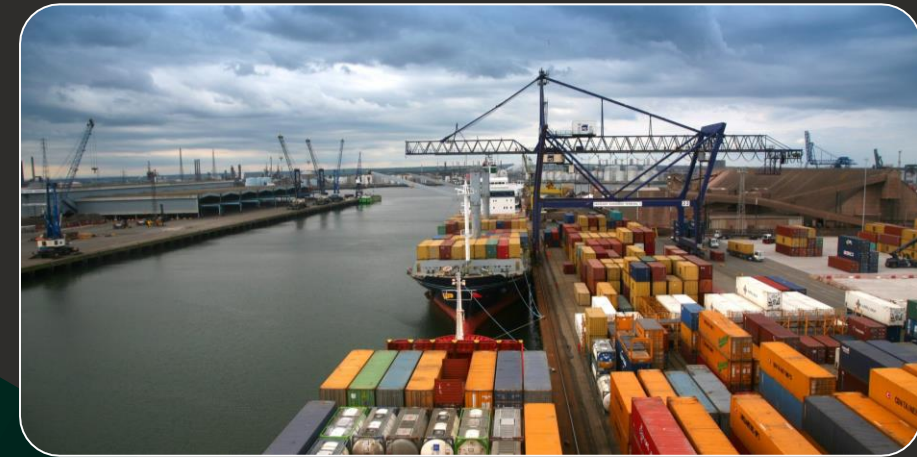


Where are we going?
Larger scale deployment of infrastructure, vessel trials



Vertically Integrated Ports

- Will deliver a feasibility study for a smart port energy system that optimises energy usage across the port and several use cases. This system will also provide predictive maintenance capability of critical energy systems
- GE will deliver a technical feasibility study for the platform deployment at the port
- Teesside University will deliver technical studies on predictive maintenance aspects of the integrated port energy system and sensor network
- Catapult will establish a demonstrator programme for 2022 to deploy physical elements of the system in a larger scale trial



Where are we going next?
Solution deployment including predictive analytics
and port digital twin



SHAPE UK – H2 Ports

- Carry out trials with a modular hydrogen electrolyser at the port with potential use cases on land and at sea, utilising clean energy sources.
- Retrofit of a small vessel to run on hydrogen supplied through the electrolyser, addressing safety and regulation on land and at sea
- Central to this project will be a proof of concept for a digital twin within a smart energy platform that considers multi-modal future users of hydrogen based on predictive demand modelling and production capacity
- The Catapult will be working with the consortia to define use cases for the digital twin, establishing impacts and the business case for the hydrogen supply system, and designing a larger scale demonstrator programme



Where are we going?
Larger scale deployment of H2 infrastructure, multi-modal, larger vessel trials



Green Port Blueprint

- Will deliver a detailed feasibility study for green shore power for Aberdeen port including multiple use cases prioritised for the offshore market
- Burro Happold will deliver technical design work within the project as the lead design consultancy to Aberdeen Harbour Board on deploying green shore power connectivity solutions
- Catapult will deliver a 'Green Ports' blueprint including wider context and impact to Aberdeen, establishing a demonstrator programme for 2022 to include large scale deployment of technology solutions linking the port to the wider community initiatives



Where are we going?
Large scale deployment of green port blueprint, multi-port collaboration

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Key Future Themes

- *Multi-modal port energy hubs*
- *Freeport innovation hubs*
- *TradeTech and frictionless borders*
- *Connected and autonomous logistics*
- *Renewable shore power / microgrids*
- *Future maritime fuels*
- *Modal shift to waterways*



Maritime and Ports

Hubs of innovation in maritime and ports decarbonisation have the potential to be powerful engines of regional growth, through attracting foreign direct investment and stimulating innovation and collaboration, working with complex system interactions and stakeholder relationships – the arteries through which innovation and opportunities will flow across supply chains.



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