



Decarbonised Maritime Transport: Research, Test and Demonstration

Transforming the future of transport and energy



Accelerating Innovation

A proving ground for cutting-edge R&D

PNDC's work in transport and mobility research is helping the public and private sector research and demonstrate future transport products and services in a realistic test environment.

Our areas of expertise include:

- ▶ **Whole energy system analysis and testing**
Assessment of how novel hydrogen technologies and systems interact and integrate with other systems, including the ability to explore whole system performance boundaries and assess external threats (e.g. cyber security). Transport and energy system interactions and optioneering.
- ▶ **Hydrogen technology and systems engineering**
Appraising the technical viability, innovation requirements, and scale-up and commercialisation challenges associated with novel hydrogen-based technologies and systems.
- ▶ **System modelling, real-time simulation and emulation**
Analysis of novel offshore & maritime transport and energy systems. Modelling and analysis of power systems and new technologies (hardware and software) in multi-vector generation, storage and utilisation prior to validation testing.
- ▶ **Regulatory policy and standards compliance**
Consultancy and testing on engineering standards for new technologies and energy vectors.
- ▶ **Real-world testing and demonstration**
Enabling the validation and de-risking of the performance and interactions of technologies in different operational scenarios in a safe, representative and controllable environment.
- ▶ **Power Hardware in the Loop Testing**
Installation, commissioning, testing and demonstration of devices (as part of simulated sub-system or system).
- ▶ **Vessel to Port energy interaction and grid infrastructure**
Analysis and modelling of ship to port energy interactions including shore power and hydrogen fuelling.
- ▶ **Planning multi-vector alternative fuelling infrastructure**
Local and regional strategy development, consultancy and due diligence analysis.
- ▶ **Future-proofing**
Using scenario-based analysis and real world validation to de-risk and futureproof the performance and commercialisation pathways of novel hydrogen technologies and systems.

The Future of Transport

From strategy to commercial deployment

PNDC supports technology developers, system integrators and end-users through product definition, system testing, commercial deployment and impact assessment.

MOD

UK naval platform real-time modelling & power systems analysis



- ▶ Developed real-time models and a real-time model library of the T26 naval platform.
- ▶ Running the real-time model as part of a Power Hardware in the Loop (PHIL) platform to test operation of the vessels for a number of different operational scenarios.
- ▶ Demonstrating operation of the vessels power system as part of a PHIL system to both industry and MOD stakeholders.

MOD

Flywheel Power Hardware in the Loop (PHIL) testing



- ▶ Characterised and tested a flywheel using PHIL as part of a simulated naval power system with other energy storage devices, in collaboration with the DOD & FSU CAPS.
- ▶ Following multi-facility cross-validation data analysis, several demonstration events held with industry and MOD stakeholders, with test results fed back to the manufacturer.
- ▶ Re-testing after upgrades and the development of a real-time model of the flywheel (based on the test data) as an energy storage device to support naval platform operation.

MOD

Progeny Task



- ▶ MOD project related to thermal testing, working in collaboration with external industry partner (Babcock) and ESRU.
- ▶ Test rig designed for the thermal management of ship systems and test the material that allows for the absorption of thermal energy as part of the cooling process in ship systems.

European Union and The Scottish Government

Hydrogen Accelerator



Scottish Government
Riaghaltas na h-Alba

- ▶ Supporting the co-ordination of Scotland's key hydrogen initiatives and delivering vital project management and technical guidance and support, particularly in the area of fuel cell technology.
- ▶ Enabling capabilities in Scotland to create new opportunities driven by the growth of the hydrogen economy.
- ▶ Research support and analysis of the challenges and opportunities for technology de-risking to accelerate the evolution of hydrogen-related solutions.

GET IN TOUCH

Find out more about our work or talk to us about opportunities for collaboration, including PNDC membership.

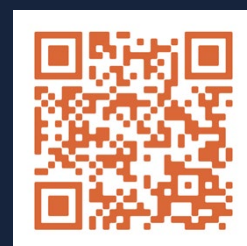
PNDC 62 Napier Road, Wardpark, Cumbernauld G68 OEF

e pndc@strath.ac.uk **t** +44 (0) 01236 617 161 **w** pndc.co.uk

t [@PNDC_UK](https://twitter.com/PNDC_UK) **in** [/company/pndc](https://www.linkedin.com/company/pndc) **yt** [@pndcstrathclyde](https://www.youtube.com/@pndcstrathclyde) **ig** [@pndcstrathclyde](https://www.instagram.com/pndcstrathclyde)

PNDC is one of the multi-award-winning University of Strathclyde's industry-facing innovation centres. The University of Strathclyde is a charitable body, registered in Scotland, number SC015263.

Find out more



pndc.co.uk/publications