Final project report: "Accelerating the Energy Transition at Sea and on Land: Ports as Hubs" (renamed as "mPATH – Ports as Energy Transition Hubs"), Project number 2021-037

Project period: October 2021-December 2022

Main project beneficiary (PI): Copenhagen Business School, Department of Strategy and Innovation, CBS Maritime, Associate Professor Henrik Sornn-Friese

Project partners:

Copenhagen Business School (CBS): CBS Maritime, Copenhagen School of Energy Infrastructure (CSEI)

Technical University of Denmark (DTU): Maritime DTU

PROJECT OVERVIEW

The project "Accelerating the Energy Transition at Sea and on Land: Ports as Hubs" (later renamed as "mPATH – Ports as Energy Transition Hubs") has aimed to establish an interdisciplinary and rigorous research partnership that captures the entire value chain of the energy transition at sea and on land, focusing on the key role of ports acting as converging points for the maritime, energy and interrelated sectors. The project had several main objectives:

- Build a research consortium with Danish, European and international academic partners, industry stakeholders, member associations, maritime authorities and other relevant actors, coordinated by CBS and in cooperation with the Maritime Research Alliance (MRA)
- Conduct an exploratory study to identify knowledge gaps and bottlenecks within the investigated area and provide input for future research and education
- Develop and submit applications for public grants to support an ambitious number of PhD projects to develop the interdisciplinary skills required in the clean energy transition and decarbonization of shipping (coordinated by CBS).
- Create an initial framework for future interdisciplinary education in the context of MRA and include international academic partners.
- Benefit the Blue Denmark by creating new knowledge about the clean energy transition and global supply chains, assessing opportunities for new business models, development of skills and job creation, and initiating future international research partnerships

PROJECT RESULTS

BUILDING OF RESEARCH PARTNERSHIP

We have successfully initiated the development of a global research partnership that we envision will eventually include all of the major current and emerging energy and maritime hubs, either as mPATH project partners, or as collaborators. We have successfully created collaborative ties to Singapore

Management University (SMU) and Nanyang Technological University (NTU), with institutional support from Singapore Maritime Institute (SMI). We expect to initiate concrete projects with SMU and NTU in 2023/2024 as part of the strengthening collaboration between the SMI and Maritime Research Alliance (MRA). With University of British Columbia (UBC) and Simon Fraser University (SFU) in Canada we have discussed several potential projects that could also be linked to the possible continuation of the tri-continental Green Shipping Project (https://greenshippingproject.com/), beyond 2023 when the project otherwise completes. In addition, we have built a strong partnership in Europe, mainly via two major funding applications (Horizon Europe's MSCS PhD Doctoral Network and North Sea Interreg's H2 Valley Ports). We have also deepened our collaboration with Danish, Nordic and European stakeholders, and furthermore explored opportunities for collaboration with Tokai University in Japan. We have held in total 23 core-project team meetings (Maritime DTU, CBS Maritime, CSEI), also needed for reshaping the partnership to better deliver on the evolving objectives.

DEVELOPING FUNDING PROPOSALS

We have developed several funding proposals that aim to fill in research gaps and work closely with industry on addressing their current and emerging needs. Two proposals have been successfully submitted and are in various stages of evaluation by the potential funders, and one application is still work in progress and will be submitted in June 2023.

- Considerable resources were dedicated to developing and submitting an application (coordinated by CBS) to Horizon Europe's Marie Skłodowska-Curie Actions (MSCA) PhD International Training Network (https://marie-sklodowska-curie-actions.ec.europa.eu/actions/doctoral-networks). This ambitious project is a partnership between 8 universities (CBS, DTU, World Maritime University, Chalmers University of Technology, NHH Norwegian School of Economics, Norwegian University of Science and Technology, Kühne Logistics University, and Kedge Business School) and supported by 14 non-academic stakeholders from Denmark, the Nordics, Europe and Columbia. The project aims to train 10 PhDs, starting in the fall of 2023, if the application is successful.
- We have also successfully submitted a Phase I application for Call Module 5 "Integrated Regional Energy System" of EU's Clean Energy Transition Partnership (CETP) (https://cetpartnership.eu/), relying on several of the same partners as in the MSCA proposal but also adding new partners from industry. The application has successfully passed through Phase I, and we have been invited to submit a full proposal (Phase II) (submission deadline is March 27, 2023).
- We also participate in the ambitious Interreg North Sea – H2 Valleys Ports (https://www.interregnorthsea.eu/apply-in-call-3) project that aims to develop Hydrogen Valley Master Plans linking production to end users. This project will develop the robust partnership and governance structures needed in five PHVs and this will include maritime transportation partnerships (MTPs) which will develop vessel design and business cases, bunkering and safety. With 13 partners and lead by Port Esbjerg, the proposal will be submitted in June 2023.

Two additional smaller research applications were developed and submitted but unfortunately proved unsuccessful in achieving funding:

- In October 2021, an aligned project on the role of Ports as Energy Transition Hubs led by CBS Maritime was selected as one of 15 sub-projects to be included in a single consortium proposal submitted to Innovation Fond Denmark for Innomission2 (IM2) – "Green fuels for Transport and Industry" (https://innovationsfonden.dk/en/p/innomissions). Unfortunately, the consortium decided not to include the CBS Maritime project in its final application to Innovation Fund Denmark.
- In August 2022, a project application (a partnership of six universities from Denmark, British Columbia in Canada, and California in the US) focusing on "Investigating the Role of Ports as Catalyst for the Global Energy Transition" was submitted to the Global Innovation Network Programme (GINP) under the Danish Agency for Higher Education and Science (https://ufm.dk/en/research-and-innovation/funding-programmes-for-research-and-innovation/eu-and-international-funding-programmes/international-cooperation/international-network-programme-1).

STAKEHOLDER DIALOGUE, WORKSHOPS AND EVENTS

With the aims of building the partnership, aligning research efforts with industry needs, and identifying concrete ways to collaborate (e.g., by developing funding applications), we hosted four hybrid workshops with the participation of academia and industry. We have continuously engaged in stakeholder dialogue, which has included more than 80 different stakeholders from Denmark, Europe, Singapore, Japan, Canada, and the US. We also held a networking event in collaboration with MRA in August 2022 and a constructive final project conference in October 2022 at CBS. In April 2022, we had a very productive visit to Singapore during Singapore Maritime Week (April 4-8) and engaged in dialogue with a number of stakeholders, visited Jurong Ports, Nanyang Technological University (NTU) and Singapore Maritime University (SMU), and had a meeting with Singapore Maritime Institute (SMI) facilitated by the Danish Embassy in Singapore. In May 2022, we organized a visit to Port Esbjerg that included presentation from the port's CEO Dennis Jul Pedersen, tour of the port, and a dialogue meeting with local stakeholders. Finally, we have attended and presented at various events and workshops, allowing us to engage with various stakeholders and disseminate the project mission and results.

KNOWLEDGE CREATION, EXPLORATORY STUDY, ACADEMIC JOURNAL ARTICLES

We have conducted a comprehensive exploratory study aiming to identify key research gaps across the following main research questions: How can ports create value as facilitators of the energy transition? What are the key Socio-Economic considerations that may constrain or enable the energy transition? What are the technical challenges and solutions enabling an effective transition? How do the shifting global energy and maritime supply chains influence the role of ports and their development? What are the key social challenges and opportunities and how ports can facilitate an inclusive and just energy transition maximizing the societal benefits? The findings from the exploratory study were presented at the final conference at CBS in late October 2022 and the subsequent discussion with conference participants provided additional insights as well as raised new issues. The exploratory study report will be completed and made publicly available in spring 2023.

In February 2023, the first academic article from the project titled "The port authority as system builder in cross-border regionalization: An exploratory study of Port Esbjerg in the development of North Sea

wind" was published as Open Access in the international scientific journal Maritime Transport Research. It can be accessed via the following link: https://doi.org/10.1016/j.martra.2023.100084

FEEDBACK AND DEVELOPMENT OF STUDENT AND RESEARCH ASSISTANTS

One Research Assistant employed at Maritime DTU and five student assistants employed at CBS have worked on the project. The student assistants at CBS were all recruited from the B.Sc. International Shipping and Trade. For most of the students, this was their first work experience in the maritime field, and we have focused on engaging them in tasks that will also be relevant to their future careers. The student's subsequent feedback to us has been very positive. We believe that hiring freshmen and midterm bachelor students and allowing them to apply and develop industry-relevant skills and engage with a variety of stakeholders (e.g., during workshops and events) has been a major achievement of the project, one which we did not originally envision as a KPI but nevertheless successfully met. This is a kind of knowledge mobilization that we will more keenly encompass in future projects, where student assistants are required.

PROJECT CONTINUATION

The mPATH project has received consecutive funding from the Danish Maritime Fund under grant agreement 2022-044 in order to cover new research and partnership development activities, essentially constituting a Phase II extension to Project 2021-037 with expanded research on maritime decarbonization as a polycentric (governance) problem with 1) ports as energy transition hubs, 2) ports as partakers in hydrogen valley clusters, and 3) ports along green shipping corridors as key focal points, and on energy transition pertaining particularly to developing countries.