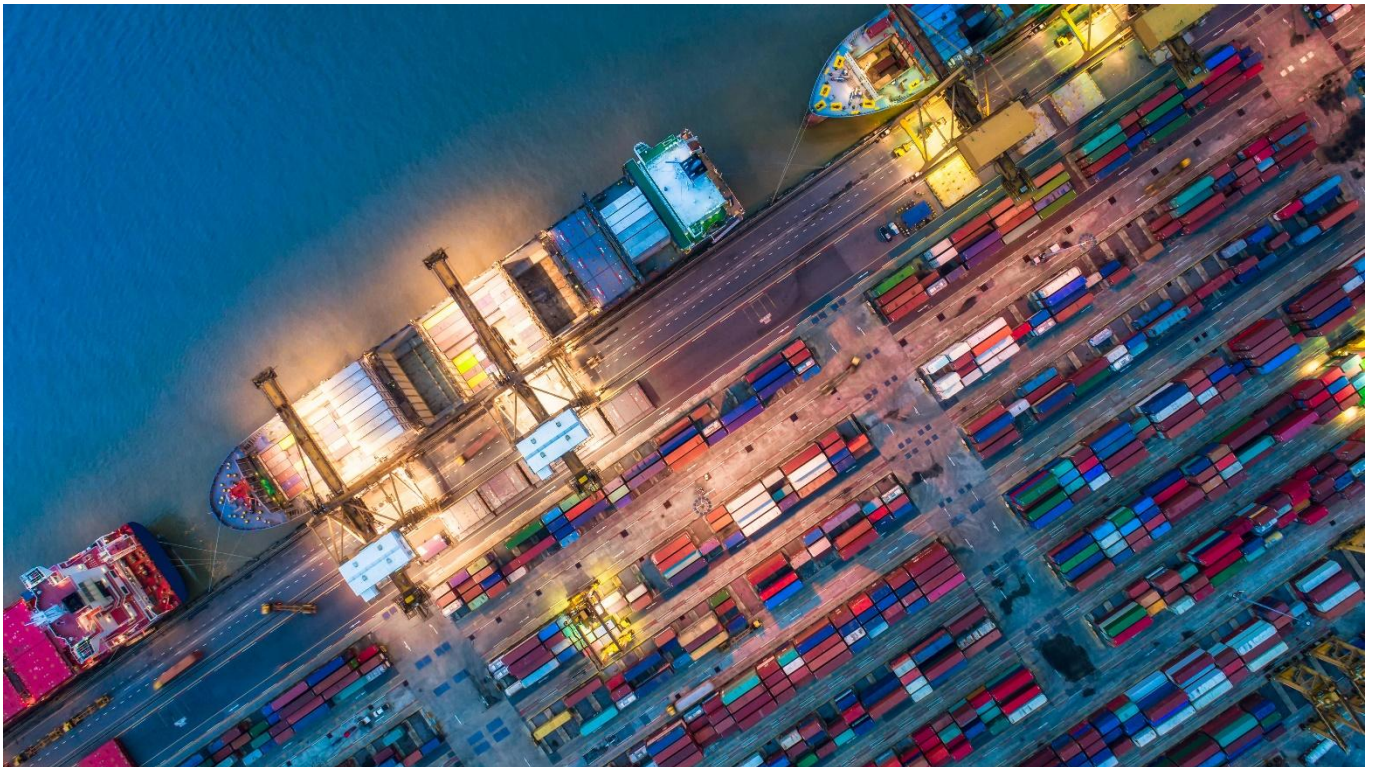


LMT monitoring report: progress and insights from the Maritime Programme



UK Research & Innovation
Our ref: 245-747-03

LMT monitoring report: progress and insights from the Maritime Programme

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List of acronyms and abbreviations

Acronym	Meaning
AiP	Approval in Principle
APS	Advanced Propulsion System
CCAM	Commercialising Connected and Autonomous Mobility
CMDC	Clean Maritime Demonstration Competition
CTV	Crew Transfer Vessel
DC	Direct Current
DfT	Department for Transport
E-CTV	Electric Crew Transfer Vessel
EPSRC	Engineering and Physical Sciences Research Council
EU	European Union
FOAK	First of a Kind
FTE	Full Time Equivalent
GHG	Greenhouse Gas
HI-FIVED	Hydrogen Innovation – Future Infrastructure & Vessel Evaluation and Demonstration
IMS	Impact Management System
IP	Intellectual Property
IUK	Innovate UK
LMT	Land and Maritime Transport
LR	Lloyd's Register
MCA	Maritime and Coastguard Agency
MSCIC	Maritime Supply Chain Innovation Centre
MSP	Monitoring Service Provider
PM	Particulate Matter
QMS	Quarterly Monitoring Scores
QRM	Quarterly Review Meeting
R&D	Research and Development
SME	Small and Medium-Sized Enterprise
SOV	Service Operation Vessel
SWATH	Small Waterplane Area Twin Hull
TDD	Transport Decarbonisation Demonstrator
TRL	Technology Readiness Level
TVH	Tees Valley Hydrogen
UKRI	UK Research & Innovation
UK SHORE	UK Shipping Office for Reducing Emissions
USV	Uncrewed Surface Vessel
WP	Work Package

ZEHD	Zero Emission Heavy Goods Vehicle and Infrastructure Demonstrator
ZEVI	Zero Emission Vessels and Infrastructure

Executive Summary

Overview of delivery

The Maritime programme, formally known as the Clean Maritime Demonstration Competition (CMDC), is a multi-year grant funding programme delivered by Innovate UK on behalf of the Department for Transport. The programme aims to accelerate the development, demonstration and deployment of clean maritime technologies. Through multiple competitive rounds, the programme supports collaborative, consortium-based projects across the maritime value chain, targeting low- to mid-TRL innovation to reduce emissions, enable regulatory learning and strengthen the UK's clean maritime industrial capability.

- **Projects:** Across CMDC waves, 87 projects have been supported, involving more than 380 partner organisations.¹ Funding has supported feasibility studies, pre-deployment trials and large-scale demonstrations, with projects typically delivered through consortia spanning vessel operators, ports, technology developers, fuel suppliers and research organisations.
- **Activities:** Project activities span feasibility assessment, industrial research, pre-deployment trials and real-world demonstrations, with a focus on de-risking emerging technologies, supporting regulatory engagement and generating operational evidence to accelerate routes to market.
- **Timescale:** CMDC has been delivered through successive funding rounds since 2021, with competitions varying in scope and duration. The programme is designed as a multi-year intervention, with later rounds increasingly focused on demonstration and readiness for commercial deployment.
- **Funding:** The programme is backed by over £187.5 million² of Department for Transport funding, with individual rounds ranging from small-scale feasibility funding to large demonstration grants.

Key findings

Technology development and commercialisation

- Most projects have demonstrated clear technological advancement, with CMDC supporting progression from early feasibility to late-stage trials. A significant proportion of projects have moved up the TRL scale across funding rounds, with several reaching TRL 7 and beyond, alongside evidence of patenting and early commercial readiness.
- CMDC has strengthened market visibility, knowledge exchange and sector capability. The programme has generated intellectual property, academic publications and extensive media coverage, particularly for real-world demonstrations, helping to build credibility, disseminate learning and raise the profile of UK clean maritime innovation domestically and internationally.
- Commercial momentum is building, but widespread adoption remains constrained. Many organisations report early revenues, contracts and export interest linked directly

¹ These figures exclude CMDC 5 and 6 funded projects.

² This encompasses projects funded under CMDC Rounds 2–4 and ZEVI projects across three strands: battery-electric vessels and charging infrastructure, shore power technologies, and alternative fuels.

to CMDC-funded projects, though regulatory uncertainty, conservative market behaviour, funding gaps and limited access to private finance continue to slow scale-up and full commercial deployment.

Partnerships and organisational development

- The programme has had a strong positive effect on partnership development, with beneficiaries reporting new and strengthened collaborations formed through consortium delivery, joint problem-solving and engagement with regulators, academic institutions and end users. These relationships supported effective delivery of complex projects, reduced duplication and enabled shared learning across consortia.
- Beneficiaries consistently described partnerships as constructive and well-aligned with project objectives. Collaboration with universities, regulators and operators was particularly valuable in supporting applied research, regulatory learning and access to assets and test environments. As projects progressed, partnerships increasingly supported operational learning and preparation for deployment.
- Participation in the programme contributed to clear improvements in organisational capability and maturity. Many beneficiaries, particularly SMEs, reported significant upskilling across technical, regulatory and project-management functions, alongside stronger internal processes, greater confidence in managing public funding, and increased credibility with government and industry stakeholders.
- While Beneficiary Survey results indicated that direct job creation was limited³, the programme delivered wider workforce benefits. These included safeguarding existing roles through enhanced skills and capability, supporting changes in roles and responsibilities, and contributing to longer-term skills development and employability across the UK maritime sector.

Barriers and enablers

- The main barriers to programme delivery related to funding structures, administrative burden and tight timelines. Retrospective reimbursement, long payment cycles and grants not fully covering evolving costs created cash-flow pressure for SMEs, while complex collaboration agreements, slow change approvals and compressed delivery windows reduced agility and increased delivery risk.
- Delivery challenges were compounded for complex or fast-moving projects. Short delivery periods limited scope for iteration and learning.
- Key enablers included flexible programme management and supportive delivery contexts. Beneficiaries consistently highlighted Innovate UK's pragmatic approach to evolving project direction, continuity in monitoring support, and favourable test environments as critical factors in managing risk and enabling successful delivery.

Next steps for the programme

The next phase of the CMDC will focus on scaling zero-emission technologies and supporting the transition from demonstration to commercial deployment. From 2027,

³ Survey findings are based on a 41% response rate and do not reflect all CMDC projects. As a result, the limited evidence of direct job creation may be driven by non-response from some projects and organisations, rather than low realised job creation.

CMDC7 will fund real-world trials of clean vessels, fuels and port infrastructure, with further competitions planned through to the end of the 2029–30 financial year, including two additional rounds expected between 2027 and 2029.

Recommendations for future evaluation

Many of the anticipated impacts of the Maritime programme are expected to emerge after project completion, particularly where commercialisation depends on further funding. To capture these impacts fully, a future evaluation should:

- Undertake follow-up evaluation one to two years after completion of CMDC7 to assess longer-term outcomes, recognising that commercial deployment timelines will vary across projects. This follow-up period is considered appropriate to capture progress beyond demonstration, while remaining flexible to account for uncertainty around market readiness and deployment schedules.
- Assess environmental impacts from supported technologies, which represent a key intended impact of CMDC, including early evidence of measurable air quality improvements (for example, reduced particulate matter (PM) levels).
- Assess economic impacts associated with commercialisation, including job creation, SME growth, inward investment and wider supply-chain effects, which are unlikely to be fully realised within current delivery timescales.
- Evaluate the additionality of CMDC funding by examining beneficiaries' progression through multiple funding rounds and assessing counterfactual outcomes, including what would have happened in the absence of support. This could include targeted analysis of projects that only participated in early funding rounds to understand subsequent technology development and outcomes.

Overall conclusions

The Maritime programme has delivered a large and diverse portfolio of clean maritime projects and has made strong progress despite operating in a technically complex and evolving regulatory environment. Delivery performance has been broadly positive, with most projects meeting, or remaining on track to meet, their objectives. Where delays have occurred, these have largely reflected the inherent challenges of certification, infrastructure readiness and large-scale demonstration rather than weaknesses in programme management. Beneficiaries consistently valued Innovate UK's engagement and flexibility in supporting delivery.

The programme has been effective in building partnerships across industry, academia and regulators, which have been central to delivering complex demonstrations and accelerating shared learning. These collaborations have generated wider benefits, including skills development, organisational learning and pathways to follow-on funding. While Beneficiary Survey analysis suggests direct job creation has been limited, CMDC has strengthened workforce capability, safeguarded existing roles and improved organisational readiness, particularly among SMEs.

CMDC funding has played a critical role in advancing clean maritime technologies from feasibility through to large-scale trials and, in some cases, near-commercial demonstration. In the wider UK SHORE programme landscape, ZEV (Zero Emission Vessels and Infrastructure) complements this by supporting higher-TRL projects as they move towards commercialisation. Early commercial signals are emerging, including training uptake, port-side contracts and export activity. However, wider adoption remains

constrained by regulatory uncertainty, conservative market behaviour, limited private finance and gaps between funding rounds, indicating that sustained and well-sequenced support will be needed to translate technical progress into widespread deployment.

Looking ahead, many of the programme's anticipated impacts will emerge over the medium to long term. Continued evaluation will be essential to understand CMDC's full contribution, including progress towards commercialisation, economic impacts and wider sectoral benefits, and to inform future interventions supporting maritime decarbonisation.

1 Introduction & methodology

Introducing the LMT portfolio

- 1.1 The LMT portfolio comprises seven grant-funding programmes spanning a range of technologies, transport modes (including rail, road and maritime), and objectives. The seven programmes which make up the LMT portfolio are: the Zero Emission Heavy Goods Vehicle and Infrastructure Demonstrator (ZEHID); Maritime Decarbonisation programme; Commercialising Connected and Autonomous Mobility (CCAM) programme; the Tees Valley Hydrogen (TVH) Transport Hub programme; Rail First of a Kind (FOAK) programme; Net Zero Propulsion programme; and Transport Decarbonisation Demonstrator (TDD).
- 1.2 The seven programmes vary in objectives, size, complexity and duration. Constituent projects can range from single applicant six-month feasibility studies costing around £25k to deliver, to four-year multi-partner collaborative research and development (R&D) projects which can cost millions of pounds.

Purpose of this report

- 1.3 Steer-ED and Technopolis were commissioned by IUK, in partnership with the Department for Transport (DfT) to conduct a monitoring commission on behalf of the LMT portfolio and the constituent seven programmes. This report is one of seven LMT programme reports focusing on Maritime, presenting final findings, synthesised from across a range of evidence sources, described below.

Introducing the Maritime Programme

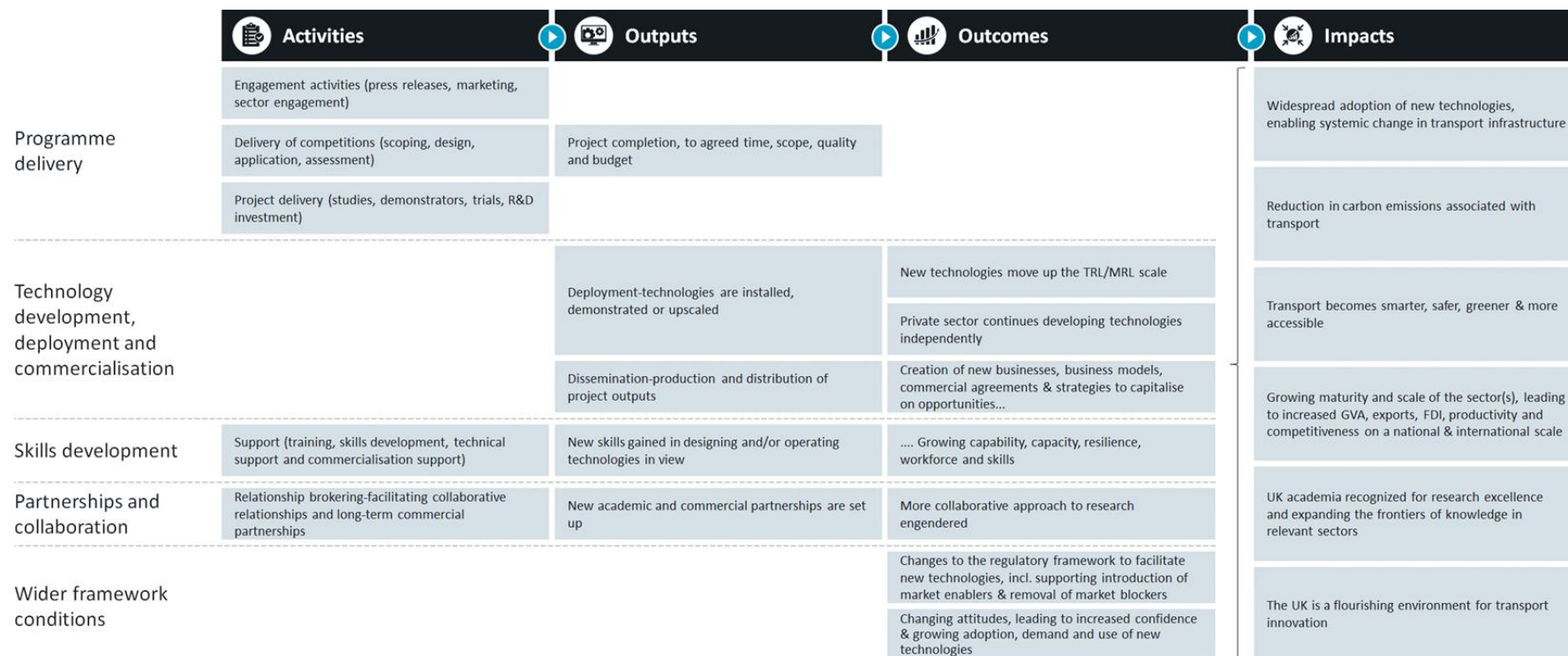
- 1.4 The Maritime Programme was established by the Department for Transport as a core delivery mechanism of the UK Shipping Office for Reducing Emissions (UK SHORE) to accelerate maritime decarbonisation. Under UK SHORE, funding and support are delivered through a range of schemes and competitions, including two flagship funding competitions, CMDC and ZEVI, alongside wider research and development, infrastructure, and accelerator funding mechanisms. For the purposes of this report, the primary focus is CMDC.
- 1.5 Since its launch in 2021, CMDC has provided over £187 million in match funding, delivered in partnership with Innovate UK, supporting more than 380 organisations across six competitive funding rounds.
- 1.6 The programme funds feasibility studies, pre-deployment trials and large-scale demonstrations, helping to advance clean maritime technologies from early development through to real-world deployment. To date, it has supported a wide range of projects aimed at reducing greenhouse gas emissions from domestic maritime operations, while strengthening the UK's clean maritime capability and supply chain.

Monitoring approach adopted

The LMT portfolio monitoring framework and logic model

- 1.7 This programme level report (and the wider LMT monitoring framework) is structured around the portfolio logic model, presented in Figure 1-1, shows the causal relationships between activities conducted and how those are expected to lead to long-term programme impacts, via outputs and outcomes. The logic model is divided into five themes, reflecting five key underlying mechanisms: programme delivery; technology development, deployment and commercialisation; skills development; partnerships and collaboration; and wider framework conditions. Each of the subsequent chapters of this report is titled after one of these five themes, providing a structured exploration of the causal mechanisms.

Figure 1-1: LMT portfolio high-level logic model

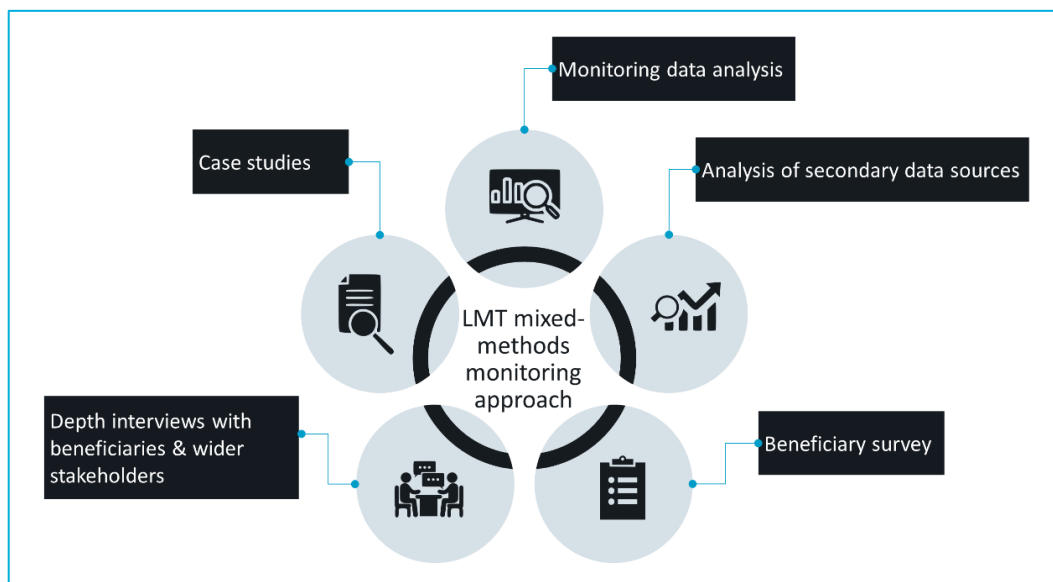


Source: Steer-ED and Technopolis, 2024

Sources of evidence utilised

- 1.8 Fieldwork was conducted over a three-year period and structured into three waves of activity, referred to as Waves 1, 2 and 3, with the following timescales:
- **Wave 1:** Fieldwork took place between July and August 2024.
 - **Wave 2:** Fieldwork took place between July and September 2025.⁴
 - **Wave 3:** Fieldwork took place between January and February 2026.
- 1.9 This final Maritime programme report brings together evidence collected across research waves (waves 1 and 3)⁵, providing a consolidated account of findings to date. This final version builds on the wave 1 Maritime programme report and incorporates newly available evidence from wave 3.
- 1.10 Figure 1-2 below sets out the five types of evidence drawn on for this monitoring commission. These evidence strands were selected to provide a broad and deep understanding of the portfolio, triangulating across a range of qualitative and quantitative research methods, and gathering inputs from a range of different perspectives.

Figure 1-2: Sources of evidence utilised within the monitoring approach



Source: Steer-ED, 2024

⁴ To note, this was not conducted for Maritime due to concurrent evaluation of the UKSHORE programme.

⁵ Wave 1 research helped form the foundation for the subsequent waves. While it provided important context, the findings presented in this report are mainly derived from wave 3.

- 1.11 A detailed description of the scope and coverage of methods deployed across the portfolio is presented in Appendix A and is briefly summarised below for the Maritime programme:
- 1.12 **Monitoring data analysis** – spanning three data sources: Applicant information data, Quarterly Monitoring Scores (QMS)⁶, monitoring reports and the Impact Management System (IMS).
- 1.13 **Analysis of secondary data – including:**
- Crunchbase to further explore whether businesses participating in LMT programmes are attracting external investment⁷;
 - Meltwater, a media monitoring platform to assess the public dissemination of project findings; and
 - Dimensions, a research database that provides patent and publication data.⁸
- 1.14 **Beneficiary Survey** - An online survey of beneficiaries was developed and distributed to project beneficiaries across all programmes within scope of this wave, totalling 201 recipients across the portfolio. The survey had a range of multiple choice and free text questions. Both project leads and partners were invited to complete the survey, meaning that multiple responses could be captured from each project. Unique surveys were created for each programme and whether a beneficiary had responded in the previous wave. The survey was open for a period of approximately six weeks across January and February 2026.
- 1.15 For the Maritime programme:
- 115 responses were received from a total of 239 beneficiaries, representing a 48% response rate (compared to a 58% response for the portfolio as a whole).
 - Survey responses covered 67 of the Maritime projects.
 - Of the survey respondents, 39 had responded during the wave 1 survey, and 76 were answering the survey for the first time.
 - It is important to highlight that the survey respondents in Wave 3 differed from those in Wave 1.⁹ As such, while the findings offer valuable insights, they represent a cross-section comparison rather than a longitudinal comparison across waves.
- 1.16 **Depth interviews** – comprised one-hour depth interviews conducted with programme beneficiaries and a selection of wider stakeholders (knowledgeable industry stakeholders from both commercial and academic institutions). The number of interviews undertaken varied by programme, in accordance with the number of stakeholders involved. A total of

⁶ QMS scores are provided by Monitoring Service Providers as part of Quarterly Review Meetings (QRM) with each project.

⁷ Crunchbase data has been included in the Appendix A. Although it provided some useful insights, the number of organisations identified was limited, making it premature to draw conclusions about any link between funding achieved and LMT.

⁸ This data was based on metadata [as of 01/09/2025 for Wave 2 and 10/02/2026 for Wave 3] from Digital Science's Dimensions platform, available at <https://ukri.dimensions.ai/>. Access was granted under licence agreement with UKRI.

⁹ A Wave 2 evaluation was no conducted for Maritime due to concurrent evaluation of the UKSHORE programme.

36 interviews were conducted across wave 3 for Maritime (an overview of interviewees is provided in Appendix A).

1.17 **Case studies** – Three project case studies have been undertaken for this programme (a total of 21 across the portfolio). For the Maritime programme, the case study projects selected were:

- Service Operation Vessel Offshore Charging System
- Hydrogen Innovation - Future Infrastructure & Vessel Evaluation and Demonstration
- Retrofit 20m Mercurio CTV

1.18 Findings are integrated across this report and are presented as vignettes with separate full write-ups presented within the appendices. All case studies have been reviewed by the programme's independent panel of subject-matter experts, selected for their expertise in relation to the programme or technology in question.

Methodological limitations

1.19 The key methodological limitations are as follows, which should be considered against the findings within this report:

- **Many technologies are still at the early stages of development**, meaning long-term impacts have not yet occurred. Many impacts are unlikely to emerge until several years after projects have completed. This is particularly the case for innovation funding, where numerous steps occur between initial project funding and measurable market outcomes. The findings gathered at this early stage (even if projects have closed) should therefore be considered indicative of a longer-term trajectory rather than conclusive.
- **Some projects target overlapping markets or similar decarbonisation technologies**, which means that forecasts of expected benefits may in some cases risk double-counting. This is compounded by the fact that relevant technology development may also be taking place outside the UK SHORE portfolio, targeting the same end markets. As a result, attributing future market-level impacts to individual projects or funding streams is inherently uncertain and should be interpreted with caution.
- **Dependency on self-reporting**: although multiple sources of evidence have been examined, including consultation with wider stakeholders and industry experts, there is nonetheless an emphasis on understanding impacts via discussion with – or reporting by – project beneficiaries. Beneficiaries may sometimes emphasise positive outcomes or focus less on challenges, thus resulting in findings which could overstate the true impact of the portfolio. Wherever possible, the views of wider stakeholders and industry experts have been considered alongside beneficiary viewpoints to mitigate this risk.
- **Heterogeneity of the portfolio**: The programmes within the portfolio vary significantly in terms of scale, technology, and commercial readiness. Applying a consistent methodology across the seven programmes is therefore challenging. To address this, Steer-ED and Technopolis sought to achieve a balance between providing consistent research tools across the portfolio, while also allowing for some tailoring to reflect the differences between programmes.
- **Survey fatigue among respondents**: Repeated surveys of beneficiaries can lead to fatigue, causing lower response rates or incomplete responses and reduced data quality. This risk has been managed via briefing sessions with beneficiaries and

proactive management of communications to ensure stakeholders understand the purpose of the research and benefits of participating. Across the portfolio, the beneficiary survey achieved overall project response rates of 51%, 66% and 58% in waves 1, 2 and 3 respectively. These are still considered good representation samples. Programme specific breakdowns are outlined in Appendix A.

Structure of this report

1.20 The remainder of this report is structured as follows:

- **Section 2: Overview of Maritime delivery** outlines the current status of Maritime and presents the progress made.
- **Section 3: Building and strengthening partnerships through programme delivery** focuses on how Maritime has fostered partnerships across industry, academia, and government.
- **Section 4: Development, commercialisation and deployment of new technologies** explores the progress made by Maritime in developing new technologies and progressing on the pathway to commercialisation.
- **Section 5: Growing skills and organisational maturity through programme delivery** assesses the impact of Maritime on enhancing skills and growing businesses and organisational capacity and capability.
- **Section 6: Impacts on wider framework conditions and long-term outcomes** discusses the potential long-term impacts of Maritime on broader industry and regulation.
- **Section 7: Conclusions & next steps** conclude the report.

2 Overview of Maritime delivery

Key Messages

- The Clean Maritime Decarbonisation Competition (CMDC) is the UK's flagship programme for accelerating maritime decarbonisation, targeting low- to mid-TRL technologies and supporting feasibility studies, pre-deployment trials and large-scale demonstrations across vessels, ports, fuels and enabling infrastructure.
- Backed by over £187.5 million in DfT funding and delivered with IUK, CMDC has supported more than 380 organisations across funding rounds, with projects delivered through consortium-based partnerships spanning industry, academia and the public sector.
- Delivery performance across the portfolio is broadly positive, with over half of projects meeting or on track to meet their planned timetables, and the majority delivering against budget and scope. Where delays occurred, these were typically not concerning core technical deliverables.
- Beneficiaries report largely positive delivery experiences, valuing IUK's support, flexibility and monitoring approach. Monitoring Officers were widely seen as knowledgeable and constructive, helping projects manage complexity and maintain momentum.
- Delivery challenges remain, particularly for SMEs, including compressed delivery windows, cash-flow pressures linked to retrospective reimbursement, and administrative or contractual burdens. While these issues did not prevent delivery in most cases, they added pressure and increased delivery risk for some projects.

Introduction

- 2.1 This chapter provides a detailed overview of the Maritime portfolio, outlining the objectives, timelines and key features of the programme, drawing on an analysis of monitoring data plus insights from the beneficiary survey. It goes on to characterise the delivery progress across the projects and offer insights from project delivery drawn from beneficiary interviews.

Introducing the programme

- 2.2 The Maritime programme (formally known as the CMDC) is a multi-year, competitive grant funding programme designed to accelerate the development and real-world deployment of clean maritime technologies. Its primary focus is on reducing greenhouse gas (GHG) emissions from domestic maritime operations while strengthening the UK's clean

maritime industrial capability. The programme forms a core constituent and scheme of the UK Shipping Office for Reducing Emissions (UK SHORE), established by the Department for Transport (DfT) to drive maritime decarbonisation.

- 2.3 The Maritime competitions in scope for this evaluation have been supported by £187.5 million¹⁰ in Department for Transport (DfT) match funding and delivered in partnership with Innovate UK (IUK). CMDC has supported more than 380 organisations across six competitive funding rounds (Table 2-1). Each call has defined thematic priorities and funding scopes aligned to evolving policy objectives. Projects are typically consortium-based, encouraging collaboration between vessel operators, ports, technology developers, fuel suppliers, and research organisations to ensure system-wide innovation and integration across the maritime value chain.

Table 2-1: Overview of CMDC competitions

Competition	Timeframe	Summary	Funding ¹¹
CMDC 1	September 2021	A precursor competition to the UK SHORE programme, which funded 55 projects	£23m
CMDC 2	Jan 2023 – Aug 2023	DfT funding 31 pre-deployment trials and feasibility studies	£12m
CMDC 3	April 2023 – March 2025.	Funding for 19 demonstrations	£60m
CMDC 4	April 2024 – March 2025	Funding for 10 demonstrations, 13 pre-deployment trials and 11 feasibility studies	£33m
CMDC 5	April – June 2024	Feasibility studies examining Green Corridor routes between the UK and international partners (the Netherlands, Norway, Denmark and Ireland).	£1.5m
CMDC 6	September 2025 – March 2026	Pre-deployment trials and feasibility studies in clean maritime solutions	£30m

- 2.32 The programme targets the low- to mid-range Technology Readiness Levels (TRLs) within the research and development pipeline, bridging the gap between early-stage innovation and commercial deployment. By supporting feasibility studies, industrial research, pre-deployment trials and large-scale demonstrations, CMDC aims to de-risk emerging technologies, enable regulatory learning, and accelerate routes to market.

- 2.33 Case study projects illustrate the breadth of scope:

- **Hydrogen Innovation - Future Infrastructure & Vessel Evaluation and Demonstration** (Appendix C) aims to demonstrate zero-emission hydrogen technology in maritime settings by testing a hydrogen bunkering station and a hydrogen-powered uncrewed vessel at sea. It focuses on proving safety, performance and commercial readiness to support future green shipping.

¹⁰ This encompasses projects funded under CMDC Rounds 2–4 and ZEV1 projects across three strands: battery-electric vessels and charging infrastructure, shore power technologies, and alternative fuels.

¹¹ Funding amounts refer to the published spend at the start of the project (i.e. the offer grant), not actual spend.

- **Retrofit 20m Mercurio Crew Transfer Vessel (CTV)** (Appendix D) seeks to decarbonise offshore wind crew transfer operations by retrofitting an existing 20 metre diesel CTV into a fully electric vessel. It demonstrates a scalable, lower-carbon alternative to new builds while gathering real-world evidence on emissions, cost and operational benefits.

Insights from project delivery

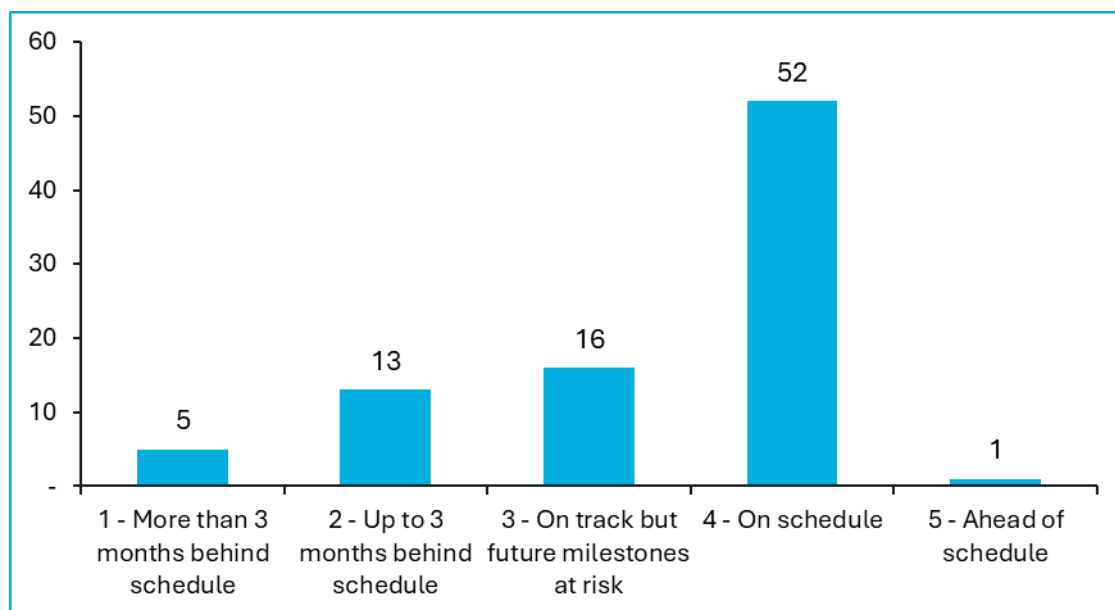
- 2.34 The extent to which milestones and deliverables for Maritime projects have been achieved in line with their planned timeline was explored using QMS data provided by IUK Monitoring Service Providers and collected as part of Wave 3.
- 2.35 The data available for analysis covered 87 Maritime projects across the following three CMDC competitions and seven strands, as set out in Table 2-2.

Table 2-2: Maritime competitions and associated strands included in QMS data

Competition	Strand
CMDC 2	Feasibility
CMDC 2	Collaborative R&D
CMDC 3	Vessel or Infrastructure demonstrations
CMDC 3	Combined demonstrations
CMDC 4	Feasibility Studies and Pre-Deployment Trials
CMDC 4	Vessel or Infrastructure demonstrations
CMDC 4	Vessel and Infrastructure Combined Demonstrations

- 2.51 As shown in Figure 2-1, analysis of QMS data indicates that:
- 52 out of the 87 projects across CMDC 2 and CMDC 4 (representing 54%) met (or are meeting) their planned timetables, including one project reported as running ahead of schedule.
 - A further 16 projects (18%) have met milestones for the current period, although future milestones are considered at risk.
 - In contrast, 18 projects (21%) have experienced milestone slippage of up to, or more than, three months.
- 2.52 Wave 1 QMS data¹² showed similar findings in relation to project timing: 63% of projects were assessed as meeting their planned timetable, 24% had met milestones to date but faced potential future slippage, and 13% had experienced slippage of up to three months.
- 2.53 While this could suggest that delays are more evident in Wave 3, this likely reflects differences in project scope and coverage. Wave 1 QMS data covered CMDC 2 and 3, whereas the current wave also includes CMDC 4 projects, which involve more complex pre-deployment trials and therefore face different sources of delay, discussed further below.

¹² It should be noted that across Waves 1 and 3, interviews and surveys were not conducted longitudinally with the same participants; therefore, findings should not be interpreted as an exact comparison over time.

Figure 2-1: Most recent QMS score for the timing of Maritime projects (n=87)

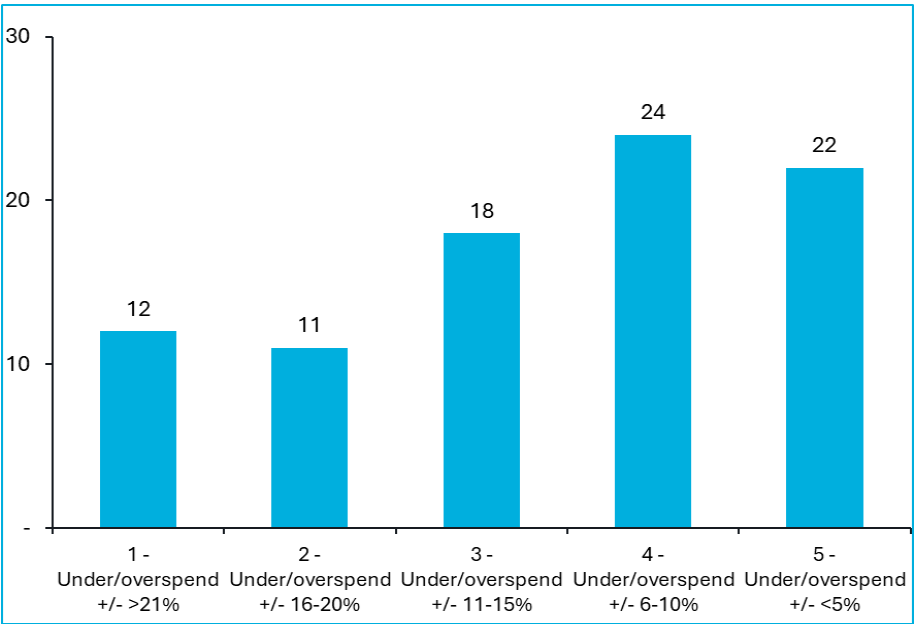
Source: QMS data (IUK), Steer-ED analysis (January 2026) (Answer options: Time Scoring Matrix, Scores 1-5)

- 2.54 For the single project identified as running ahead of schedule, this was attributed to effective delivery and programme management, with all substantive work completed and only formal project closure activities remaining.
- 2.55 Projects meeting their planned timetable form the dominant group, although delivery “on time” often involved managing a degree of friction. Across these projects, delays relating to procurement, supplier performance, technical integration, or regulatory and class documentation were common; however, these issues were typically absorbed within the schedule or resolved without affecting the agreed end date. In many cases, core technical work packages were completed as planned, while final reports, close-out documentation, or formal approvals were finalised shortly after project completion.
- 2.56 Where timelines were particularly tight, projects protected delivery through replanning or approved Project Change Request (PCR) extensions, which created more realistic baselines and were frequently cited as important in achieving completion. Several projects also noted that schedules were deliberately ambitious, requiring intensive effort, parallel working, or acceptance that some testing or validation activities would continue post-project. Overall, meeting the planned timetable generally reflects successful delivery of core technical objectives, with minor administrative, approval, or testing activities trailing slightly beyond the formal project end date.
- 2.57 Projects delayed by up to three months are typically minor overruns. Most work packages were completed, but one or two key dependencies, such as a compliance review, late design change, infrastructure issues, or delayed demonstration, pushed delivery into the close-out period or the next quarter. These projects were often described as “mostly complete,” with sea trials, demonstrations, or final integration deferred but expected to conclude shortly, sometimes on a zero-cost basis.
- 2.58 In contrast, projects delayed by more than three months faced multiple setbacks and issues that could not be resolved within the funded timeframe. These included persistent technical blockers, cascading equipment and build delays, unresolved approval or

certification requirements, and sustained subcontractor underperformance. In these cases, the lack of recovery options resulted in extended delays and incomplete delivery.

- 2.59 Findings from beneficiary interviews broadly support the QMS evidence, with the majority of projects reporting that they had either met, or were on track to meet, their planned objectives. Projects that experienced delays also corroborated the underlying causes identified in the QMS data, particularly in relation to approvals, infrastructure dependencies, supplier performance, and the scheduling of demonstrations.
- 2.60 The latest QMS data also provides an assessment of how well Maritime projects are delivering against their budget. As shown in Figure 2-2, 22 projects recorded an over- or underspend of less than 5%, while 24 projects showed a variance of 6-10%. Minor variances of under 5% were generally attributable to accurate forecasting and robust financial planning, with small and explainable differences such as slightly reduced travel costs or unrequired software licences. Projects recording a higher variance of 6-10% typically reflected operational adjustments, staging changes, or minor delivery delays.
- 2.61 A smaller group of 12 projects experienced larger variances, with an over- or underspend of more than 21%. In most cases, these variances reflect major delivery delays that resulted in expenditure being reprofiled between quarters. Common drivers included delayed procurement of high-value items such as electrical systems or test rigs, and slower-than-expected subcontractor contract signature. Larger variances also arose from forecasting inaccuracies, for example where forecasts were not updated following approved PCRs, or where delivery partners failed to submit claims over multiple quarters.

Figure 2-2: Maritime project delivery against budget (n=87)

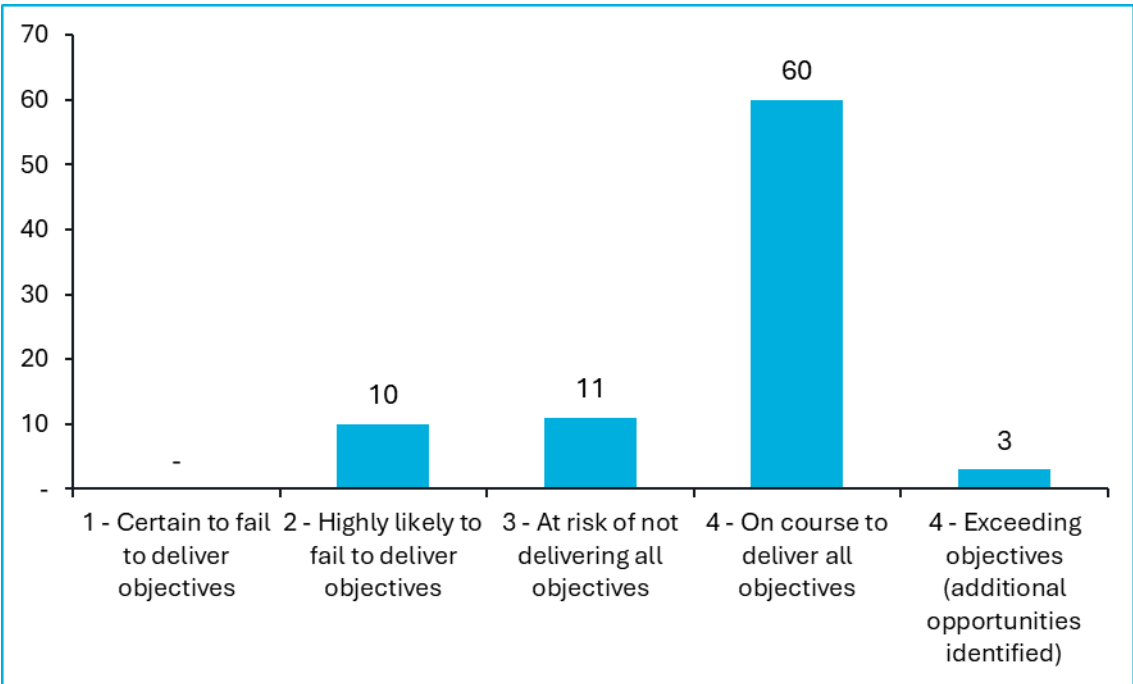


Source: QMS data (IUK), Steer-ED analysis (January 2026). Question: How well has the project been able to deliver against budget? (Answer options: Cost Scoring Matrix, Scores 1-5)

- 2.62 Finally, QMS data was used to assess the extent to which Maritime projects were achieving their objectives in Wave 3 (Figure 2-3). The majority of projects (60 projects, representing 71%) were assessed as having met, or being on track to meet, their planned objectives. A further three projects reported plans to pursue opportunities beyond those originally specified. These included progression to a major client project using developed

modelling software, completion of full deployment, further evaluation of asset longevity, and development of a tyre pressure monitoring system.

Figure 2-3: Most recent QMS score for the scope of Maritime projects (n=84)



Source: QMS data (IUK), Steer-ED analysis (January 2026). Question: How well has the project delivered against its objectives? (Answer: Cost Scoring Matrix, Scores 1-5)

Beneficiaries’ delivery experience

- 2.63 Beneficiaries reported a largely positive experience regarding delivery, with key enablers and barriers to delivery consistent across the projects.
- 2.64 **Beneficiaries generally found the application process to be clear and well structured**, with many noting that it became easier and more predictable with experience. Feedback on unsuccessful bids was valued, and several interviewees considered Innovate UK’s process smoother than comparable UK or EU schemes. Overall, the level of scrutiny was seen as appropriate given the use of public funding.

“So the process through Innovate UK is really good. We work across grant funding organisations in Europe, UK and Scotland and Innovate UK’s process is by far the smoothest.” – Maritime Wave 3 Beneficiary

- 2.65 However, the process was also described as time-intensive and demanding, particularly for SMEs. Short application windows, extensive narrative requirements, and expectations for early-stage certainty created pressure for small teams without dedicated bid resources. While most beneficiaries accepted this trade-off, some felt the burden risked discouraging repeat or first-time applicants.

“I mean, for an SME with six staff, it is a total utter nightmare of making these applications because it's so time consuming.” – Maritime Wave 3 Beneficiary

- 2.66 One wider stakeholder also highlighted that short application windows may encourage applicants to adapt existing activities to fit CMDC bids, rather than initiating genuinely new projects.

“Lots of these technologies and companies are already doing things and almost some of them are shoehorning what they want to do in so they can get funding for it. [...] I don't know if it's intentional or by accident, but it almost feels that it's [the application window] so short that, you've almost got to have the project ready and planned.” – Maritime Wave 3 Wider Stakeholder

- 2.67 **Interactions with IUK were described as positive and straightforward.** As well as deeply supportive through crises, delays and complexities.
- 2.68 Beneficiaries generally reported a positive and workable experience of grant management, with core processes functioning effectively. Quarterly claims and reporting were widely seen as appropriate for SMEs, providing structure without being overly burdensome. Online returns and claims submission were described as working reasonably well overall, with only minor practical issues around cost-line alignment that required additional liaison but did not materially disrupt delivery.
- 2.69 That said, beneficiaries highlighted a small number of friction points. Claims processes were sometimes described as slightly clunky, and the requirement for independent audits came as an unexpected and significant cost for small businesses. While these issues did not usually cause major problems, they did add administrative and financial pressure, particularly for SMEs operating with limited internal resources.
- 2.70 **Feedback on monitoring was largely positive.** Monitoring Officers were often described as knowledgeable, supportive, and constructive. Regular reviews and reporting requirements were seen as providing useful structure, helping projects to stay on track and avoid drift. The feedback received, while occasionally firm, was largely viewed as improving discipline and delivery.

“Monitoring Officers are generally very interested. They're innovation people and, we've had the same Monitoring Officer, which has been quite cool. [They] raise really useful points which have helped our projects.” – Maritime Wave 3 Beneficiary

- 2.71 **However, experiences were not entirely consistent.** Some beneficiaries noted variability between Monitoring Officers, differences in the depth and duration of reviews, and a lack of standardisation in reporting templates, which could increase administrative burden. Overall, monitoring was regarded as effective and reasonable, but with scope to improve consistency and reduce unnecessary process friction.

“There’s some inconsistency on reporting. Maybe, so some monitoring officers want more reporting than others. Maybe some more consistency there would be good.” – Maritime Wave 3 Beneficiary

Key barriers and enablers to delivery

- 2.72 Across delivery, there were some **barriers** highlighted across beneficiaries:
- **Funding and cash-flow constraints:** Retrospective reimbursement, long payment cycles, and grants not fully covering real or evolving costs created cash-flow pressure, particularly for SMEs.
 - **Administrative and contractual burden:** Heavy collaboration agreements, slow change approvals, and difficulty handling organisational changes delayed starts and reduced project agility.
 - **Compressed timelines:** Short delivery windows limited iteration, increased delivery risk, and reduced value for money, especially in later CMDC rounds.
- 2.73 **Enablers** to successful delivery reported by beneficiaries included:
- **Flexibility and pragmatism in delivery:** Innovate UK’s willingness to accommodate evolving project directions, where still aligned with decarbonisation objectives, was seen as beneficial for R&D, recognising the iterative nature of innovation.

“When you’re scoping out a project, particularly if it’s a longer project, you don’t quite know what direction it goes in. There seems to be good pragmatism that that’s fine, which again doesn’t necessarily exist everywhere.” – Maritime Wave 3 Beneficiary

- **Favourable project context and test environments:** In some cases, project location and operating context (e.g. avoiding complex international jurisdictions) significantly simplified implementation and reduced delivery risk. The corridor between the Port of Dover and the French ports of Calais and Dunkirk was cited as a specific example, reflecting the predictability and consistency of operations, with ferries running regularly between these locations.
- **Continuity and consistency in monitoring:** Having the same Monitoring Officer across multiple projects created continuity, improved understanding of project context, and reduced administrative friction.

Conclusion

- 2.74 CMDC was established to accelerate the development, demonstration, and early deployment of clean maritime technologies, supporting the UK’s ambition to decarbonise domestic maritime operations while strengthening industrial capability. Across multiple funding rounds, the programme has supported a broad portfolio of feasibility studies, pre-deployment trials, and large-scale demonstrations spanning vessels, ports, fuels, and enabling infrastructure. While delivery has taken place against a backdrop of technical complexity and ambitious timelines, the majority of projects have progressed broadly in line with expectations, with many now generating operational evidence, regulatory learning, and clearer routes to market.

- 2.75 Delivery experience across the programme has been largely positive. QMS data shows that most projects have met, or are on track to meet, their planned objectives, with delays typically contained and attributable to technical challenges and certification requirements. Beneficiaries consistently valued Innovate UK's role in supporting delivery, highlighting constructive engagement, pragmatic monitoring, and flexibility where projects evolved in response to learning. However, participants also reported challenges linked to compressed delivery windows, cash-flow pressures associated with retrospective reimbursement, and administrative or contractual burdens, particularly for SMEs and complex consortia.
- 2.76 Overall, CMDC has played a critical role in de-risking innovation, enabling collaboration across the maritime value chain, and advancing technologies closer to commercial deployment. While the programme's scale and ambition inevitably introduced delivery pressures, beneficiary feedback suggests that its core strengths, particularly the quality of monitoring, flexibility in delivery, and alignment with sector needs, have supported meaningful progress. The findings from this chapter highlight both the effectiveness of the programme to date and the opportunity to further strengthen delivery experience in future rounds, as projects move from demonstration toward sustained commercial uptake.

3 Building and strengthening partnerships through programme delivery

Key Messages

- The Maritime programme has been highly effective in strengthening both new and existing partnerships, with survey and interview evidence showing widespread collaboration and consistently high ratings for relationship quality.
- Partnerships with universities, regulators and end users were particularly valuable, supporting applied research, regulatory learning, access to test assets, and the development of credible routes to commercial deployment.
- Delivery-led collaboration played a critical role, with joint problem-solving, shared data and operational learning helping consortia deliver first-of-a-kind projects and manage technical and regulatory complexity.
- Beneficiaries reported clear benefits from these partnerships, including improved bid quality, skills and workforce development, enhanced visibility and credibility with government and industry, and the creation of new sector initiatives and coordination mechanisms.

Introduction

- 3.1 A key objective of the LMT portfolio is to encourage a collaborative approach to research through fostering new academic and commercial partnerships. As a result, Maritime programme applicants were required to deliver their project in partnership with at least one other organisation. Participating organisations could include businesses, charities, academic institutions, public sector organisations and research and technology organisations.
- 3.2 This chapter sets out the role of project delivery in building and strengthening partnerships between industry, academia and regulators. It explores the mechanisms through which new partnerships were formed, and the Maritime programme's contribution to strengthening these relationships. It goes on to describe beneficiaries' accounts of the types of partnerships formed and their anticipated (or realised) benefits.

Exploring the role of programmes in partnership development

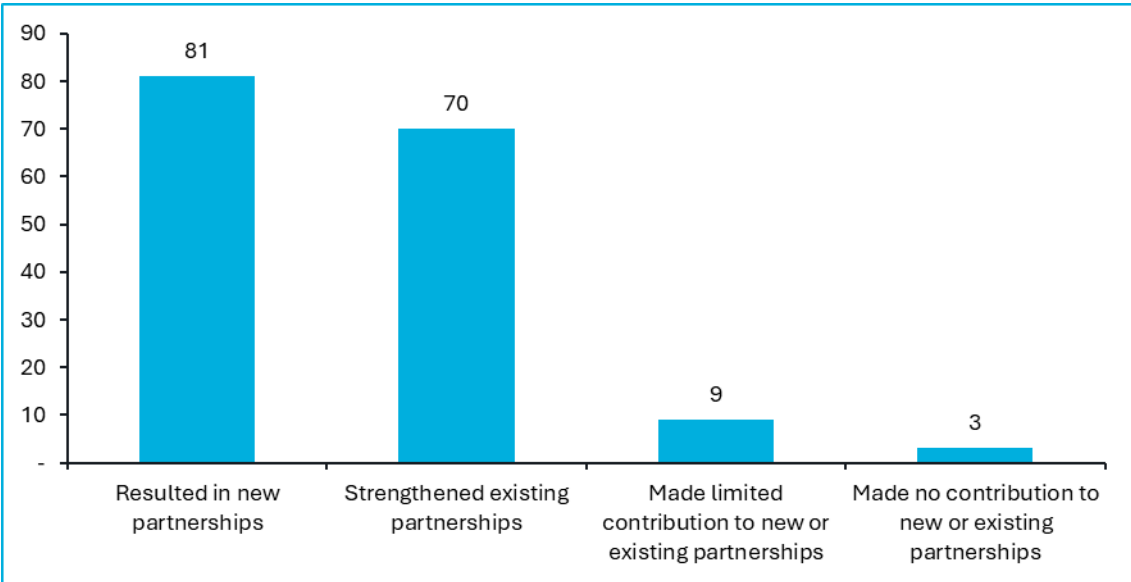
3.3 Across Wave 3, nearly all beneficiaries reported that partnership and collaboration formed a key part of the Maritime programme. Interviewees reflected that their involvement in Maritime played a pivotal role in enabling and shaping both new and existing partnerships.

“This sort of collaboration wouldn’t have come through if CMDC funding wasn’t there.” – Maritime Wave 3 Beneficiary

3.4 This is supported by beneficiary survey findings, as shown in Figure 3-1: which indicated that Maritime participation facilitated both the formation of new relationships and the strengthening of existing ones, reported by 81 (70%) and 70 (61%) beneficiaries respectively.

3.5 When compared to Wave 1 findings, this points to an evolving pattern of partnership development: 87% of respondents reported forming new relationships, compared to 51% who reported strengthening existing ones. Taken together, these findings suggest that partnership formation has been a consistent strength of the Maritime programme, with a growing emphasis over time on strengthening existing partnerships as successive competitions have progressed.

Figure 3-1: Extent to which the project has contributed to new relationships/partnerships or strengthening existing ones (n=115)

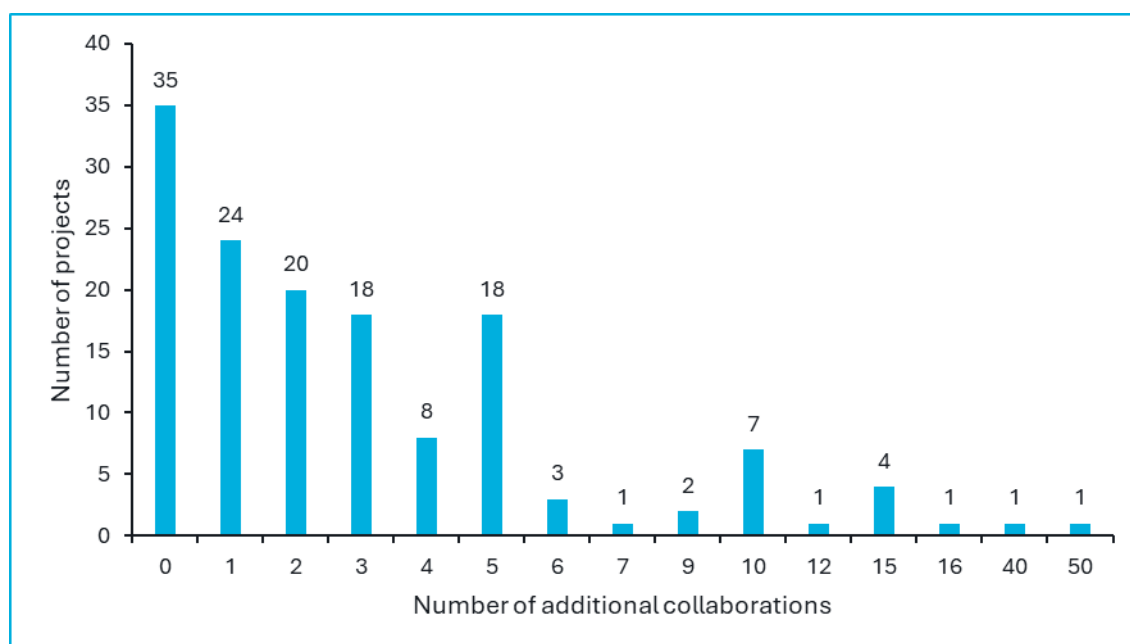


Source: Beneficiary Survey, Steer-ED analysis (January 2026). Question: ‘To what extent has the project contributed to creating new relationships/partnerships or strengthen existing ones?’ (Answer options: Yes, No for each category)

3.6 Analysis of Wave 3 IMS data provides another source that supports these findings with 109 out of 144 beneficiaries having formed new collaborations over the past year (Figure

3-2). This indicates Maritime has stimulated new connections, broadening the reach and impact of innovation activity.

Figure 3-2: Number of new collaborations of beneficiaries in the past 12 months, as a result of the Maritime programme (n=144)



Source: Wave 3 IMS data (IUK), Steer-ED analysis (January 2026), Question: As a result of this Innovate UK support, how many new collaborations have you made with external organisations in the last 12 months?

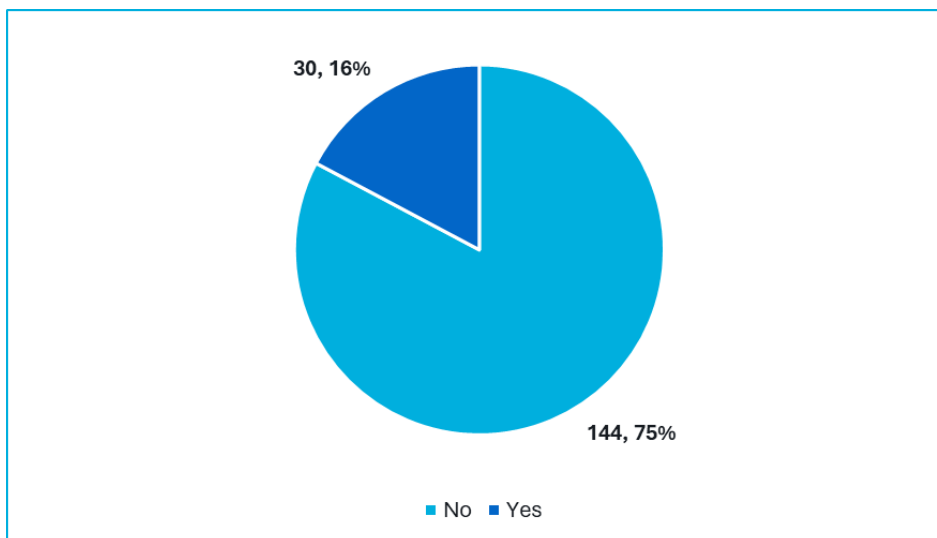
3.7 These partnerships have formed through a variety of mechanisms:

- **Programme-enabled networking and visibility:** Showcase events, cohort activities, and Innovate UK-led engagement increased visibility and credibility, helping organisations attract new partners, commercial leads, and stakeholder interest. These forums facilitated informal relationship-building alongside formal project delivery.
- **Progressive expansion of consortia:** Partnerships often evolved across CMDC rounds, with consortia expanding to include additional specialist capabilities (e.g. data, AI, simulation, hydrogen systems) as project needs became clearer.
- **Delivery-led relationship building:** Joint problem-solving, shared data, and operational learning.
- **Knowledge exchange and capacity building:** Knowledge transfer between partners, including academic input into design and regulation, and industry insights into operations and commercial constraints.

3.8 Innovate UK Business Connect (Innovate UK's partner-matching, networking and advisory service), and the Catapult Centres (which are UK-wide, sector-focused innovation organisations established by Innovate UK) are intended to support partnership development. Their role is to foster connections between project beneficiaries and relevant Catapult Centres, supporting collaboration, access to specialist expertise, and capability building across the programme.

3.9 However, as shown in Figure 3-3, only 16% of Maritime beneficiaries reported using IUK Business Connect in relation to support sought from IUK.

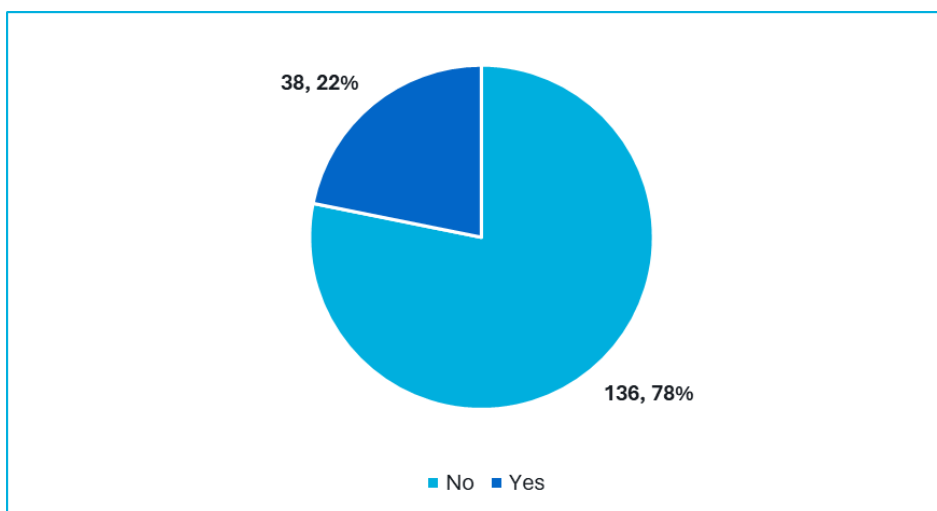
Figure 3-3: Number of Maritime beneficiaries that have used IUK Business Connect (n=174)



Source: Wave 3 IMS data (IUK), Steer-ED analysis (January 2026), Question: Have you used IUK Business Connect engagement related to this support?

- 3.10 A similar pattern is observed for Catapult Centre engagement, with only 22% of beneficiaries confirming involvement with a Catapult Centre (Figure 3-4:).

Figure 3-4: Number of Maritime beneficiaries that have used the Catapult Centre (n=174)



Source: Wave 3 IMS data (IUK), Steer-ED analysis (January 2026), Question: Have you had Catapult centre engagement related to this support?

- 3.11 This suggests that both IUK Business Connect and the Catapult Centres may be underutilised in relation to their intended role in partnership formation within the Maritime programme. Findings from Wave 1 interviews similarly indicated that Business Connect was not a key driver of new partnership formation, suggesting that its role may not have evolved since then.
- 3.12 One possible explanation is that beneficiaries were able to establish sufficient partnerships through the mechanisms highlighted above, which is consistent with the high proportion of projects reporting new collaborations. However, one beneficiary

reported unsuccessful attempts to engage with Business Connect, indicating potential gaps in responsiveness.

“We've actually been trying to get in touch with Business Connect for some time to sort of see if they've got anything to help on the exploitation front. So that's one area where maybe innovate you know could be a little bit better just in terms of reactivity and support.” – Maritime Wave 3 Beneficiary

- 3.13 This suggests that the role of these organisations, and how they support Maritime projects going forward, could be more clearly defined to ensure targeted assistance for projects that require it. As well as improving signposting to support that some beneficiaries may not be aware of, even where partnerships are already being formed through other mechanisms.

Types of partnerships formed, and how they have been used

- 3.14 Beneficiaries described several types of partnerships formed or strengthened through project delivery, including:
- **Partnerships with universities:** Many projects brought together universities and industry partners to combine research with delivery. Universities contributed simulation and testing, while industry partners provided vessels, infrastructure and operational data. In several cases, these relationships were new and later evolved into longer-term collaboration.
 - **Partnerships with regulators:** Projects frequently involved regulators and classification bodies (e.g. Lloyd's Register, Maritime and Coastguard Agency [MCA]) as close collaborators. These relationships supported regulatory learning, the development of new guidance, and early engagement on approval pathways, sometimes contributing directly to rule-setting and standards development.
 - **Partnerships with end-users:** Many consortia included vessel operators, ports, ferry operators, shipyards, and infrastructure owners as end users. These relationships grounded projects in operational reality, provided trial assets and test sites, and helped shape credible routes to commercial deployment.
- 3.15 One wider stakeholder also highlighted the Clean Maritime Research Hub¹³ as a future route through which partnerships may be formed or strengthened. Many Hub members have been involved in CMDC projects, positioning the Hub as a complementary mechanism for linking partners and sustaining collaboration beyond individual projects.

¹³ Funded by the Engineering and Physical Sciences Research Council (EPSRC) and the UK SHORE programme, the Hub is a partnership of 14 universities, supported by 70+ industrial, civic and international partners, dedicated to decarbonising the maritime industry.

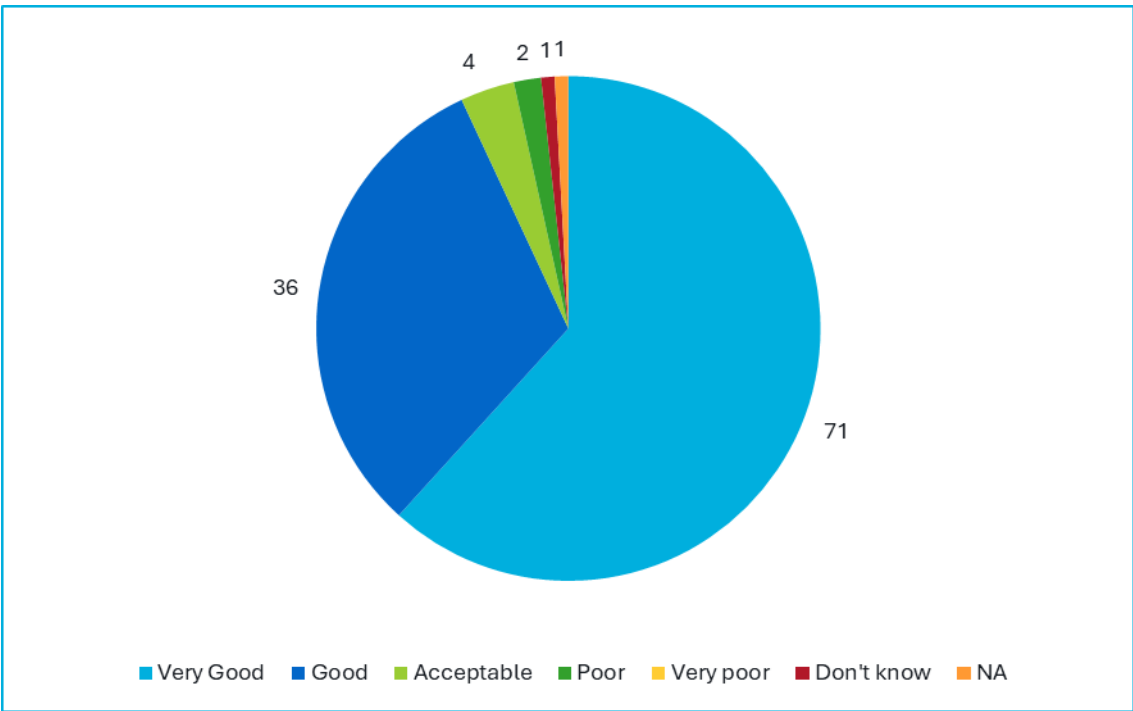
“The Hub would like to play even more of a role, if it was deemed feasible or possible.” – Maritime Wave 3 Wider Stakeholder

- 3.16 In terms of the quality of the relationships formed, feedback across the board was mostly very positive, with many beneficiaries reporting that the collaborations were strong, high-trust, and productive during delivery.

“[The partnership is] a very successful case study where they partnered up and helped sort of handhold really a non-experienced shore power business get into this market. The partnership was valuable to us.” – Maritime Wave 3 Beneficiary

- 3.17 This sentiment is also reflected in the beneficiary survey results. As shown in Figure 3-5, 71 out of 115 responses to the beneficiary survey reported the quality of relationships between project partners to be ‘very good’. Results also showed that 36 beneficiaries found that the relationship quality was ‘good’, while four reported it to be ‘acceptable’. Two respondents reported relationships between partners to be poor. Results also showed that 11 beneficiaries reported relationships between partners to be very poor, 2 reported it to be don't know, and 1 reported it to be NA.

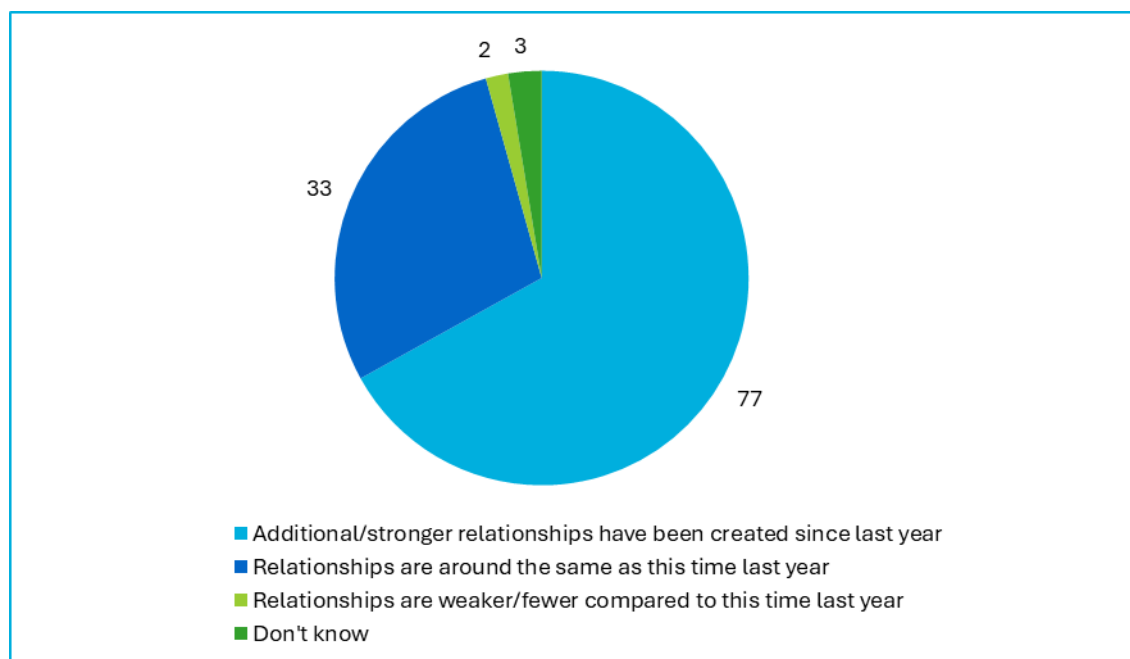
Figure 3-5: Beneficiary perspectives on the quality of relationships between project partners (n=115)



Source: Beneficiary Survey, Steer-ED analysis (January 2026). Question: ‘How would you rate the quality of relationships between project partners?’

- 3.18 Throughout the programme, the nature and scope of relationships have evolved, as shown by Figure 3-6. Survey data indicates that 77 of 115 beneficiaries (67% of responding beneficiaries) reported the establishment of new or stronger relationships compared to last year.

Figure 3-6: Beneficiary perspectives on how relationships have changed since last year (n=115)



Source: Beneficiary Survey, Steer-ED analysis (January 2026). Question: ‘How would you rate the quality of relationships between project partners?’

- 3.19 Two wider stakeholders also echoed that collaboration had improved since earlier competitions.

“You've got the projects, you've got the government, you've got the class societies, the certifying authorities, all the people involved. That communication is working better now than it was, not saying there's not still iterations for improvement, but it's definitely there.”
 – Maritime Wave 3 Wider Stakeholder

- 3.20 Despite this, some beneficiaries noted that relationships weakened after project completion, particularly where there was no immediate operational or commercial need to continue working together. In these cases, partnerships were still viewed as valuable, but time-limited.

“[The relationship] cooled a bit. They're all very busy, as are we. So, unless you've got a common goal, it's hard to keep those communications going, but we're still friends.”
 – Maritime Wave 3 Beneficiary

Beneficiary perspectives on the benefits of partnerships

- 3.21 Beneficiaries were asked to further explain any benefits realised because of new or strengthened partnerships through Maritime involvement.

- 3.22 Interviewees reported that partnerships delivered clear benefits during delivery, including enabling consortia to function at all, shaping successful bids, and supporting first-of-a-kind projects. Partnerships led to concrete outcomes such as invitations to Horizon Europe bids, successful follow-on funding awards, opportunities for extended trials (including year-long testing), and the creation of new initiatives such as the Maritime Supply Chain Innovation Centre.¹⁴

“Very good rapport with EMEC and in fact we did a joint application. They invited us to apply for one of the European Horizon projects because of what we had done with them.”
– Maritime Wave 3 Beneficiary

- 3.23 Collaboration also strengthened skills pipelines and regional capability. For example, through graduate recruitment, curriculum development, and regional working groups. Visibility and credibility was also increased with government, policymakers, and industry stakeholders through events, showcases, and case-study dissemination.
- 3.24 Looking ahead, many of the beneficiaries that were interviewed expect to continue working with key partners, particularly universities, ports, test facilities and regulators, to support commercialisation, skills development and sector engagement.
- 3.25 Several highlighted ongoing activities, such as: curriculum delivery and graduate recruitment, use of existing or future demonstration facilities, and continued engagement through regional working groups and sector initiatives – including when collaboration is less intensive than during delivery.

“So certainly, with Southampton University, we are now taking effectively a minimum of two graduates per annum from them as a direct benefit of our collaboration together.” – Maritime Wave 3 Beneficiary

Case study vignette showcasing partnership development and the benefits to the project/organisation

The retrofit of the 20m Mercurio Crew Transfer Vessel (CTV) to 100% electric propulsion (Appendix D) demonstrated the technical feasibility of zero-emission operations in the offshore wind sector.

Strong partnerships were central to the project’s success. Vessel operators, propulsion and battery suppliers, offshore wind stakeholders and investors worked collaboratively to de-risk system integration and enable validation. Close collaboration across partners, including MJR Power & Automation, Blackfish Engineering, Artemis Technologies, and Goodchild Marine Services, was a major strength. This enabled iterative design improvements and ensured that the retrofit responded directly to operational requirements offshore.

¹⁴ The Maritime Supply Chain Innovation Centre (MSCIC) is a new, UK-based innovation centre focused on strengthening the maritime manufacturing and supply chain, particularly for SMEs.

The commercial benefits of partnership have been equally significant. The project has strengthened investor confidence, supported new vessel orders, and catalysed the creation of 'Charge Offshore' during CMDC 1, a dedicated commercial pathway to scale electric CTV deployment. Charge Offshore, a specialist maritime electrification company, now provides a focused platform to commercialise learnings from the retrofit, attract further investment, and accelerate market adoption.

Conclusion

- 3.26 Overall, the evidence indicates that the Maritime programme has been highly effective in fostering collaboration across industry, academia and regulators. Both survey and interview findings show that participation has consistently enabled the formation of new partnerships and the strengthening of existing ones, with collaboration widely regarded as integral to successful project delivery.
- 3.27 Partnerships formed through the programme were diverse in nature and purpose, spanning academic research, regulatory engagement and end-user involvement, and were generally characterised by high levels of trust and productivity during delivery. While engagement with Innovate UK Business Connect and the Catapult Centres was limited, beneficiaries were nevertheless able to establish robust partnerships through programme-enabled networking, consortium working and shared delivery challenges.
- 3.28 Beneficiaries reported that these partnerships delivered tangible benefits, including enabling complex projects to proceed, supporting skills and capability development, and enhancing visibility and credibility within the sector. Although some collaborations naturally reduced in intensity following project completion, many have provided a strong foundation for continued engagement around commercialisation, skills development and sector coordination. Taken together, the findings suggest that the Maritime programme has made a strong contribution to strengthening collaborative capacity within the UK maritime decarbonisation ecosystem.

4 Development, commercialisation and deployment of new technologies

Key Messages

- CMDC funding rounds has enabled significant movement ‘up’ the TRL chain, and several projects are now fully commercialised. Earlier CMDC funding rounds focussed primarily on early-TRL levels, and several organisations have progressed through subsequent CMDC funding rounds to advance these technologies up the TRL chain.
- Knowledge sharing has been a prominent and useful component of technology commercialisation. The collaborative environment encouraged by the consortium requirement in CMDC funding rounds has enabled a deep level of collaboration across what is a small industry, with academic partnership proving especially useful for unlocking expert knowledge.
- Barriers to mass commercialisation remain and could prove prohibitive if not proactively addressed. Gaps between CMDC funding rounds was often cited by project teams as a barrier to many of these firms, which, due to the innovative nature of the technology (and the risks associated with this), are largely reliant on CMDC grant funding for commercialisation.

Introduction

- 4.1 This chapter explores the extent to which Maritime projects have been successful in developing and deploying technologies, as well as progressing towards commercialisation.

Reported TRL progression across projects, and mechanisms driving this

- 4.2 CMDC funding rounds have enabled progression through the TRL levels¹⁵, with several firms entering the early funding rounds with early-stage TRL projects (TRLs 1-3), and

¹⁵ Based on beneficiaries that have reported TRL levels in the Beneficiary Survey.

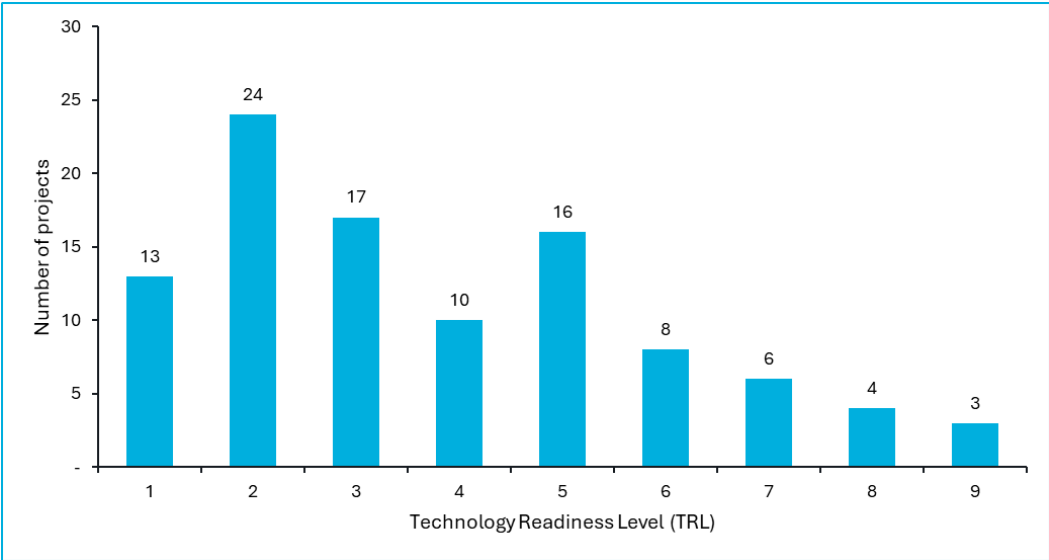
progressing into CMDC6 with later stage TRL projects, including some notable projects at TRL 7 and beyond.

- 4.3 For those firms that have been part of several CMDC funding rounds, and progressed up the TRL chain, a typical progression looks as follows:
- **CMDC 1-2 (TRL 2-4):** Typically, feasibility studies focussing on validating alternative fuel systems for maritime use, or conceptual systems designs and early digital models.
 - **CMDC 2-4 (TRL 4-6):** There is greater variation among these, particularly in terms of the type of technology developed, but typically include bench-scale prototypes, trials of ancillary technologies (i.e., propellers for larger ship systems), and system-level architecture for electrical or hydrogen systems.
 - **CDMC 4-6 (TRL 4-6):** Included various strands ranging from larger-scale field trials, operational testing, early patenting and commercialisation, as well as early-stage feasibility studies.
- 4.4 CMDC funding rounds can therefore be seen as a direct mechanism for driving commercialisation, funding research and testing that enables firms to develop and demonstrate technologies ultimately for commercialisation and deployment.
- 4.5 Two points are of note here. First, not all firms have participated in every CMDC funding round; some engaged only in earlier or later rounds. As a result, these firms do not necessarily follow the progression pathway outlined above and may not demonstrate the same TRL progression as projects that participated in successive rounds. Second, the later CMDC funding rounds have not funded TRL 6-7 projects exclusively; in some cases, early-stage TRL projects have also been funded (such as feasibility studies).
- 4.6 Many firms have reported development of fully-commercialised products, through the surveys and interviews, as a result of one, or multiple, CMDC funding rounds.

“Post CMDC three we have commercialised. So we are a business that is making revenue. We’ve made about 1.5 million in revenue demonstrating pioneer delivering payload capabilities.” – Maritime Wave 3 Beneficiary

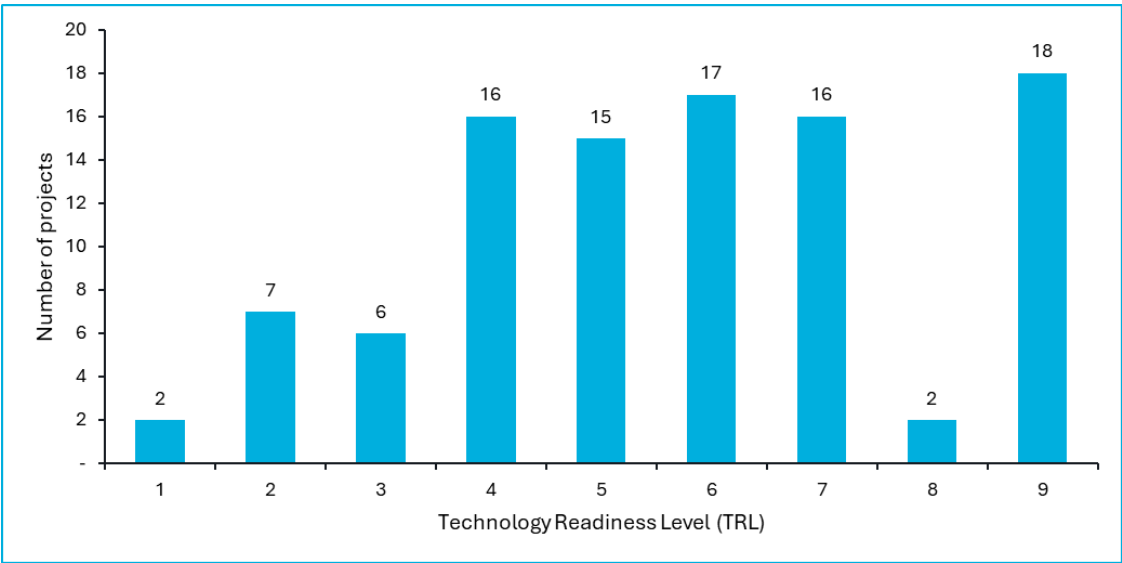
- 4.7 Before the application process of the Maritime programme the vast majority of firms surveyed were operating at TRL 1-5. At the time of the survey, firms have made significant progress, with most firms operating at TRL 4-9, with a plurality of firms at TRL 9, demonstrating a proven system in an operational environment.
- 4.8 The progression of technology aided by CMDC funded projects is demonstrated by Figure 4-1 and Figure 4-2 below, outlining TRL progression from the start of CMDC-funded projects until their completion.

Figure 4-1: Reported TRL of Maritime projects at application stage (n=115)



Source: Beneficiary Survey, Steer-ED analysis (January 2026), Question: With reference to the Technological Readiness Level (TRL) scale, what was the TRL of the technology when you completed your application? (Answer options: Numeric (1-9), Unsure)

Figure 4-2: Reported current TRL of Maritime projects (n=115)



Source: Beneficiary Survey, Steer-ED analysis (January 2026), Question: With reference to the Technological Readiness Level (TRL) scale, what is the TRL of the technology now? (Answer options: Numeric (1-9), Unsure)

Intellectual property and information dissemination

4.9 Intellectual property (IP) generation has been prominent throughout all CMDC funding rounds. Across maritime projects captured by the Beneficiary Survey, 18 patent applications have been submitted by participant firms, including for: carbon-capture and storage systems, and hydrogen and ammonia injection systems. These are examples of novel technology in the maritime decarbonisation industry and demonstrates increased knowledge in this sector.

- 4.10 In addition, during beneficiary interviews, many firms added that their teams have gained specialist knowledge through CMDC-funded projects that has boosted the capability of the sector as a whole.
- 4.11 As the maritime sector in the UK is generally small, industry actors tend to communicate and collaborate widely, and knowledge dissemination is commonplace, with the exception of novel technologies that have commercial sensitivities. Academic institutions, encouraged to become involved through the consortium-building process, are a main source of this knowledge-sharing, with many projects reporting that numerous articles had been published as a result of CMDC funding.
- 4.12 Another route for knowledge sharing is through often well-attended industry events, including those organised by Innovate UK. Several recipients mentioned strong relationships with the maritime industry in India, where the UK-India trade deal has opened up doors for new research and commercial opportunities.
- 4.13 Using Meltwater data, mentions of Maritime projects in the media were identified (including in news media, trade press, industry publications, social media, blogs, and other sources), with searches undertaken for each of the projects based on keywords from 2025-2026.
- 4.14 Media items were found in the last year for 48 of the 87 projects in the Maritime portfolio. This included 2,649 media items in total, so an average of 30 items per project (across all 87 projects). Across the programme, most of the media items found were news items (81%), while social media posts accounted for 19%.
- 4.15 Analysis suggests that projects that are more user-facing, involving real-world demonstrations, have tended to gather more press. The most media items (100+ in each case) were identified for the following four Maritime projects:
- **Pioneering Onboard Carbon Capture - Pilot Project (700 items)** – developing and demonstrating an onboard carbon capture technology on an ocean-going vessel.
 - **Multipurpose eFoil Platform (402 items)** - demonstrating a 100% electric water taxi and luxury yacht.
 - **AirWing Maximised Thrust Wind Propulsion Demonstration (356 items)** - demonstrating an auxiliary wind propulsion system on cargo ships.
 - **Zero Emission Cross River Ferry (111 items)** – demonstrating a zero emission ferry across the river Thames between Canary Wharf and Rotherhithe.

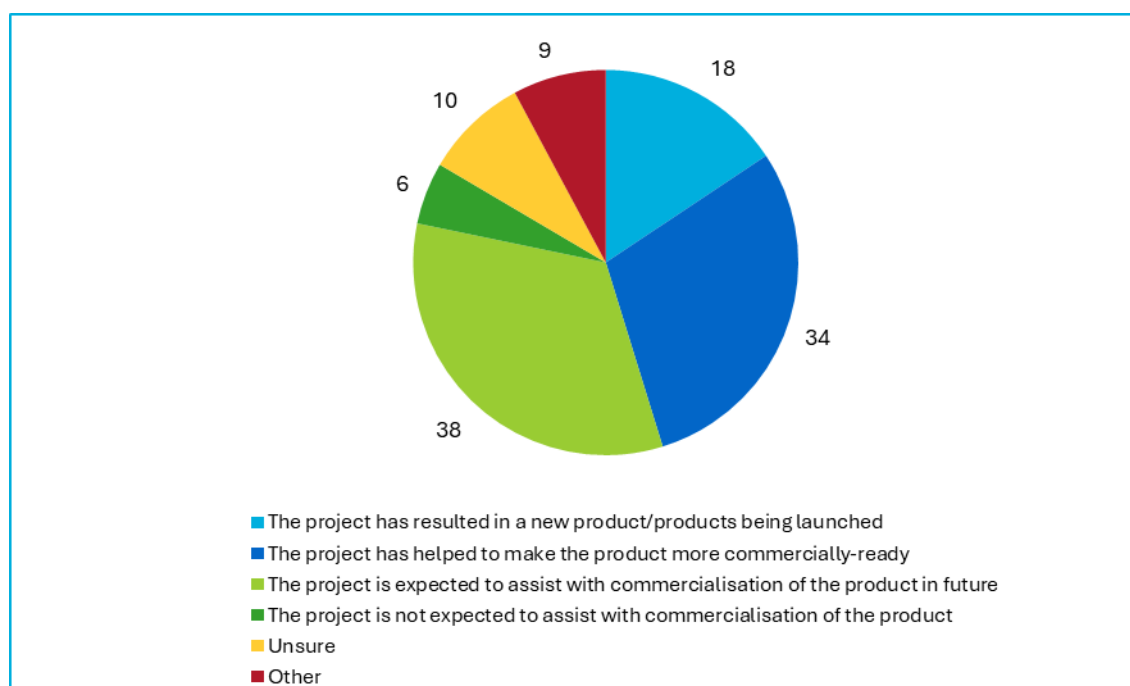
Commercial progress made by organisations

- 4.16 Recipient organisations have made significant progress towards commercialisation, including, as mentioned, revenue generation from CMDC-funded projects. In the majority of cases, this commercialisation was solely attributed to the LMT-funding, with many projects suggesting that the high costs associated with innovation projects would have prevented any progress being made in the absence of this funding.
- 4.17 Several examples of commercial progress were highlighted by projects as follows:
- Commercial traction was especially prominent among training focused organisations, particularly those responsible for designing the hydrogen maritime technician curriculum. This curriculum has begun to be adopted by early customers, including maritime training centres, port sector skills academies, and private operators seeking to prepare their workforces for the transition to hydrogen and ammonia fuels.

- One consortium was awarded a substantial contract with Belfast Harbour to contribute to the planning, specification, and early deployment stages of its emerging hydrogen enabled green port zone.
- Firms developing ammonia ready generator sets (gensets) reported expanding their manufacturing capacity in response to rising interest from both UK based vessel operators and overseas stakeholders. This expansion includes investment in upgraded assembly lines, new test bench equipment, and the hiring of specialist engineers.
- Several SMEs also reported securing export agreements in international markets, such as India and mainland Europe, for hydrogen generation equipment and integrated power management systems. These agreements ranged from small pilot orders through to multi-unit procurement discussions. Several firms noted that international clients viewed CMDC supported technologies as more credible than those from competitors, due to its association with the UK government - though this was less of a factor in domestic markets, likely due to the number of SMEs engaging in CMDC funding rounds.

4.18 Feedback from the interviews is supported by survey responses, with 78.3% of respondents stating that the Maritime programme is at least expected to assist with the commercialisation of the project in the future.

Figure 4-3: The role Maritime projects have played in commercialisation progress (n=115)



Source: Beneficiary Survey, Steer-ED analysis (January 2026), Question: Which of the following statements best represents current progress in terms of helping to get the product to market?

4.19 The following three Maritime projects provide selected examples of commercial progress:

- **Project ZERO – Zero-Emission Research and Offshore Service Vessel:** It produced fully modelled vessel designs, engineering studies, business cases, and shipyard engagement work — all of which are now being used to prepare for a future commercial build. Due to this comprehensive suite of project, partners have secured follow-up interest and discussions with shipyards.

- **ZE H-Class Ocean USV:** The project successfully developed the vessel architecture, fuel-cell system, and safety case, receiving Approval in Principle (AiP) from classification bodies for a hydrogen powered USV. This has directly fed into a larger, commercially-funded programme that aims to build and deploy the vessel.
- **Marine Vessel Lightweighting (MariLight):** This project looked at how to use advanced materials and 3D-printing-style manufacturing to make vessel components much lighter whilst maintaining strength. Those findings are now being used to pitch lightweighting solutions to shipbuilders and component suppliers who want efficiency improvements.

Barriers and enablers to technological and commercial development

- 4.20 Throughout the interviews, firms were very clear on the barriers to the commercial development of their technologies, including:
- **Cultural:** Beneficiaries often report that ports and the maritime industry are conservative organisations, adhering to long established processes- making it difficult to persuade them of the benefits of new technologies.
 - **Regulatory:** Consultations have highlighted that regulators and class societies are often making regulations as these technologies are commercialised, meaning there is limited information on what is expected of new technologies. There is also a gap between standards and regulations in current legislation, and a suggestion that regulatory minimums are often placed at a level that prevents healthy competition between firms operating at different discretionary standards.
 - **Financial:** Through our engagement with industry, it is evident that the industry is beset with a number of financial difficulties. SMEs are often self-funded, and angel investment in the UK is limited in comparison with the US, with much of what is available in the last few years geared towards artificial intelligence.
 - **Political:** Political will around commitment to the net zero agenda was a common theme throughout the consultations, with many suggesting a more intensive carbon taxation policy was needed to achieve this goal. Most commonly, the gaps between funding rounds on LMT, and other government projects, was identified as a barrier to accelerating firms up the TRL scale.
- 4.21 Enablers for the development, commercialisation, and deployment of new technologies highlighted include:
- **Partnerships:** Willing commercial partnerships, in part cultivated through CMDC funding rounds, has enabled greater knowledge-sharing and technology advancement than could be achieved in silos. Academic institutions were especially noted as being receptive to aiding commercial projects, and provided a wealth of expertise.
 - **Expertise:** Respondents often felt that the UK had a wealth of talent in engineering and the clean energy sciences that could help accelerate the decarbonisation of the maritime industry, with the right incentives.
- 4.22 Generally, recipients were more likely to mention the barriers to commercialisation of their projects, with the main enablers already being in place, and the barriers still yet to be overcome.

Case study vignette showcasing a project which has made notable commercial progress, plus commentary on the barriers and enablers experienced

Led by ACUA Ocean Ltd, Hydrogen Innovation – Future Infrastructure & Vessel Evaluation and Demonstration (HI-FIVED), involved the design, build, and certification of the UK’s first hydrogen-powered autonomous Small Waterplane Area Twin Hull (SWATH) vessel, the Uncrewed Surface Vessel (USV) Pioneer, along with a mobile hydrogen bunkering station.

The project delivered major technical breakthroughs, including first-of-its-kind regulatory approvals under Workboat Code 3, allowing the vessel to enter commercial service and begin generating revenue soon after certification.

The project faced significant challenges including a mid-project shift from liquid to gaseous hydrogen, difficulties with one of the consortium partners, and working through an under-developed regulatory landscape.

Despite this, the project succeeded through strong engineering capability, collaborative engagement with Lloyd’s Register and the Maritime and Coastguard Agency, and support from an otherwise helpful and experienced consortium.

UKRI support was the key enabler for the project’s success, and ACUA Ocean have stated that without CMDC funding the project would not have taken place.

Conclusion

- 4.23 The CMDC funding rounds have played a significant role in advancing maritime technologies from concept to commercial readiness. Through structured progression across the TRL scale, largely in line with CMDC funding rounds, many SMEs have been able to undertake development activities that would have not been possible without government support.
- 4.24 Alongside technical development, the programme has generated significant intellectual property and strengthened the wider knowledge base through publications, and media visibility. Academic–industry collaboration has been an especially powerful mechanism for capability building and dissemination of research and outputs.
- 4.25 However, commercial progress does remain vulnerable to systemic barriers. These constraints pose real risks to scaling, even for firms with strong prototypes or early commercial traction. The enablers identified (partnerships, expertise and sustained funding) highlight that continued structured support will be needed to maintain progress towards commercialisation.

5 Growing skills and organisational maturity through programme delivery

Key Messages

- A large proportion of beneficiaries reported meaningful improvements in skills, with projects driving upskilling across technical, operational, regulatory and project management areas through hands-on delivery of complex maritime innovation activities.
- Involvement in Maritime projects contributed to growth in organisational maturity, particularly for SMEs, through improved ways of working, strengthened internal systems, and greater confidence in delivering complex, publicly funded projects.
- Projects supported the embedding of more innovation-led organisational cultures, with beneficiaries reporting increased staff confidence, cross-team collaboration, and a stronger appetite for experimentation and learning.
- While immediate job creation was modest, programmes played a more significant role in safeguarding existing roles by stabilising organisations through enhanced capability and skills development.
- Wider labour-market benefits were also suggested, with improved employability of UK graduates and positive spill-over effects for the broader maritime skills ecosystem cited as potential longer-term impacts.

Introduction

- 5.1 Delivery of Maritime projects is expected to stimulate growth in the capability, capacity, resilience, workforce and skills of beneficiary organisations, ultimately leading to growth in the maturity and scale of the Maritime sector, with corresponding economic benefits. This chapter sets out the mechanisms by which activities have impacted organisational skills and maturity, and the role of the programmes in creating and safeguarding jobs.

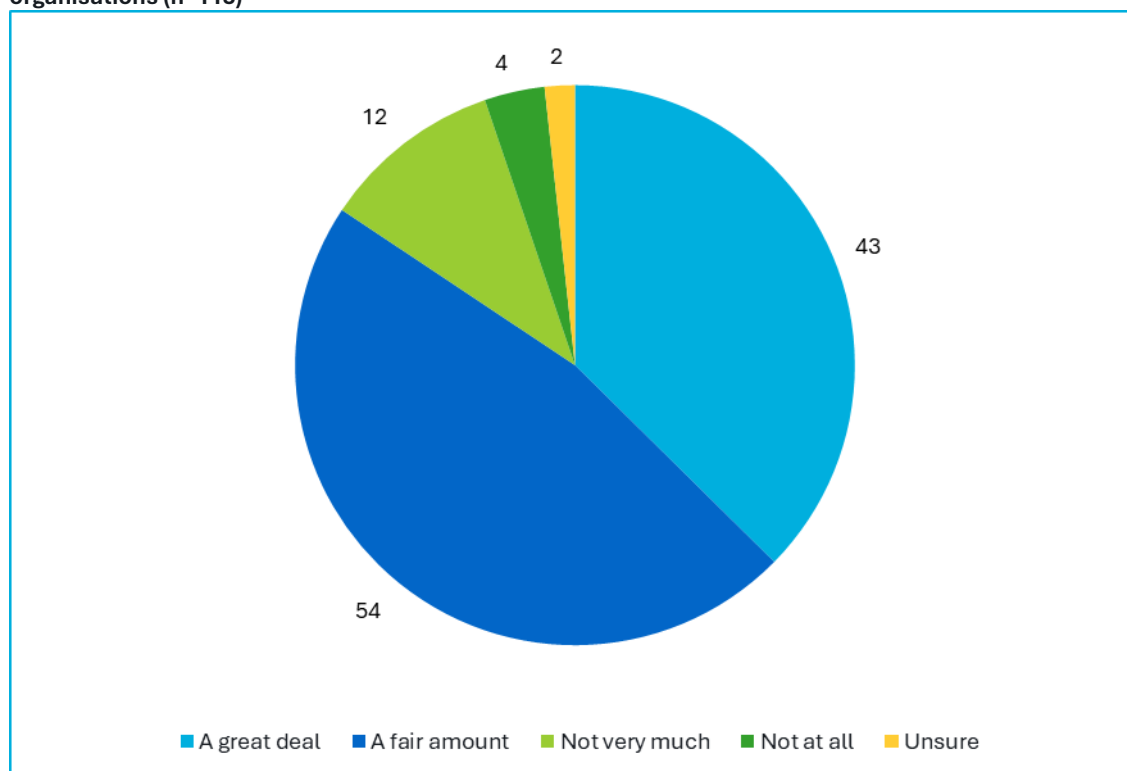
How projects have contributed to skills development amongst partner organisations

- 5.2 When asked about the extent to which project involvement positively influenced skills levels within their organisation, 43 out of 115 respondents (37%) indicated that it had done so 'a great deal' (Figure 5-1). The largest proportion of respondents (47%) indicated

that it had done so by ‘a fair amount’. A small number of beneficiaries (4) noted that there was no skill development as a result of project involvement.

- 5.3 Wave 1 survey findings were comparable. Overall, 39% of respondents reported that project involvement had improved skills ‘to a great deal’, while a further 44% indicated an impact ‘to a fair amount’. This suggests that beneficiaries’ perceptions of skill development have remained largely consistent between competitions.

Figure 5-1: Extent to which the project has had a positive impact on skill levels within beneficiary organisations (n=115)



Source: Beneficiary Survey, Steer-ED analysis (January 2026). Question: ‘To what extent has the project had a positive impact on skill levels within your organisation? This could include for example commercial, technical, or regulatory knowledge/skills.’

- 5.4 Qualitative evidence from beneficiary interviews further supports this mostly positive perspective on the role of programme involvement in upskilling. Beneficiaries shared examples of skill enhancement and emphasised the degree of learning experienced through the project:
- Enhancing technical skills:** Projects drove significant upskilling in areas such as hydrogen and ammonia fuel handling, high-voltage offshore electrical systems, electric propulsion, wind-assist technologies, multi-fuel operation, and scale-model and ocean-basin testing. In several cases, costly capabilities that had previously been outsourced were brought in-house.

“We’ve learned so much about this technology. Our team, our technical team, has come up a notch.” – Maritime Wave 3 Beneficiary

“That’s a massive skill that’s come in-house. That again, we wouldn’t have been able to do without this innovation funding. Not only does it save Chartwell cost, but it also offers us an opportunity to offer it as a service to other customers.” – Maritime Wave 3 Beneficiary

- **Operational capability:** Beneficiaries reported broadened marine operations experience, including pilot delivery and mobilisation. Younger engineers and apprentices particularly benefited from hands-on exposure, with project learning enabling staff to step into senior or high-responsibility roles at short notice.

“There was a lot of skills development. There was a very good example of this, the young engineer that we put on to doing the field work for that trial. He learned a lot while he was on that trial.” – Maritime Wave 3 Beneficiary

- **Project management and procurement:** Participation improved internal processes such as procurement planning, vendor management, documentation, transparency, and professional project management.
- **Enhancing regulatory understanding:** Projects strengthened understanding of certification pathways, engagement with classification societies, port planning processes, emerging standards, hydrogen risk management, and international regulatory frameworks.

How projects have contributed to growth in organisational maturity amongst partner organisations

5.5 Beneficiaries also widely acknowledged that their involvement in the projects led to meaningful growth in organisational maturity.

- **Ways of working:** Organisations developed new tools, processes and internal systems during projects, which are now reused across other programmes. This included improved engineering workflows, modularised designs and internal testing tools.
- **Organisational culture:** Several beneficiaries described increasing development an innovation-led culture, with greater cross-team idea generation, experimentation, and staff confidence.
- **Improved understanding of government-funded schemes:** Beneficiaries reported increased confidence in their ability to deliver for government-funded schemes, manage public funding effectively, and compete for future opportunities. Even where domestic market adoption remained constrained, beneficiaries viewed the organisational learning and maturity gained as positioning them strongly for future programmes.

“I think the whole process of doing this has given us confidence that we can deliver. We can deliver for the UK government and, you know, spend the grant money within the time window effectively.” – Maritime Wave 3 Beneficiary

Case study vignette showcasing how a project has resulted in the maturing and skills development of the organisation(s) involved

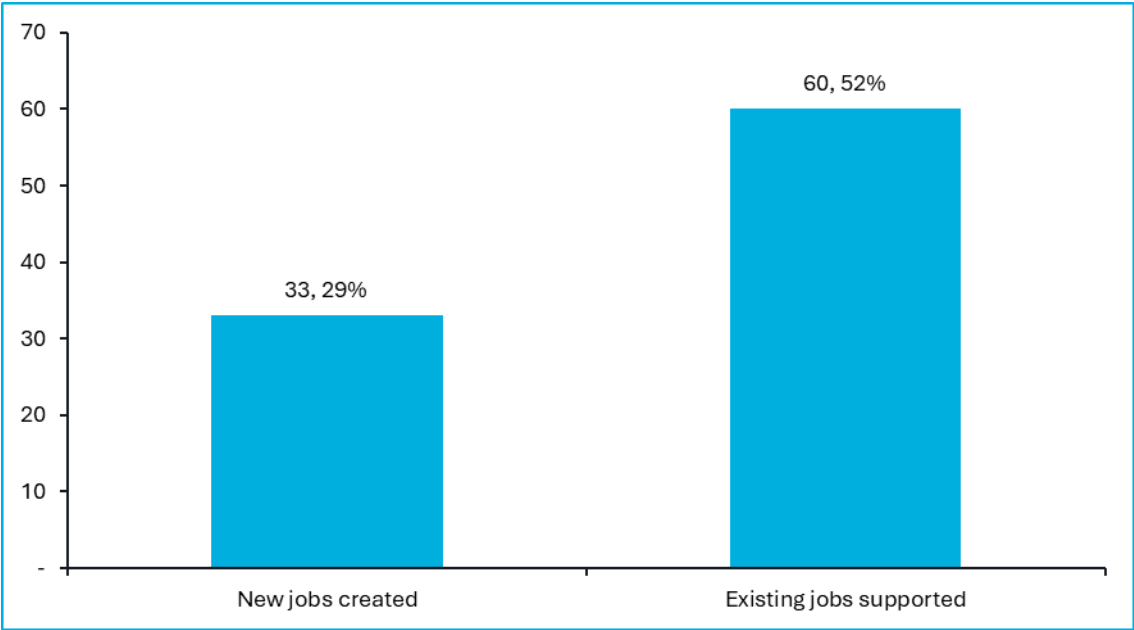
Tidal Transit (full case study in Appendix D) is a specialist offshore vessel operator that led a CMDC-supported project to retrofit an existing crew transfer vessel with electric propulsion and offshore charging capability. Project involvement significantly strengthened the organisation’s technical capability, particularly in electric vessel conversion, battery integration, offshore charging design, and regulatory navigation under the MCA Workboat Code.

Through delivering this retrofit, the team developed hands-on expertise in systems integration, spatial and weight constraints, fire safety, certification pathways, and operational energy modelling for offshore wind contexts. These learnings have directly informed subsequent new-build electric vessels, with lighter, denser battery systems and improved design choices now embedded across the fleet. The project also increased organisational confidence in delivering complex engineering schemes, strengthened internal decision-making around retrofit versus new-build strategies, and positioned the company as a credible technical leader in electric crew transfer and offshore charging solutions.

The role of programmes in creating and retaining jobs

- 5.6 Beneficiaries reported mixed impacts on job creation and retention arising from programme participation, as shown in Figure 5-2. Of the 115 Wave 3 survey respondents, 29% reported that new roles had been created as a direct result of project involvement. A larger proportion (52%) reported that existing roles had been supported, which aligns with qualitative findings above highlighting the role of projects in employee upskilling and capability development.
- 5.7 It should be noted that reported figures for new roles created may, in some cases, reflect displacement of staff from elsewhere within beneficiary organisations rather than net job creation. However, among those interviewed, beneficiaries generally did not report that this was the case.

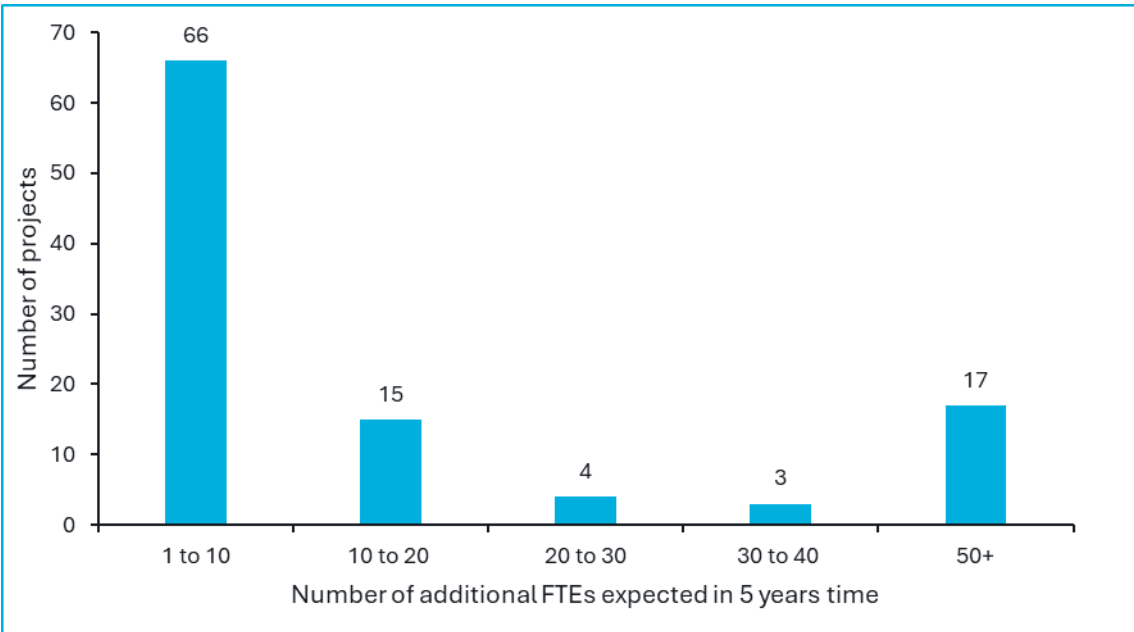
Figure 5-2: Number of beneficiaries reporting the creation of new jobs or that existing jobs had been supported (n=115)



Source: Beneficiary Survey, Steer-ED analysis (January 2026). Question: Has the project resulted in the creation of new jobs, and/or existing jobs being supported? If so, please specify the number for each. If you aren't sure, please give your best estimate.

5.8 IMS data (Figure 5-3) provides further insight into expected longer-term employment impacts. Most beneficiaries (66 out of 105) anticipate employing between one and ten additional Full Time Equivalent (FTE) staff within five years as a result of Maritime programme involvement, with 17 forecasting increases of more than 50 FTEs. This suggests that beneficiaries expect programme participation to contribute to job creation over time, although typically at a modest scale.

Figure 5-3: Number of additional FTEs expected in five years-time, as a result of the Maritime programme (n=105)



Source: Wave 3 IMS data (IUK), Steer-ED analysis (January 2026), Question: As a result of this Innovate UK support, how many more or less Full Time Equivalent (FTE) employees do you expect to have in your business in five years' time?

- 5.9 Findings from beneficiary interviews broadly support this picture, indicating that direct job creation was limited, but that projects played an important role in supporting and stabilising existing roles through skills development. One beneficiary, for example, reported growing from two to seven staff over three years, attributing this expansion to enhanced R&D capability developed through programme participation.
- 5.10 More broadly, some beneficiaries highlighted wider labour-market benefits, noting improved employability of UK graduates within the maritime sector and positive spill-over effects for the wider skills ecosystem, even where employment growth within individual organisations remained constrained.

“One part of the project is to design training courses for seafarers to operate ships that have future fuels installed. So that they'll graduate with the right certificates to operate ships.” – Maritime Wave 3 Beneficiaries

Conclusion

- 5.11 The findings demonstrate that participation in the Maritime programme has played a meaningful role in strengthening organisational skills, capability and maturity across beneficiary organisations. Survey and interview findings consistently show that projects supported substantial upskilling, particularly in technical, operational, regulatory and project management capabilities, with learning embedded through hands-on delivery of complex activities.
- 5.12 Beyond individual skills development, projects contributed to wider organisational maturation. Beneficiaries reported improvements in ways of working, innovation culture, and confidence in engaging with government-funded schemes, managing public funding, and competing for future opportunities.
- 5.13 In terms of employment impacts, direct job creation was generally modest, with programmes playing a more prominent role in supporting existing roles and stabilising organisations through enhanced capability and skills development. Over the longer term, some beneficiaries anticipate gradual employment growth.
- 5.14 Taken together, this suggest that the Maritime programme's primary contribution lies not in immediate large-scale job creation, but in building the skills, confidence and organisational capacity required for sustainable growth. This strengthening of the skills base and organisational maturity provides a foundation for future scaling of activity within individual organisations and contributes positively to the resilience and long-term development of the wider UK maritime decarbonisation ecosystem.

6 Impacts on wider framework conditions and long-term outcomes

Key Messages

- CMDC funding rounds have catalysed a measurable shift towards new technology adoption in a traditionally conservative industry. Whilst ports and operators are often initially resistant to meaningful change in their processes, clear demonstration of the commercial benefits of new technology can overcome this initial reluctance to adopt new technologies.
- Regulatory standards are currently undeveloped in comparison to other industries, but evidence suggests that collaboration between regulators, class societies, and industry can accelerate and improve regulation of the maritime industry. Where consortia have had close working relationships with the Maritime and Coastguard Agency (MCA, the regulator) and Lloyd's Register (the class society), the experience has been generally positive, with CMDC acting as the catalyst for a raft of regulatory improvements.
- Commercialisation of products in early TRL development stages is the largest barrier to a more wide-spread achievement of long-term outcomes. Projects that have achieved commercialisation of their products can and do demonstrate environmental and economic benefits.

Introduction

- 6.1 This chapter discusses the role that Maritime projects have played in affecting trust in, and adoption of, maritime technologies, plus contributions to the regulatory environment.

The role of projects in driving adoption of new technologies

- 6.2 The Maritime sector is reportedly a traditional industry that is resistant to significant changes, and therefore unwilling to use and/or accept new technologies, due largely to tight profit margins and the historic nature of many of these institutions. Despite this, CMDC recipients have reported improvements in the attitude of maritime organisations (i.e., regulators, ports, shipbuilders) towards embracing new technologies.
- 6.3 This has been especially prevalent as firms have moved up the TRL chain- an ability to demonstrate late-stage technologies in use over extended periods of time has provided

confidence to these institutions that these new technologies can be valuable commercial assets.

- 6.4 Several projects have directly proven a change in willingness across the industry to accept new technologies through the commercialisation of novel products.
- 6.5 ACUA Ocean for example have developed the UK's first Workboat Code 3-compliant hydrogen powered Unmanned Surface Vessel (USV) after proving its ability to operate continuously for 24 hours. Through this the company has brought in £1.5 million in revenue through orders of the product (USV Pioneer), demonstrating the uptake of this novel technology in the UK maritime industry.
- 6.6 Artemis Technologies has developed and prepared for deployment its EF-14 high-speed electric passenger vessel, with Orkney Ferries acting as the operator partner. Feedback from this pilot has fed directly into the commercial version of the vessel and accompanying high-power charging system.
- 6.7 Edwards & Renouf's APS Marine Coating has been trialled on commercial fishing trawlers, with operators reporting weekly fuel savings of 50-70 gallons, a significant reduction in operating costs. This practical demonstration of the operational benefits of novel marine technologies has promoted the acceptance of new technologies in the industry.

The role of projects in shaping the regulatory environment

- 6.8 As many of the projects funded by the Maritime programme are on the frontier of technological development, regulatory standards are generally not well established or understood by recipient organisations, commercial operators, or even the class societies and regulators themselves.
- 6.9 As a result, firms have often reported having to maintain close working relationships with class societies and regulators in order to collaboratively develop standards for new technologies, thus influencing and helping to establish the framework on which subsequent technologies will be developed.
- 6.10 These organisations consistently reported that their projects provided regulators with practical evidence and operational insights that were otherwise unavailable. These conversations have fed into risk profiling and approval pathways.
- 6.11 O.S. Energy UK has reported 'close discussions with the MCA and class society' throughout the development of their hydrogen storage and systems integration work, which has shaped best practice and regulation around crew training and safety expectations.
- 6.12 Similarly, MAHLE Powertrain's project on ammonia and hydrogen combustion engines has informed regulatory thinking around future emissions standards for alternative-fuel engines.
- 6.13 As technologies continue to develop through the TRL chain, and competitors to newly patented and commercialised technologies emerge, the growth depth and breadth of information available to regulators. This will enable them to develop new and improved regulations and standards to the benefit of UK operators and technology developers domestically and in regard to competing internationally.

Case study vignette showcasing the long-term impacts of one of the technologies being developed

O.S. Energy UK developed and integrated hydrogen storage and fuel system components alongside a novel propeller fitted and tested on an operational commercial offshore vessel.

Throughout their project, O.S. Energy engaged intensively with the Maritime and Coastguard Agency (MCA) and Lloyd's Register (the class society) for developing the regulatory framework needed for commercialisation of hydrogen systems.

Hydrogen is still a nascent technology, and as such there are several 'unknowns', most notably linked to safety concerns around flammability.

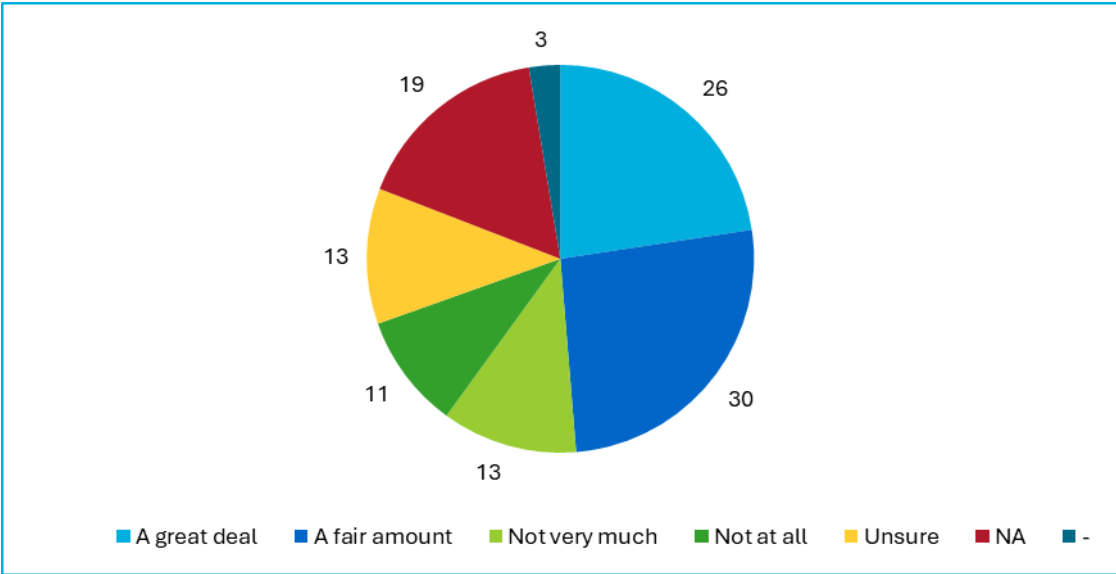
In collaboration with the MCA and LR, Edwards & Renouf have supported training courses and partnerships with training providers for seafarer certifications. The aim of this was to teach the necessary skills needed to operate these new hydrogen systems offshore, and thus support the case for safety and usability in regulation and standards-setting.

Long-term outcomes

- 6.14 Many recipients interviewed and surveyed have provided feedback that their projects have already begun to contribute to long-term outcomes for the UK, though given the early-stage nature, and pre-commercialisation, of many of these projects, a majority still do not believe their project has yet to contribute to long-term positive outcomes.
- 6.15 Through the survey firms were asked to report on outcomes achieved as a result of CMDC funding¹⁶. The most commonly reported outcomes were that projects had already contributed to developing solutions which can be exported globally (49% stating a positive impact), and that their product has a positive carbon reduction (37%) or other positive environmental impact (36%) on the transport industry.

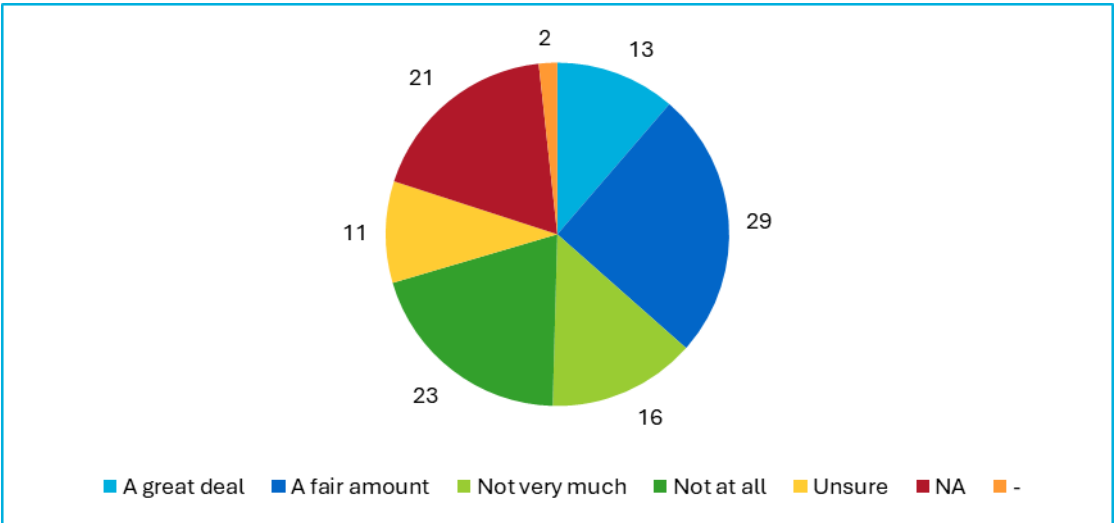
¹⁶ These include; limiting the carbon impact of transport, reducing other environmental impacts of transport, making transport safer, making transport more reliable, making transport more inclusive/accessible, improving connectivity across the UK, and developing solutions which can be exported globally.

Figure 6-1: Extent to which Maritime projects have already contributed to societal impacts: developing solutions which can be exported globally (n=115)



Source: Beneficiary Survey, Steer-ED analysis (January 2026). Question: To what extent has the project already contributed to the following societal impacts: developing solutions which can be exported globally?

Figure 6-2: Extent to which Maritime projects have already contributed to societal impacts: reducing the carbon impact of transport (n=115)



Source: Beneficiary Survey, Steer-ED analysis (January 2026). Question: To what extent has the project already contributed to the following societal impacts: reducing the carbon impact of transport?

- 6.16 The outlook for future delivery of these benefits is mixed dependent on the level of commercialisation already achieved by firms. Firms that have already begun to commercialise their products (i.e., revenue-generating) are more likely to report that their products will generate long-term outcomes, primarily around decarbonisation and exporting, whereas firms that do not have marketable products as of yet are generally pessimistic about being able to bring their product to market.
- 6.17 There was a general consensus across stakeholders that the CMDC funding rounds have been beneficial to the delivery of long-term outcomes. Barriers and enablers to long-term

outcomes are therefore the same as for commercialisation, which are highlighted in Sections 4.23 and 4.24, above.

Edwards & Renouf: APS Marine Coating

Edwards & Renouf, through CMDC funding, have developed a new coating for marine vessels to prevent damage to marine vessels when in water. This coating has also been proven to reduce drag, enabling vessels to travel at a greater range whilst reducing emissions.

From extensive testing on fishing vessels, evidence has been gathered that this new coating helps vessels achieve 5% fuel savings compared to traditional coating, translating into savings of 50-70 gallons a week for a large trawler.

APS Marine Coating is now being sold and used in the UK, whilst also being manufactured in the UK, creating domestic jobs in a sub-sector often reliant on importing.

Due to the commercialisation of their technology, Edwards & Renouf are confident that their product has already enabled reductions in UK emissions in the maritime sector, as well as creating opportunities for international export.

Conclusion

- 6.18 Maritime projects funded through the LMT programme have already achieved meaningful progress in improving trust and adoption of emissions-reducing technologies, often aided by close relationships with regulators that feed into their product development.
- 6.19 Despite this clear evidence of success, more wide-spread adoption of CMDC-funded products is far from certain. The key barriers to achieving this success include:
- **Political:** Firms frequently reported concerns around long-term government commitment to the Net-Zero agenda. If this commitment is not backed by tangible legislation and funding, then operators and developers will not be incentivised to invest in clean technologies, and long-term environmental outcomes will not be achieved.
 - **Commercialisation:** The other primary barrier to achieving positive long-term outcomes from the CMDC project comes from barriers to commercialisation as highlighted in Chapter 4. The commercial operating environment in the maritime industry is beset with financial and regulatory burdens- and without commercialisation of developing technologies the benefits of these technologies will not be realised.
- 6.20 The vast majority of projects have emphasised the pivotal role of CMDC funding in helping with the development of their projects, and many of these companies explicitly state that their projects and products would not have been achieved without CMDC funding rounds.

7 Conclusion & next steps

Key Messages

- The CMDC programme has delivered a large and diverse portfolio of projects across multiple funding rounds, supported by over £187.5m in Department for Transport match funding to accelerate maritime decarbonisation.
- Overall delivery performance has been positive, with most projects meeting or on track to meet milestones; delays have been limited and largely driven by technical, regulatory and infrastructure challenges rather than programme management.
- Beneficiaries consistently highlighted Innovate UK's monitoring approach, engagement and flexibility as strengths, while noting pressures from compressed timelines, administrative requirements and cash flow impacts, particularly for SMEs.
- The programme has been effective in enabling new partnerships and strengthening collaboration across industry, academia, ports, operators and regulators, which were critical to delivering complex demonstrations.
- CMDC funding has been pivotal in progressing technologies through the TRL pipeline, from feasibility to large scale trials, with some projects reaching TRL 7 and generating early commercial and IP outcomes.
- Skills and organisational capability gains have been a clear outcome, particularly in technical delivery, regulatory engagement and managing complex, publicly funded innovation projects.
- Higher TRL demonstrations have helped build confidence in clean maritime technologies and informed regulatory pathways, though wider commercial uptake remains constrained by cost, regulatory uncertainty and access to finance.
- Looking ahead, future rounds will focus on scaling and commercial deployment, with beneficiaries calling for longer timescales, stronger commercialisation support, earlier regulatory engagement and clearer strategic focus.
- Future evaluation should include follow-up monitoring one to two years post-CMDC7 to assess longer-term impacts, alongside deeper evaluation of additionality by tracking beneficiaries' progression through funding rounds and counterfactual outcomes in the absence of support.

Summary of monitoring findings

- 7.1 This report is structured around the LMT portfolio logic model, which is divided into five themes: programme delivery; partnerships and collaboration; technology development, deployment and commercialisation; skills development; and wider framework conditions. The key findings from the monitoring commission in each of these areas are set out below.

Delivery

- 7.2 CMDC has delivered a large and diverse portfolio of projects across multiple funding rounds, supported by £187.5 million of Department for Transport match funding. The programme has funded feasibility studies, pre-deployment trials and large-scale demonstrations to accelerate maritime decarbonisation, delivered in partnership by DfT and Innovate UK. Operating primarily across low- to mid-TRLs, CMDC has engaged a broad range of industry, research and public-sector partners within a context of technical complexity, regulatory uncertainty and ambitious timelines.
- 7.3 Monitoring evidence indicates that delivery performance has been broadly positive. QMS data shows that most projects have met, or are on track to meet, their planned milestones and objectives, with delays generally limited and linked to certification, infrastructure readiness, supplier performance and demonstration scheduling. More significant slippage was confined to a small number of projects and was typically driven by compounding technical or approval-related challenges rather than programme management issues.
- 7.4 Beneficiary experience of delivery and monitoring has also been largely favourable. Innovate UK's engagement, monitoring support and flexibility were consistently cited as strengths, helping projects manage risk and adapt to emerging challenges. However, beneficiaries also reported pressures related to compressed timelines, retrospective reimbursement and administrative requirements, particularly for SMEs and complex consortia. Overall, the findings suggest that CMDC has effectively supported delivery against ambitious objectives, while highlighting opportunities to further reduce friction as projects move closer to commercial uptake.

Partnerships

- 7.5 Evidence from surveys, monitoring data and beneficiary interviews indicates that the Maritime programme has been effective in fostering collaboration across industry, academia and regulators. Partnership working was integral to delivery, enabling new and strengthened collaborations between technology developers, operators, ports, universities and regulators. For many beneficiaries, these partnerships were essential to delivering complex demonstrations requiring access to assets, test environments and regulatory engagement.
- 7.6 Partnerships were diverse in function, combining academic research, regulatory learning and end user involvement in trials and demonstrations. Relationships were generally characterised by high levels of trust and productivity, supported by shared problem solving and joint learning. While formal engagement with Innovate UK Business Connect and the Catapult Centres was limited, beneficiaries established effective partnerships through consortium working and programme enabled networking.
- 7.7 Beneficiaries reported tangible benefits beyond project delivery, including support for skills development, graduate recruitment and pathways to follow on funding. Although some collaborations reduced in intensity after project completion, many have provided a durable foundation for continued engagement around deployment, skills pipelines and sector coordination.

Development, deployment and commercialisation

- 7.8 Evidence indicates that CMDC funding has been instrumental in advancing maritime technologies through the TRL pipeline, from early feasibility and system design to large scale trials and, in some cases, TRL 7 level demonstrations. Across funding rounds, projects have progressed from conceptual models and bench scale prototypes to operational testing, regulatory approval and early deployment. For many SMEs, this progression would not have been achievable without grant funding, given the cost, risk and regulatory complexity associated with maritime demonstration.
- 7.9 The programme has also generated wider innovation benefits, including patentable IP in areas such as hydrogen, ammonia and carbon capture, strengthened academic–industry collaboration, and increased visibility for demonstration-led projects. A number of organisations have translated technical progress into early commercial outcomes, including training uptake, port-side contracts and export activity. However, regulatory uncertainty, conservative market behaviour, limited private finance and gaps between public funding rounds continue to constrain scale-up, suggesting that sustained and well-sequenced support will be required to convert technical readiness into widespread commercial adoption.

Skills

- 7.10 The Maritime programme has had a clear and positive impact on skills development across beneficiary organisations, particularly in strengthening technical, operational and regulatory capabilities. Many beneficiaries described project delivery as a catalyst for accelerated learning, enabling staff to develop hands on expertise in areas such as alternative fuels, electric propulsion, certification processes and complex project delivery.
- 7.11 In addition to individual skills development, the programme has contributed to increased organisational maturity. Beneficiaries reported improved ways of working, stronger internal processes, and greater confidence in managing public funding and delivering complex, government supported projects. Exposure to regulatory engagement and large scale demonstration activity was particularly important in strengthening organisational confidence and readiness for future opportunities.
- 7.12 While Survey analysis indicated that direct job creation was not widespread, the programme has supported meaningful employment outcomes by safeguarding existing roles and enhancing workforce capability. Upskilling enabled staff to take on broader responsibilities and positioned organisations to respond to emerging market opportunities. Over time, these capability gains are expected to support gradual employment growth and contribute to addressing longer term skills needs within the UK maritime decarbonisation sector. Moreover, the early-stage nature of this evaluation means that wider employment impacts may not yet be fully captured, as more substantial job creation would typically be expected to emerge through later-stage commercialisation, scale-up and wider rollout.

Wider outcomes and impacts

- 7.13 The Maritime programme has played a clear role in building trust in clean maritime technologies and encouraging early adoption. Higher TRL demonstrations have helped shift industry attitudes by providing credible evidence of safety, performance and

operational value. While uptake beyond the programme remains limited by cost and regulatory uncertainty, growing interest from operators, ports and regulators suggests positive momentum.

- 7.14 Projects have also contributed to shaping the regulatory environment through close collaboration with regulators and classification bodies. Real world trials have supported the development of approval pathways, clarified safety expectations and informed regulatory thinking for emerging technologies, helping to reduce uncertainty for future projects.
- 7.15 Although long term impacts are still emerging, early evidence points to benefits including initial emissions reductions, operational efficiencies and export potential. Beneficiaries consistently highlighted CMDC funding as pivotal in enabling this progress. Overall, the programme has laid important foundations for wider adoption and longer term impact, with continued support needed to translate early progress into sustained, sector wide outcomes.

Next steps for the programme

- 7.16 As a programme, the next phase of CMDC focuses on scaling up zero-emission technologies and moving them from demonstration to commercial deployment. From 2026, CMDC7 will support real-world trials of clean vessels, fuels and port infrastructure, with further competitions planned through 2029.¹⁷ This will be followed by two more rounds to be launched between 2027 and 2029. Within the wider UK SHORE programme landscape, ZEVI 2 (the second round of the UK's ZEVI programme) will also play a key role in supporting deployment and demonstration of near-commercial zero-emission maritime technologies.
- 7.17 Beneficiaries shared a range of suggestions to improve future programme delivery. These can be summarised as:
- **Allow more realistic timescales and continuity between rounds:** Improve delivery quality and value for money through longer application windows, extended delivery periods, and avoiding start stop gaps that disrupt momentum.
 - **Strengthen commercialisation and scale up support:** Provide structured support beyond R&D funding, including access to product development expertise, certification and insurance advice, market guidance, and mechanisms such as procurement commitments or capital funding to bridge the TRL 6 to market gap.
 - **Enhance regulatory engagement and coordination:** Enable earlier and more coordinated regulatory involvement, particularly with the MCA and classification societies, by involving regulators early on in project design.
 - **Narrow the strategic focus:** Retain technology neutrality while sharpening strategic focus on areas of UK comparative advantage to support shipyards, workforce skills and wider delivery capability.

¹⁷ Department for Transport (2025) *The future of UK Shipping Office for Reducing Emissions (UK SHORE)*. Available at: <https://questions-statements.parliament.uk/written-statements/detail/2025-09-15/HCWS921> [Accessed: 19th February 2026]

Recommendations for future evaluation

- 7.18 The findings from this research provide evidence to suggest that interim outcomes are being achieved by funded projects as expected. In many cases, it is not yet clear as to whether the anticipated impacts have or will be realised – with many projects noting that commercialisation of technologies will be dependent on additional grant funding. With this in mind, it is recommended that additional monitoring and evaluation is undertaken following the completion of CMDC7 (one or two years after projects have completed) to capture the longer-term benefits. In particular, economic impacts related to commercialisation of technologies, job creation, SME growth, and inward investment.
- 7.19 In addition, the Maritime programme has provided multiple rounds of funding, broadly supporting project progression through the TRLs, as highlighted above. To assess the additionality of the funding, further in-depth research/ evaluation would be useful to understand beneficiaries' journey through the funding rounds and what would have happened at each stage in the absence of the funding. This could be supported by identifying projects that participated in the initial funding rounds only and understanding the technology progress and outcomes achieved following this.

Appendices

A Sources of evidence utilised

Monitoring data analysis

- A.1 Three forms of programme monitoring data are captured by IUK and were provided to Steer-ED for analysis, as described below.

1) Applicant information data

- A.2 Basic ‘demographic’ data covering organisations awarded funding. The data includes the beneficiary’s name, project name, project description, competition programme, the total amount of funding, which was initially bid for, the grant funding amount provided, project start and end date.

2) Quarterly Monitoring Scores (QMS) monitoring reports

- A.3 Quarterly assessments undertaken by external MSPs; typically, industry professionals who are knowledgeable about the technology in question and are contracted to provide an independent assessment of project progress on a quarterly basis. Their assessment covers the project’s scope, time, cost, exploitation, risk, and project management. Officers score each of these project aspects as well as providing commentary as to the reasoning behind their scores.
- A.4 For Wave 3, QMS data was only provided for five programmes; CCAM, FOAK (2025 specifically), TVH, Maritime and ZEHID.

3) IUK’s impact management system (IMS)

- A.5 IMS is a data collection system which, at the time of writing, is being rolled out across all IUK programmes. It captures data upon project commencement, during project delivery, and following project completion, and is provided in the form of short-answer multiple choice, quantitative, or character-limited free-text responses. It covers subjects including patents, technology progression and partnerships (amongst others).
- A.6 For wave 3, IMS data was provided for only three programmes: CCAM, FOAK (2025 specifically); and Maritime.
- A.7 These programmes had additional data available in wave 3 and this information was therefore included within this Monitoring Report (as text updates rather than generation of new graphs).
- A.8 It should also be noted that the data available varied across these four programmes, with fewer questions being asked of FOAK beneficiaries compared to CCAM beneficiaries. We anticipate additional data from IMS will be available for subsequent monitoring activities.

Analysis of secondary data sources

- A.9 Three sources of secondary data were explored for inclusion within this document:

Crunchbase

- A.10 To further explore whether businesses participating in LMT programmes are attracting external investment, and whether LMT participation aligns with investment-raising events, Technopolis have made use of Crunchbase – a platform that provides information on businesses and funding events.
- A.11 Of the ~430 unique organisations participating in LMT projects (at the time of undertaking Wave 2 analysis), Technopolis were able to identify 215 (50%) in Crunchbase (the remainder were mainly public orgs and universities). Of these, 88 have one or more instances of securing external funding (251 deals in total, 2010- July 2025). Crunchbase provides details on the type of funding, the date and the financial amount.
- A.12 Findings evidenced that investment/ funding activity was relatively low pre-project participation, and increased gradually, peaking during IUK LMT project period — with the highest number of investment/funding rounds in 2023 (63). This suggests a clear increase in funding and investment round announcements following the start of IUK LMT project participation.
- A.13 Table A-1 shows the different types of funding / investment round that are captured.

Table A-1: Funding / investment round

Investment Type	Number	Investment Type	Number
Grant	131*	Non-equity assistance	4
Seed	28	Post-IPO debt	5
Pre-seed	7	Private equity	3
Series-A	16	Series-B	6
Equity crowdfunding	5	Corporate Round	2
Convertible Note	2	Series-C	2
Debt Financing	7	Undisclosed / Unknown	28
		Grand Total	251*

Source: Technopolis Crunchbase data, 2025. *Note: 13 LMT grants are included, which have then been removed from the subsequent analysis.

- A.14 For the 88 companies with funding data, Technopolis have tracked deals (both volume and value) over time at the company level. Technopolis have analysed the total number and value of deals for each company since the start of their LMT project, and then also compared this with the number and value of deals achieved in an equivalent period prior to the project start date (i.e. if the LMT project started two years ago, Technopolis has compared the two years, pre- and post- this start date).
- A.15 At the overall portfolio level, this reveals:
- LMT participants have achieved 110 deals since their project started. This is 43% higher than the 77 deals they achieved in the same length of time before project start.

- LMT participants have achieved deals worth \$4.7bn since their project started. This is more than five times higher than the \$0.8bn achieved in the same length of time before project start.
- On average (per company, amongst these 88), organisations have secured 1.3 deals worth \$52.9m since project start, and 1.0 deals worth \$9.7m in the same period before.
- An additional, updated analysis was also undertaken in Wave 3 for the Maritime and FOAK programmes, covering the period 2018 to the end of 2025. This update also included the additional 26 FOAK projects awarded in 2025.

Meltwater analysis

- A.16 To assess the public dissemination of LMT projects, a structured search of media output was conducted using Meltwater, a media monitoring and analytics platform. The data collection for each project covered the one year period from 12 August 2024 to 12 August 2025, capturing online news and print, as well as social media activity on platforms, blogs, and forums. An additional, updated analysis was also undertaken in Wave 3 for the Maritime and FOAK programmes, covering the period from 30 January 2025 to 29 January 2026. This updated analysis also includes 26 FOAK projects awarded in 2025.
- A.17 For accuracy, search queries were tailored for each project by combining project titles or acronyms with lead organisation names, and articles were manually screened to remove irrelevant results. The search process also involved an iterative refinement of keywords to ensure that retrieved content was directly attributable to the projects.
- A.18 Meltwater's metrics enabled assessment of both the quantity and quality of media coverage. Estimated views gauged the average exposure of articles, reach measured the potential audience size, and engagement captured interactions across platforms including Facebook and Twitter. These data points were collected for each project and aggregated at the programme level, providing a comprehensive overview of LMT projects' media performance.

Dimensions

- A.19 Dimensions is a comprehensive research database that provides patent and publication data. The LMT projects were identified within the Dimensions dataset. However, only FOAK of the seven programmes were associated with patents and only FOAK and CCAM were associated with publications within the dataset.
- A.20 As not all the programmes were associated with patents and publications from the dataset, there is some discrepancy to self-reported information from project beneficiaries which will be further explored with the Dimensions team. Dimension data has therefore only been included for programmes where patents and publications have been linked.
- A.21 It should be highlighted that for wave 3 specifically¹:
- A.22 A dimensions search was done for FOAK 2025, however there was no data regarding linked patents or publications for these. This is likely due to Rail awards are quite recent compared to the Maritime awards and are subsequently yet to be added to Gateway to Research.
- A.23 A dimensions data search was also undertaken for Maritime.

Beneficiary survey

- A.24 An online survey of beneficiaries was developed and distributed to all project beneficiaries during each of the research waves across the full portfolio, amounting to 582 recipients. Both project leads and partners were invited to complete the survey, meaning that multiple responses could be captured from each project. The survey included a range of multiple choice and free text questions and allowed for the gathering of valuable additional data beyond the core data collected by IUK via IMS, QMS monitoring reports and applicant information data.
- A.25 Unique surveys were created for each programme and whether a beneficiary had responded in the previous wave. The number of questions therefore varied slightly between programmes and whether a beneficiary had responded in the previous wave. However, the core survey questions remained consistent between programmes and whether a beneficiary had responded in the previous wave.
- **For Wave 1:** The survey was open for a period of approximately three weeks from 15 July 2024 to 3 August 2024 (for six programmes) and for approximately four weeks between 16 September 2024 to 11 October 2024 for the TDD programme. Overall, the survey was issued to 464 recipients across the portfolio (236 responded).
 - **For Wave 2:** The survey was open for a period of approximately six weeks from July to September 2025, issued to 220 recipients across the portfolio (145 responded).
 - **For Wave 3:** The survey was open for approximately four weeks between January and February 2026, issued to 347 recipients across the portfolio (201 responded).
- A.26 Table A-2 shows the beneficiary survey response rates and number of responses from unique organisations within each of the seven programmes.

Table A-2: Beneficiary survey response rates and overall number of responses (all waves)

Programme	Number of responses	Number of beneficiaries sent the survey	Response rate
ZEHID	85	125	68%
CCAM	146	179	82%
Hydrogen	26	29	90%
FOAK	74	102	73%
Maritime	196	481	41%
Net Zero propulsion	28	76	37%
TDD	27	39	69%
Total	582	1,031	56%

Source: Steer-ED survey response analysis, 2026

- A.27 Across the LMT portfolio, the beneficiary survey achieved the following project response rates per wave:
- Wave 1 = 51%, which is still considered good representation.
 - Wave 2 = 66%, which is still considered good representation.
 - Wave 3 = 58%, which is still considered good representation.

Depth interviews with beneficiaries and wider stakeholders

- A.28 The qualitative research component comprised one-hour depth interviews conducted with programme beneficiaries and a selection of wider stakeholders. The interviews were held using MS Teams and were guided by a topic guide.

Beneficiary interviews

- A.29 As Table A-3 shows, a total of 183 interviews were undertaken with project beneficiaries (project leads, and in some cases project partners) during the three-year LMT research period, split per wave as follows:

- Wave 1 – 70 interviews.
- Wave 2 – 61 interviews.
- Wave 3 – 52 interviews.

- A.30 The number of interviews undertaken varied by programme, in accordance with the number of stakeholders involved in the programme. The ZEHID and CCAM programmes were a key focus for beneficiary interviews due to the substantial number of beneficiaries participating in these initiatives.

Wider stakeholder interviews

- A.31 Interviews with wider stakeholders took the same format and were conducted with a selection of knowledgeable industry stakeholders (from both commercial and academic institutions), based on recommendation by IUK and programme sponsors. These interviews were conducted over the three-year research period under the LMT portfolio. As Table A3- shows, a total of 118 interviews with wider stakeholders were completed across all three research waves combined.

- Wave 1 – 53 interviews.
- Wave 2 – 50 interviews.
- Wave 3 – 15 interviews.

- A.32 Priority was given to programmes with the largest funding allocation, and therefore ZEHID and CCAM were a key focus for wider stakeholder interviews.

Summary

Table A-3: Beneficiary wider stakeholder interviews (all waves)

Programme	Number of Beneficiary Interviews	Number of Wider Stakeholder Interviews
ZEHID	24	27
CCAM	52	18
Hydrogen	11	16
FOAK	29	16
Maritime	38	22
Net Zero Propulsion	18	9
TDD	11	10
Total	183	118

Source: Steer-ED interview analysis, 2025

Interview notes and analysis

- A.33 All interviews were recorded and transcribed using the automatic transcription facility on Microsoft Teams. A note-taker also attended each interview and took detailed notes of the conversation between the interviewer and the interviewee.
- A.34 Following the interview, the notes taken by the note-taker and any notes taken by the interviewer were either manually coded or analysed using qualitative analysis software, Atlas.ti. Both forms of analysis were guided by a coding frame aligned with the study's research questions and topic guide to ensure consistency. Coding was conducted by the programme leads and project team support to ensure consistency and reduce bias, with openness to emerging themes.
- A.35 Learnings from these interviews, supported by quotations, have been provided throughout this report.

Case studies

- A.36 A total of 21 case studies have been developed for the monitoring commission (two, three or four case studies for each programme). These are presented as vignettes within the report and as separate full write-ups within remaining parts of the appendices. The case studies were developed through interviews with project leads and supporting desk research. All case studies have been reviewed by the programme's independent panel of subject-matter experts, selected for their expertise in relation to the programme or technology in question. This provides a valuable external perspective on the importance and potential long-term impact of the technology in question.

B Case Study: Service Operation Vessel Offshore Charging System

Introduction	
Value	£834,208 (CMDC) + £478,469 (ZEVI)
Duration	10 months (CMDC), ZEVI ongoing
Start date	January 2023 (CMDC)
End date	October 2023 (CMDC)
Context & Objectives	
Project summary	The Service Operation Vessel (SOV) Offshore Charging System project was funded through the CMDC competition in round 2, under the Collaborative Research and Development (R&D) strand. The lead project partner is MJR Power & Automation, a developer of maritime automation and power solutions. The project involved development of a charging system that can be installed on offshore wind turbines. The charging system can be used to power battery-electric crew transfer boats and maintenance vessels operating in offshore wind farms. The project built on a previous CMDC project which successfully developed a solution for crew transfer vessel (CTV) charging. Related innovation projects are currently ongoing, including the Retrofit 20m Mercurio CTV, which was further funded through the ZEVI competition, under the Battery Electric Vessel and Charging Infrastructure strand.
Context	The SOV project addresses the following challenges: • High fossil fuel consumption in offshore activities, compounded by poor availability of charging infrastructure. • Existing battery technology has range limitations, meaning powered vessels are unable to make the journey to and from offshore wind farms in a single charge. The charging system comprises of several components including a turbine/offshore substation power converter. This converts windfarm power into DC power which works consistently with CTV battery systems. The 'Reeler' deployment system allows a connector to be latched to the substation for charging to take place. When charging is complete, the vessel is detached and can continue with day-to-day activities. The benefit of using this

	technology is the ability to use battery electric boats, rather than diesel boats, powered by green electricity generated from the wind farm being serviced. The technology also involves a real-time control and safety system, as well as a web portal to access data analytics.
Objectives	The key aims of the project were: • To reduce and eventually remove the use of fossil fuels in offshore activities. • To deliver reduced emissions and contribute towards net zero. • To develop an offshore charging solution, functional in a marine operational environment. • To take a credible and viable idea and create a commercial solution for the UK supply chain to then export into other countries.
Project Activities	CMDC funding supported several elements of the SOV project including: • A dedicated project team. • Project management. • Engineering. • Concept design. • Detailed engineering design. • Manufacturing documentation packages. • Manufacturing systems components. • Materials and equipment purchases. In terms of key challenges, supply chain issues were noted as a key barrier to progression. In the peak of the COVID-19 pandemic, there were issues with the availability of specific materials and component parts. In some cases, supplies were unavailable for 12 to 24 months. The interviewee also expressed that the hard deadline for project completion required by IUK was a key challenge to project delivery – due to project delays, the testing of the product had to take place after the project completion deadline, and therefore had to be undertaken at cost to the company (the funds that had not yet been spent had to be returned to IUK). Despite these challenges, building a product from scratch over a compressed period was reported to have been a major success for MJR. Without the funding received from IUK, the interviewee estimates that the project would likely have taken closer to three years to complete. The expert partner interviewed in relation to the case study emphasised that a key success of the project was to have developed a technology which can be used offshore, where there is no stable platform and working conditions are challenging.

	Additionally, the PR and marketing received from both IUK and the DfT were noted for their role in helping to raise the profile of the product and the organisation. Finally, the opportunity to showcase the British vision and skills in engineering was seen as a success of the programme.
Outcomes & Impacts	
Outcomes	The project has resulted in the delivery of a robust product which, when fully commercialised, will play an important role in the decarbonisation of maritime operations. The control and safety system also provides real-time information which can be used for monitoring purposes, allowing asset owners to evaluate the performance of charging operations by examining their energy usage, carbon savings and emissions reductions. The technology is close to commercialisation, with a spin-out joint venture company having been formed to manufacture and sell the product. The product, which has been named ‘Aquarius’ will be launched to the market on 31 October 2024, and a first customer has already made a purchase. Beyond this core technology, related products have also been developed, including a power and propulsion system for small (30m) boats to facilitate electrification. Additionally, the project has contributed to the delivery of ShorePower charging solutions – scalable power conversion providing in-port power and charging capabilities. These ‘spin-off’ products have been self-funded by MJR, thanks to increases in turnover and company growth. The external expert highlighted that in scaling this technology upwards for larger vessels, the true value of offshore power could be realised. A key limitation of offshore power generation for other applications is the energy lost through transmission to shore. By charging vessels at the site of energy generation, this loss is eliminated. The expert partner also pointed out that the existing national grid infrastructure will be far from sufficient to power the needs of ports to support a fully-electrified marine fleet, and so this technology helps to mitigate this challenge to some extent – reducing the pressure on the national grid.
Impacts	The charging system developed is comprehensive and reduces the need for manual handling in an industry where charging automation has not yet been thoroughly established. For MJR, the project has also resulted in new collaboration opportunities, working with organisations such as Blackfish engineering, Catapult and Tidal Transit. MJR have also published academic articles, papers, news articles and press releases related to the project. Government connections have also been enhanced, by working closely with Ofgem, on a framework for how electricity supply is licensed and managed. They have also

	raised awareness on offshore operations, through regular engagement with the marine classification societies and the British Standards Institute. The external expert noted that eventual scaling-up of the technology would generate economic, environmental and social impacts. Economic impacts would include the creation of new jobs, if several refuelling or charging stations were to be developed offshore. Further, this would contribute to reductions in the cost of electricity which would benefit the environment. Finally, social impacts include the transfer of dangerous equipment, hazardous storage and unsolicited noise away from local communities onshore.
Additionality	Without the SOV project, the offshore charging technology would likely still have been developed, due to the gap in the maritime market and need for clean, reliable infrastructure. However, MJR themselves state that they would have been unlikely to develop the technology and would have continued business as usual. Given the project was largely materials and equipment based, the funding primarily supported in the purchase of this. Part of the CMDC competition budget was used to protect the project's IP. The prototype technology developed under CMDC has been simplified and redesigned with bigger capacity under the ZEVI competition. However, with the company being an SME, further investment will be required to launch and sustain the final product into the market. Therefore, while the grant funding assisted in technology development other factors affect the extent to which the technology and associated products will be successful in the market.
Successes and lessons learnt	
Key lessons	The LMT programme was received positively particularly regarding the continuous engagement from IUK and DfT and the straightforward application process. The officers involved were helpful in providing introductions, moral support and overcoming obstacles. Minor technical lessons learnt included establishing best-practice and shared language across all parties involved to avoid misinterpretation in documents. The success of the SOV project was multi-faceted. A potential shortcoming of the LMT programme was in the lack of 'protection' and 'security' given to proposed ideas. Without this protection, foreign companies or larger enterprises, with sufficient financial backing, have been able to deliver these ideas – in turn creating barriers to market entry for British competitors in the long run. Further, a barrier to achieving a fully commercialised product over the programme was the length of the project period.

	Insufficient time has caused delays in product refinement and revision. A key improvement noted for future programmes involves adopting a ‘funnel’ approach to funding. In doing so, the most favourable projects would be taken forward, with continuous support throughout different competition rounds, eventually leading to product commercialisation.
Next Steps	The offshore charging technology is in the process of being commercialised. Given lots of working capital is required to launch into the market, networks have been created with potential investors looking into supporting manufacturing, product development, sales, marketing and operations.

C Case Study: Hydrogen Innovation - Future Infrastructure & Vessel Evaluation and Demonstration (HI-FIVED)

Introduction	
Value	£3,837,335 grant, £1,533,942 match-funding from partners existing reserves.
Duration	Two years
Start date	April 2023
End date	March 2025
Context & Objectives	
Project summary	Led by ACUA Ocean Limited (Ltd), the HI-FIVED project is a collaborative UK innovation initiative focused on demonstrating zero-emission hydrogen technologies for maritime applications. The core aim of the project is to build, test and demonstrate a hydrogen bunkering station and a hydrogen-powered small waterplane area twin hull (SWATH) vessel (a high-stability, zero-emission craft) in real sea conditions-named the USV (uncrewed surface vessel) Pioneer. The two-year project progresses previous work on hydrogen propulsion and aims to achieve Technology Readiness Levels (TRL) 7–8, validating performance, safety, and integration of hydrogen fuel-cell systems for future green maritime corridors. It also engages extensive commercial, technical and regulatory partners, and uses economic and environmental analyses to explore wider investment opportunities in the UK hydrogen supply chain.

Context	The project is led by ACUA Ocean Ltd, a company specialising in advanced marine engineering and zero-emission vessel technologies. ACUA Ocean Ltd is working with a consortium to deliver the project, including: maritime technical firms (e.g., NASH Maritime, Trident Marine Electrical); innovation partners (Unitrove Innovation, Composite Manufacturing & Design); and academic research from the University of Southampton. Industry and technology context The project exists within the maritime decarbonisation and hydrogen economic landscape - a rapidly evolving area, as governments and industries strive to reduce greenhouse gas emissions in transportation sectors. Green hydrogen (produced with low or zero carbon intensity) is seen as a promising fuel for shipping, especially for short-sea and coastal operations where battery alternatives may be limited. There are broad challenges in developing hydrogen bunkering infrastructure; in particular, designing safe onboard hydrogen storage and fuel-cell propulsion systems that can operate reliably in varied marine conditions, while meeting industry safety and certification standards. Demonstrations like HI-FIVED help bridge the gap between prototype technologies and real-world deployment, addressing both technical maturity and supply-chain integration. Challenges the project is aiming to solve: • Transition to zero-emission maritime transport: reducing emissions from sea transport, which remains a substantial contributor to carbon output. • Infrastructure readiness: Building and validating hydrogen refuelling (bunkering) systems suitable for broader commercial use. • Operational validation in marine environments: Demonstrating the vessel's performance across different sea states to show safety and reliability, critical for commercial adoption. • Supply chain integration: Assessing the UK hydrogen supply chain's ability to support future maritime hydrogen use. • Stakeholder engagement: Working with commercial end users and authorities to develop new use cases, supporting adoption and market pull.
Objectives	The project aimed to deliver against five key objectives: 1. Demonstrate hydrogen-powered maritime technology: validate the performance of ACUA Ocean's hydrogen bunkering station and hydrogen-powered SWATH vessel in operational conditions. 2. Achieve high Technology Readiness Levels: progress vessel and infrastructure maturity toward TRL 7–8 by completing a full four-week demonstration at sea.

	3. Showcase safety, endurance, and reliability: prove that zero-emission systems can meet rigorous marine safety and operational benchmarks across real-world conditions. 4. Assess and strengthen the hydrogen supply chain: use environmental and economic studies to identify future investment opportunities and support broader industry uptake. 5. Engage with end users and stakeholders: conduct workshops, demonstrations, and consultations to generate market insights, develop new business cases, and build commercial momentum for hydrogen in maritime transport.
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Project Activities

Outline of process activities

The overall aim of the project was to deliver a combined demonstration of a shoreside mobile hydrogen bunkering station and a zero-emission hydrogen powered SWATH vessel.

- **WP1: Project Design and Set Up.** Including confirming of materials needed for subsequent work packages.
- **WP2: Technical Design Phase.** Technical design of the vessel, including manufacturing of a temporary hull mould.
- **WP3: Green Hydrogen Supply Chain.** Assessment of the green hydrogen supply chain that facilitated a decision away from liquid to gaseous hydrogen.
- **WP4: Approvals and Assessments.** Collaboration with Lloyd's Register on the outputs of the technical design phase to move to manufacturing.
- **WP5: Vessel and infrastructure build, and system integration.** Building of bunkering and vessel infrastructure including preliminary demonstration.
- **WP6: Vessel and Hydrogen Systems Factory Acceptance Test.** Including inspection by Lloyd's Register of on water hydrogen bunkering.
- **WP7: Harbour Acceptance test.**
- **WP8: Infrastructure installation and commissioning.** Installing the hydrogen multi-fuelling system.
- **WP9: Vessel and infrastructure commercial demonstration.** Four-week demonstration of the SWATH vessel at Falmouth Harbour.
- **WP10: Green Shipping Corridor Impact Assessment and beyond.** Including an economic impact assessment, an environmental impact assessment, and a GHG emission savings report.

Key challenges

The team encountered significant challenges throughout the process. Most notably, the consortium had to move from liquid to gaseous hydrogen when it became clear that liquid hydrogen was impractical to source, handle, and certify.

	There were challenges associated with the changing regulatory landscape, including: • Lloyd’s Register¹ updated its low flash point fuel rules (standards for fuels that ignite more easily than traditional marine fuels); and • The Maritime Coast Guard Agency (MCA) introduced Work Boat Code 3 - this significantly changed the rules for autonomous vessels. These regulatory changes were further contributors to the change away from liquid hydrogen, which meant that a formal change request process had to be undertaken, pushing back timelines and increasing administrative burden. There were challenges in managing the relatively large consortium. In particular, a critical partner failed to deliver any outputs which resulted in Aqua Ocean having to absorb additional responsibilities at short notice. Key successes Despite the obstacles, the project reportedly delivered several notable successes. The vessel became the first autonomous craft certified under Workboat Code 3 in the UK and the first hydrogen powered vessel to receive such certification. The regulatory approvals, in particular, was considered to be a major breakthrough by the project, as it required entirely new interpretations and learning for both the consortium and the regulators. Experience of the LMT programme Overall, the project team had a positive experience of working with IUK, citing knowledgeable programme leads and a consistent, supportive monitoring officer. In addition, they noted that, over time, IUK’s systems and processes improved, facilitating smoother project delivery. However, there were frustrations around administrative requirements, most notably the change management process (when the project pivoted from liquid to gaseous hydrogen) which was considered to be slow.
Outcomes & Impacts	
Outcomes	The project successfully delivered a fully certified hydrogen powered autonomous vessel and the supporting hydrogen refuelling infrastructure. Alongside this, substantial engineering and operational knowledge was developed that did not previously exist both in the company, or across the wider maritime industry. The vessel has since entered commercial use and is generating revenue. It is also continuing to evolve through integration with other autonomous technologies, such as subsea robotics and aerial drones.

	ACUA Ocean has generated approximately £1.5 million in revenue since August 2025, when the regulatory approvals for USV Pioneer came through.
Impacts	The project has strengthened the UK's position in maritime autonomy and low emission vessel technology. Regulatory bodies, such as the MCA and Lloyd's Register, have gained significant insight from working on the project, which will benefit future innovators. Across Clean Maritime Demonstration Competition 3 (CMD3), 94% of ACUA OCEAN's spend was in the UK, in which they partnered with 97 British small and medium enterprise (SME) subcontractors, 63% of which were based in the Great South West. The project is estimated to have supported 117 jobs in the marine sector across partners, subcontractors, and suppliers. The current integration with other autonomous technology could open access to major global markets in marine robotics and offshore inspection. With the potential to replace large-crewed vessels, the technology offers major cost, safety, and environmental benefits.
Additionality	Aqua Ocean Ltd stated that without UKRI support, the company and the vessel would not exist at all. The funding unlocked the ability to recruit skilled staff, engage suppliers, develop complex engineering systems, and navigate the regulatory landscape. It also created the foundation for ongoing commercial activity and future innovation in the firm.
Successes and lessons learnt	
Key lessons	The main lesson learnt through the project was that the hydrogen economy, specifically in the maritime industry, is still in early stages of maturity. The project highlighted the importance of pursuing pragmatic emissions reductions rather than striving exclusively for zero emission solutions that are currently uneconomic. The team also learned a great deal about the regulatory environment and safety requirements for vessel and shore-side hydrogen systems. Key factors behind success The success of the project was driven by a determined engineering team, responsive and knowledgeable programme leads, and strong support from committed partners such as Trident and the University of Southampton. The willingness of the MCA as the regulator and Lloyd's register as the class society to actively participate in the design of the project was essential to ensuring a successful end product. Barriers and enablers to delivery and impact Two of the main barriers to project delivery were a) issues surrounding liquid hydrogen, and b) navigating the regulatory system for a nascent technology. Reasons for these barriers are outlined below: • The project moved away from an initial focus on liquid hydrogen to gaseous hydrogen. The liquid hydrogen supply chain in the UK is

	limited, and this scarcity means that where supply does exist, it is expensive. There are also safety concerns around the flammability of liquid hydrogen when in contact with water, that was uncovered through discussions with the regulators. - As the USV Pioneer was the UK's first hydrogen-powered autonomous vessel, regulatory standards did not fully exist before the project, and had to be written in collaboration with the MCA and Lloyd's register throughout the programme. This meant that there were limited pre-defined 'standards' for ACUA Ocean to work to, which made the process more difficult. Other barriers to delivery included consortium management, namely the failure of one of the partners to deliver their contracted work- meaning that ACUA Ocean as the lead partner had to take on this portion of the project in addition to their other responsibilities. The main enabler was the IUK grant funding, without which the project would not have gone ahead. Other enablers included strong subcontractor capability and constructive regulatory collaboration. The strong assistance of most consortium partners was also critical. Suggested improvements for the future Four suggestions for improvement were identified by the project team: - Clearer continuity of funding to avoid gaps between competition rounds; - Integration of Innovate UK's finance system with accounting tools to make the administrative burden lighter for SMEs; - More flexible change management process; and - A centralised platform for sharing learning across projects.
Next Steps	ACUA Ocean is currently integrating their SWATH vessel with other autonomous technologies, and will likely pursue further CMDC funding rounds to enable this. CMDC3 has enabled the commercialisation of the USV Pioneer for offshore monitoring and maintenance, and they are hopeful that these revenue streams will enable them to gradually become less reliant on CMDC funding in the long-term.

D Case Study: Retrofit 20m Mercurio CTV - 100% Electric)

Introduction	
Value	£6,344,092
Duration	Five years
Start date	October 2023
End date	September 2028
Context & Objectives	
Project summary	The retrofit 20m Mercurio CTV project, led by offshore energy solutions provider, Tidal Transit, demonstrates how crew transfer vessels (CTVs) serving the offshore wind sector can be decarbonised through full electrification of an existing vessel. By converting a conventional diesel-powered CTV into a fully electric crew transfer vessel (E-CTV), the project provides a practical and scalable pathway to reducing maritime emissions. Rather than pursuing a new build, the project focuses on the retrofit of a 20 m Mercurio CTV, namely ‘Ginny Louise’. Note that the project is referred to as ‘e-Ginny’. This approach avoids the substantial embodied carbon associated with manufacturing new vessels while extending the operational life of existing assets. It also exemplifies a circular-economy model, maximising the value of in-service vessels while significantly reducing lifecycle emissions. The retrofit involves a complete replacement of the vessel’s propulsion and energy systems. Diesel engines, fuel tanks and associated systems are removed and replaced with electric motors, propulsion pods, and a multi-megawatt-hour battery system. The resulting vessel aims to deliver zero-emission operation, reduced noise, improved manoeuvrability and lower maintenance requirements compared to its diesel predecessor. Over a three-year demonstration period, the project will gather operational, environmental and economic performance data. This evidence will quantify emissions reductions, cost savings and wider operational benefits, supporting the case

	for vessel retrofit as a viable and repeatable alternative to new builds in achieving net-zero maritime operations.
Context	The project sits within the offshore wind operations and maintenance sector, where crew transfer vessels play a vital role in enabling daily access to offshore wind farms. As offshore wind capacity continues to expand across Europe, demand is increasing for reliable, efficient and low-emission marine transport. Despite this growth, most CTVs remain diesel-powered, collectively consuming an estimated 164 million litres of diesel per year in Europe. This results in significant CO₂ emissions alongside other environmental impacts, including noise pollution, poor air quality and fuel spill risk. Operators are also facing rising fuel costs and increasing regulatory pressure to reduce emissions. Decarbonising offshore crew transfer presents specific challenges. While battery-electric ferries have proven effective on short, predictable routes, offshore wind operations typically involve longer distances, higher power demands, rapid turnaround times and limited access to offshore charging infrastructure. Historically, these constraints have limited the feasibility of full electrification. However, advances in battery technology, electric propulsion, power management and high-capacity charging systems are rapidly expanding what is technically and operationally possible. Within this evolving landscape, retrofitting existing CTVs offers a compelling solution. It enables faster deployment, lower upfront and embodied carbon impacts, and reduced risk compared to new builds, while allowing operators to build on existing fleets and expertise. This approach positions the offshore wind industry for a meaningful transition toward fully electric operations, aligned with long-term net-zero and sustainability goals.
Objectives	The central objective of the Mercurio project was to complete a successful and fully tested retrofit reconstruction of the vessel hull and power system. Adjacent to this, the demonstrator provides an opportunity to integrate proven commercial electric propulsion technologies, including Corvus batteries, Danfoss motors, and Volvo IPS pods, into a demanding offshore workboat environment. In doing so, the project aimed to generate new insights into the feasibility and limitations of retrofitting older vessels, informing when retrofits are appropriate and when purpose-built electric vessels offer a better long-term solution. The project also sought to establish offshore charging as a scalable and practical solution for the offshore wind sector. This

	meant demonstrating that vessels could use power generated by the turbines they service, enabling longer-range electric operations that are not limited by shoreside infrastructure alone. The project sought to show that offshore charging could support day-to-day operations, reduce diesel dependency, and provide a model for decarbonising the wider marine logistics chain. Beyond technical development, the project intended to build industry confidence, stimulate wider adoption, and support future regulatory and commercial pathways needed for green marine operations. By delivering a real-world demonstrator, the project aimed to catalyse progress across the supply chain and support the offshore wind sector in meeting emerging policy and sustainability requirements.
Project Activities	The project involved the full electrification of the Mercurio CTV, and the development of an associated offshore charging solution. Funding covered the physical retrofit of the vessel, the purchase of offshore and shoreside charging systems, and the engineering effort required to redesign the vessel's systems and safely integrate a large-scale battery and electric propulsion architecture. The retrofit required substantial technical adaptation. This was in response to two key challenges: • The vessel required a significantly larger battery size which was not anticipated at the start of the project. Specifically, the battery system was expanded to nearly 3.5 MWh and then backdown to 3MWh due to weight issues (originally intended to be over 2 MWh), requiring extensive reconfiguration of the vessel's interior, electrical systems, and cabling. • Many turbine platforms lacked the necessary space or access for large transformers. As a result, the charger was re-engineered to allow installation on a substation as well. By the end of this initial funding period, retrofitting was near completion, with commissioning and sea trials scheduled to verify real-world performance. Key challenges The project lead noted the following technical challenges encountered in delivery: • The fibreglass hull was thicker than expected, requiring far more cutting and grinding. Diesel residue within the structure complicated modifications, and the volume of high-voltage cabling required far exceeded initial estimates. The larger battery system also pushed the vessel to its physical limits, adding unplanned cost and complexity.

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- Infrastructure challenges centred on the realities of installing charging systems in offshore wind environments. Limited turbine platform space and access constraints meant the charger had to be redesigned to enable installation on substations. Onshore, ports lacked sufficient grid capacity to support megawatt-scale charging or even lower power charging, highlighting a major national barrier to scaling electric vessels. Commercial challenges were dominated by difficulties in securing a demonstration partner. Despite sustainability commitments, wind-farm operators face rigid financial frameworks and multi-department governance structures that make additional capital expenditure difficult to justify. The estimated cost of participating in a three-year demonstration created further hesitation.

Key successes

Despite these challenges, the project achieved several important successes:

- Collaboration across partners, MJR Power & Automation, Blackfish Engineering, Artemis Technologies, and Goodchild Marine Services, was a major strength. These relationships deepened over the course of the project and led to the creation of Charge Offshore, a joint venture established to commercialise offshore charging solutions.¹⁸
- The project also generated substantial public visibility, supported by proactive communications and a dedicated project blog. This helped position the company as a leading innovator in marine electrification and attracted interest from global operators, developers and investors. Importantly, the work has produced immediate commercial benefits: lessons from the retrofit directly informed the specifications of newbuild electric CTVs now under construction in Spain. The project has therefore contributed to a broader shift in the sector, helping to stimulate the emergence of new offshore charging providers and accelerating industry readiness for electric operations.

Experience of the LMT programme

The project team's experience with the LMT programme was largely positive. The application and interview processes were clear and well supported, benefitting from the experience of partners who had participated in previous competitions.

However, the team identified several areas for improvement. The timeline was considered tight for a first of its-kind retrofit, and the three-year demonstration period was viewed as excessive, particularly because it cannot begin until all elements, including

¹⁸ The joint venture was created as a result of CMDC 1.

	offshore charging infrastructure, are fully deployed. Delays in securing a host have therefore created structural barriers that sit outside of the project team's control. The experience with monitoring officers varied, with a mid project change creating some administrative disruption. While IUK was supportive, its ability to influence commercial partners, especially major utilities, was limited. The team identified a need for stronger support to help innovators secure demonstration environments, particularly where operational costs are intrinsically high.
Outcomes & Impacts	
Outcomes	The project achieved a number of significant outcomes. Technically, the vessel retrofit is now close to completion, incorporating a high-capacity battery system, new propulsion equipment, and major structural adjustments. The offshore charger design has matured and undergone testing, with new flexibility allowing installation on turbines or substations. Shoreside charging units are complete and ready for deployment. Commercially, it strengthened partnerships, enhanced brand visibility, and generated valuable operational learning that is now shaping new-build vessels already in production. The project has helped catalyse a wider market shift, with offshore charging providers entering the sector, suggesting that the project's signalling effect has been strong.
Impacts	The project's technological impact includes validating the integration of commercially proven propulsion components and identifying the next generation of batteries suitable for electric CTVs. The redesign of the offshore charger broadens its deployment potential across windfarm assets. Commercial impacts are emerging through new vessel orders, strengthened investor confidence, and the creation of Charge Offshore as a dedicated commercial pathway. Industry impacts include demonstrable shifts in attitudes: according to the consultee, where stakeholders were once sceptical, there is growing acceptance that electric and hybrid operations will become standard. The project aligns with evolving international regulatory expectations, positioning the UK supply chain to respond to future demand. Environmental impacts are expected to be significant. Once operational, the vessel will produce no direct emissions and will be capable of charging using curtailed offshore wind energy, turning wasted renewable electricity into productive activity.

	These impacts could be further amplified if design and retrofitting challenges are shared with CTV manufacturers and if offshore charging design requirements are communicated with windfarm operators or constructors.
Additionality	Without Innovate UK funding, the retrofit would not have been financially viable, and private investors would not have committed at the scale required. The project produced unique technical learning, influenced newbuild programmes, and accelerated market development around offshore charging. It has positioned the company and its partners at the forefront of a rapidly emerging market and helped trigger broader sectoral momentum that would not have occurred otherwise.
Successes and lessons learnt	
Key lessons	Lessons learnt The retrofit demonstrated that while electrification of older vessels is possible, it is costly and cumbersome. Newbuild electric CTVs will ultimately deliver better performance and cost efficiency. It also highlighted the importance of early design integration for offshore charging and the need for realistic assumptions about battery size and cabling requirements. Commercially, the team learned that stakeholder alignment is essential, and that windfarm operators require clear commercial incentives and internally accountable champions to adopt new technologies. Barriers and enablers to delivery and impact Key barriers included structural constraints during retrofitting, insufficient portside electrical infrastructure, and difficulties securing a demonstration partner due to internal cost and governance restrictions within utilities. The three-year demonstration requirement added further rigidity. Key enablers included strong cross partner collaboration, investor backing, the creation of Charge Offshore, and the increased visibility and credibility generated through communications and public engagement. Suggested improvements Future programmes should allow more flexible timelines and consider shorter, phased demonstration periods. There is a clear need for targeted support to help innovators secure demonstration partners, and for demonstration phase funding mechanisms to bridge the gap between technical delivery and commercial deployment.
Next Steps	The immediate next step is to commission the vessel and begin sea trials, validating its performance and refining operational parameters. Securing a demonstration partner remains the

priority, as the formal demonstration cannot begin until both the vessel and offshore charger are deployed on a live wind farm.

Beyond the retrofit, the company is now focused on purpose-built electric propulsion vessels, with two already under construction in Spain and more planned as part of a staged order. These vessels benefit directly from the technical learning generated through the retrofit.

Commercialisation plans involve offering a combined vessel and charger package, supported by flexible ownership and leasing models enabled through investor backing. Engagement with regulators and the Crown Estate¹⁹ will continue, with the aim of integrating offshore charging and port electrification more effectively into future offshore wind development.

¹⁹ An independent commercial business that manages a diverse portfolio of land and property owned by the UK monarch in right of the Crown.

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