

EVALUATION OF UK SHORE PHASE 1

Detailed process, impact and value for money
evaluation findings for UK SHORE phase 1

03 AUGUST 2026

Department for Transport

Great Minster House

33 Horseferry Road

London

SW1P 4DR



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1 Introduction

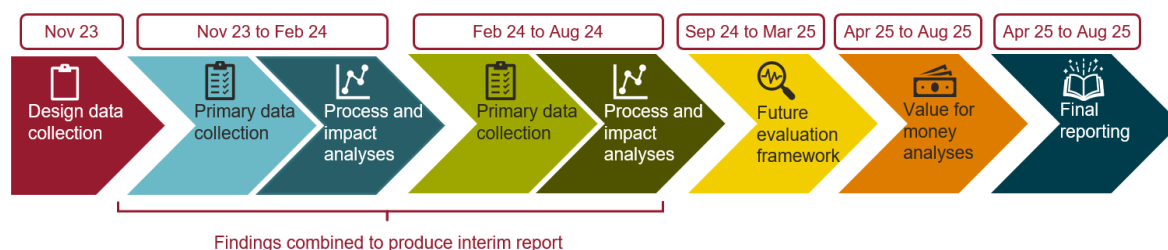
The Department for Transport (DfT) launched the UK Shipping Office for Reducing Emissions (UK SHORE) programme in March 2022, with total public funding of £206 million between April 2022 and March 2025.¹ UK SHORE is a portfolio of schemes. It aims to address maritime emissions and support skilled jobs across the country by accelerating the research into, and development of, clean maritime technologies. UK SHORE built on the £23 million allocated to the Clean Maritime Demonstration Competition Round 1 (CMD1) in 2021.

DfT commissioned Frontier Economics and SYSTRA Ltd. to design and lead the process, impact and value for money (VfM) evaluation of the UK SHORE phase 1 portfolio and of its individual schemes launched before October 2023. The evaluation aims to evidence robustly whether UK SHORE is on track to meet its objectives, and what is working well, what is not, why and for whom.

This report provides detailed findings of the final stage of a process, impact and economic VfM evaluation of UK SHORE phase 1, delivered in alignment with the Magenta Book (2020). It builds on, and in some cases synthesises, the findings of the [interim process and impact evaluation](#) (conducted in 2024 and published in 2025). Signposting to more detailed discussions in the interim report is provided where relevant throughout this report. The accompanying Executive Summary (**Note to DfT: LINK TO EXEC SUMMARY ONCE PUBLISHED**) document summarises findings across the 2 detailed evidence reports.

Figure 1 summarises the main delivery phases of the evaluation.

Figure 1 Evaluation implementation stages



Source: Frontier Economics and SYSTRA Ltd.

1.1 The UK SHORE portfolio

Terminology relating to UK SHORE can vary across documents, data and published materials, reflecting the complex nature of the intervention. To aid consistent reporting, the key terms

¹ [DfT launches UK SHORE to take maritime 'back to the future' with green investment](#), 10 March 2022.

below are used throughout this report to reflect the nature of UK SHORE. UK SHORE is a **portfolio** of **schemes**. The Clean Maritime Demonstration Competition (CMD C) and Transport Research Innovation Grant (TRIG) consist of multiple **scheme rounds** (CMD C1 to CMD C6; TRIG21 to TRIG24). Larger schemes also include **scheme strands**, which often have specific technology focuses.

Each **scheme** round funds multiple **projects**. For some schemes, consortium working is required and there are therefore multiple organisations involved in each project. In these cases, each project has a **project lead**, who manages the **consortium**, and collaborators, who form part of the consortium. The evidence base draws on some project-level evidence collected from the project lead and some organisation-level evidence where multiple organisations responded from each project. This is explained further in Section 1.2. It also includes some evidence from applicant organisations, that is all of those who applied (either successfully or unsuccessfully) for funding from the schemes.

This evaluation considers the UK SHORE schemes that had been announced at the time of the development of the Evaluation Framework (September 2023). The different schemes vary in terms of their technology readiness level (TRL), total funding, funding per project and number of projects:²

- **Clean Maritime Demonstration Competition** rounds 1-4 (**CMDC1-4**), a total of £129 million to 2025 in public funding over the first 4 rounds for mid TRL maritime decarbonisation technology.
- **Zero Emission Vessel and Infrastructure** round 1 (**ZEVI**), a total of £80 million in public funding for high TRL research. Funding was available until March 2025, with project partners providing funding to cover demonstration for at least 3 years from April 2025.
- **Transport Research Innovation Grant** annual rounds from 2021 to 2024 (**TRIG21-24**) provided 100% grant funding of up to a maximum of £45,000 for proof-of-concept research projects, with cohorts running every year. The 4 rounds of TRIG in scope total £1.5 million of public funding.
- **Clean Maritime Research Hub (The Hub)**, a flagship research hub made up of 13 universities ('members of The Hub') and led by the University of Durham. From September 2023 to March 2028, UK SHORE and the Engineering and Physical Sciences Research Council (EPSRC) are providing £9.25 million.

Schemes are delivered with support from **delivery partners**, who collect and assess applications and undertake project monitoring. Innovate UK is the delivery partner for CMD C and ZEVI, and the Connected Places Catapult (CPC) is the delivery partner for TRIG. Alongside DfT, the EPSRC is a joint delivery partner and co-funder of The Hub. Support from the delivery partners includes dedicated **monitoring officers**, who manage data sharing between organisations and the DfT and supported project reporting. Other key **stakeholders**

² A more detailed discussion of the UK SHORE schemes, the technology focus, TRL, location of projects supported and the funding provided is set out in Section 3 of the interim report.

are the Maritime and Coastguard Agency (MCA), which provides support on regulatory requirements, and the National Shipbuilding Office, which oversees all government interests in shipbuilding.

The design of the current UK SHORE portfolio was explicit in supporting technologies across a range of TRLs, aiming to provide technologies with the opportunity to develop and progress through multiple schemes.

Alongside public funding, CMDC, ZEVI and The Hub drew on industry funding, totalling £120 million. Generating match funding from industry was a requirement for public investment for these schemes. TRIG had no industry or match funding requirements.

The 2021 to 2025 portfolio also included 2 schemes announced since September 2023: CMDC5 (£1.5 million) and the Smart Shipping Acceleration Fund (£8 million). Moreover, in January 2025, an extra £30 million of UK SHORE funding was allocated to CMDC6. More recently, the government announced a further £448 million of funding for UK SHORE between 2026 and 2030.³ These investments are not in scope for this evaluation.

Terminology can vary across UK SHORE literature and reporting, including government and delivery partner web pages and monitoring data. To aid consistent reporting, the key terms described above are used throughout the Executive Summary and final report. The phrase 'UK SHORE portfolio' refers specifically to the schemes in scope (which make up a subset of the first phase of UK SHORE). 'ZEVI' refers to the first round of ZEVI and 'CMDC' refers to first 4 rounds of CMDC.

1.2 Definitions of key concepts considered in the evaluation

1.2.1 Measures of project development

The impact evaluation commonly uses several measure systems to assess the maturity level of the projects: technology readiness levels (TRLs), commercial readiness levels (CRLs) and market readiness levels (MRLs).

Technology readiness level (TRL)

TRL is a measure from 1 to 9 which captures the maturity of the technology being researched, where a lower TRL indicates a lower maturity level (see Table 1 for detailed definitions).

An increase in TRL indicates that a project has been able to advance its technology. However, TRL stagnation or regression is not in itself an indicator of an unsuccessful project. Part of the purpose of research and development (R&D) funding is to help unsuccessful projects 'fail

³ [More than £1.1 billion investment to boost growth, jobs and skills in UK's coastal towns and cities - GOV.UK](#)

faster', freeing up investment for other technologies which may ultimately be successful. This possibility was built into scheme-level business case expectations for UK SHORE.

As part of monitoring data collected by Innovate UK and the CPC, project leads were asked to report their TRL at both the start and the end of project (ZEV1 projects were also asked at project mid-point).

Table 1 **Definition of TRLs**

TRL	Definition
1	Basic principles have been observed or formulated.
2	Developing hypothesis and experimental designs.
3	Specifying and developing an experimental proof of concept.
4	Proof of concept demonstrated in test site or initial evaluation of costs and efficiency produced.
5	Technology or process validated in relevant environment.
6	Technology or process validated in operational environment.
7	System complete and qualified.
8	Product, technology in manufacture or process being implemented.
9	Produced, service on commercial release or process deployed.

Source: Provided by UK SHORE (as used in Innovate UK monitoring data)

Commercial readiness level (CRL)

CRL is a measure from 1 to 9, where a higher CRL indicates that the product or technology is closer to being ready for market launch and commercialisation (see Table 2 for detailed definitions). As part of Innovate UK monitoring, project leads for CMD1-3 and The Hub were asked to report their CRL at the start and end of the project as part of DfT monitoring.

Table 2 **Definition of CRLs**

CRL	Definition
1	Knowledge of applications, use cases and market constraints is limited and incidental or has yet to be obtained at all.
2	A cursory familiarity with potential applications, markets and existing competitive technologies or products exists.

3	A more developed understanding of potential applications, technology use cases, market requirements or constraints, and a familiarity with competitive technologies and products allows for initial consideration of the technology as product.
4	A primary product hypothesis is identified and refined through additional technology product-market analysis and discussions with potential customers or users. Potential suppliers, partners and customers are identified and mapped in an initial value-chain analysis. Any certification or regulatory requirements for product or process are identified.
5	A deep understanding of the target application and market is achieved, and the product is defined. A comprehensive cost-performance model is created to further validate the value proposition and provide a detailed understanding of product design trade-offs. A basic financial model is built with initial projections (for example, near- and long-term sales, costs, revenue and margins).
6	Market or customer needs and how those translate to product needs are defined and documented (for example in market and product requirements documents). Product design optimisation is carried out considering detailed market and product requirements, cost and performance trade-offs and manufacturing trade-offs.
7	Product design is complete and supply and customer agreements are in place. All necessary certifications or regulatory compliance for product and production operations are accommodated. Comprehensive financial models and projections have been built and validated for early stage and late stage production.
8	Customer qualifications are complete; initial products are manufactured and sold.
9	Widespread deployment is achieved.

Source: UK SHORE

Market readiness level (MRL)

MRL is a measure from 1 to 10, where a higher MRL indicates that the product or service is closer to being ready to offer commercially for a group of customers (see Table 3 for detailed definitions). As part of Innovate UK monitoring, CMD4 and ZEVI project leads were asked to report their MRL at the start and end of the project (ZEVI projects were also asked at project mid-point).

Like CRL, MRL indicates a technology's progression towards commercial rollout but the 2 are not directly comparable. Innovate UK switched from capturing CRL to MRL after CMD3.

Table 3 **Definitions of MRL**

MRL	Definition
1	Unsatisfied needs have been identified.

2	Identification of the potential business opportunities.
3	System analysis and general environment analysed.
4	Market research.
5	Target defined.
6	Industry analysis.
7	Competitor analysis and positioning.
8	Value proposition defined.
9	Product/service defined.
10	Business model defined coherently.

Source: UK SHORE

1.2.2 Scaled and unscaled emissions

CMDC3 and CMDC4 projects were asked to report potential emissions savings as a result of their project at 2 levels:

- **unscaled emissions:** Emissions savings achieved by a single demonstrator project in comparison to the relevant counterfactual that exists in the maritime sector
- **scaled emissions:** Emissions savings that could be achieved by the potential deployment at scale of the technology in the wider maritime market

These 2 terms were defined by Innovate UK in the monitoring data.

1.2.3 Project and organisation level reporting

For CMDC and ZEVI, consortium working was a requirement of funding. This had implications for the ways in which different data sources were collected and analysed for this evaluation.

Monitoring data was collected from all organisations involved, but some questions were relevant at the project level. For CMDC1 and CMDC2, some questions were only asked at the project level. Therefore, monitoring data analysis for the impact evaluation was conducted at both the 'project' level and the 'organisation' level:

- Project-level analysis took one response from each project, typically the project lead.
- Organisation-level analysis kept responses from all organisations. Organisations could be involved in multiple projects and were expected to respond to the data for each project separately. In this sense 'organisation' refers to the unique project-organisation combination. Where the potential double counting of the same organisation posed a limitation of the analysis, this is noted throughout the report.

For TRIG, more than one organisation may have been involved in each project, but monitoring data was only collected from the lead organisation. Therefore, analysis is conducted at the project level.

As part of this evaluation, a primary survey was conducted and sent out to all organisations involved in CMDC, ZEVl and TRIG projects. Responses typically (but not exclusively) came from project leads. The term 'survey respondent' is therefore used when referring to this data in the process evaluation.

1.3 Structure of the report

The remainder of this report is structured as follows:

- Section 2 provides a summary of the evaluation approach, including evidence sources and limitations.
- Section 3 presents the **process evaluation findings**, building on and synthesising findings from the interim and final evaluations.
- The **impact evaluation findings** are structured as follows:
 - Section 4 provides findings for CMDC3 and CMDC4 and a limited set of additional findings for CMDC1 and CMDC2 (evaluated in detail in the interim report)
 - Section 5 sets out the findings for the first round of ZEVl
 - Section 6 provides findings for TRIG23/24 and a limited set of additional findings for TRIG21/22 (evaluated in detail in the interim report)
 - Section 7 builds on the early findings for the Clean Maritime Hub from the interim report, drawing on additional evidence
 - Section 8 enhances the early portfolio-wide findings from the interim report, drawing on scheme-wide and additional portfolio evidence
- Section 9 details the **value for money findings**, building on a limited set of findings in the interim report.
- Section 10 sets out lessons learned and points to consider for future UK SHORE or similar schemes.

2 Evaluation approach

This section sets out the approach taken for the evaluation, including evidence sources and limitations.

2.1 Approach and scope

The evaluation is based on a framework agreed with DfT in late 2023. This framework developed a theory of change and process map (see Annex A for the portfolio-wide process map and logic model; scheme-level versions are included in the annexes of the interim report).

This report is the final stage of the current phase of UK SHORE evaluation. Table 4 summarises the differences between this evaluation and the interim evaluation.

Table 4 Summary of interim and final evaluation

	Interim evaluation	Final evaluation
Process evaluation	■ Focus on earlier stages of the process (design, set-up, application and assessment) ■ Delivery processes for CMD1, CMD2, TRIG and The Hub, to some extent ZEV	■ Focus on latter stages of the process (mobilisation and delivery) ■ Includes delivery processes for CMD3, CMD4, TRIG, The Hub and ZEV
Impact evaluation	■ Covered a limited sub-set of schemes (the first 2 CMD rounds, the first 2 TRIG rounds, ■ A limited portfolio analysis (based on only a subset of schemes)	■ Adds additional insight for schemes included in the interim evaluation ■ Includes additional schemes (CMD3 and CMD4, and ZEV)
Value for money evaluation	■ A comparison of costs and benefits was not included	■ Includes a quantification of costs and benefits ■ Builds on findings of strategic fit

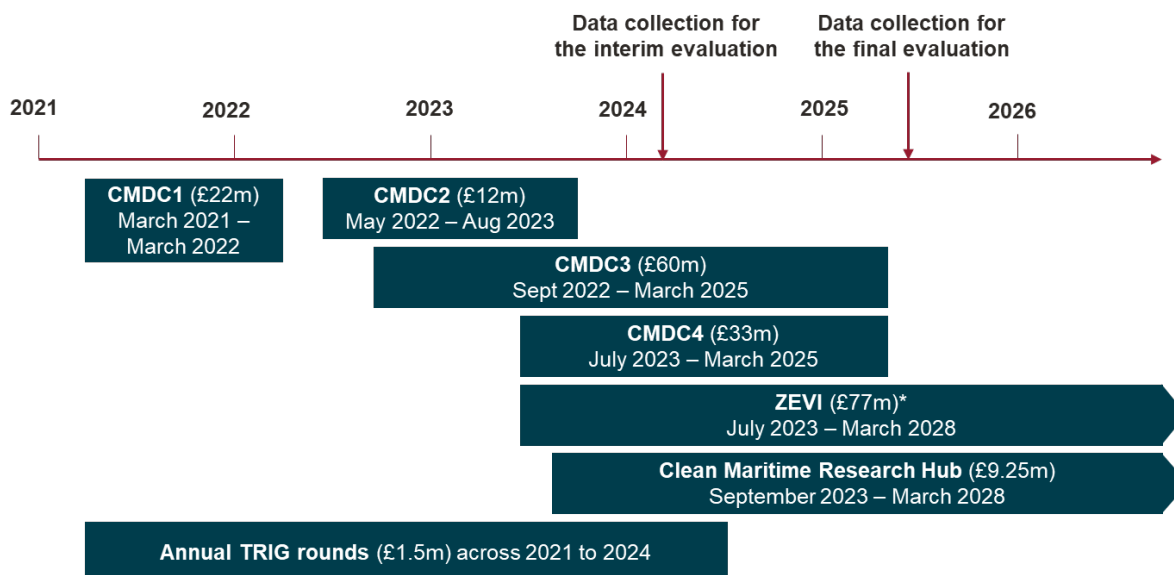
Source: Frontier Economics and SYSTRA Ltd.

Note: No changes were made to the underlying logic model or process maps for UK SHORE or the associated process, impact and VfM evaluation questions for the final report compared to the interim report.

Figure 2 sets out the schemes in scope for this evaluation and their level of completion at the time of data collection. Most schemes had completed by the point of data collection in June 2025. However, The Hub and the demonstration phase of ZEV projects were still underway. Later CMD and TRIG rounds had completed only recently at the time of data collection, which limited the potential for longer-term impacts to materialise. Earlier CMD and TRIG

rounds had completed for some time, but limited follow-on data to assess longer-term impacts was available.

Figure 2 A summary of the schemes in scope of this evaluation



Source: Frontier Economics

Note: * ZEVI is split into a funded stage (to March 2025) and an unfunded demonstration phase (from March 2025).

As a result, limited data on longer-term outcomes and impacts was available for this evaluation. Early stage outcomes include technology development, job creation and retention within projects, and improved private sector confidence. Longer-term outcomes include emissions savings and significant growth of the clean maritime sector. Looking at early stage outcomes provides some evidence to assess whether UK SHORE is on track to achieve the anticipated longer-term outcomes in the future

Therefore, the aim of this evaluation is to assess what elements of the **process** have worked well and less well, the evidence for early stage **impact** and whether longer-term impacts can be expected to materialise, and whether it is likely that **value for money** will be achieved.

Frontier Economics and SYSTRA have developed a separate evaluation framework to assess the longer-term benefits of UK SHORE to 2028, which could be used as the basis to capture longer-term outcomes and impacts in the future.

The remainder of this section sets out the approach for the process, impact and value for money section in turn.

2.1.1 Process evaluation

A process evaluation looks primarily at what worked and what could be improved in relation to the delivery of an intervention ([HMT Magenta Book, 2020](#)). For the evaluation of UK

SHORE, process maps and evaluation questions were developed at the portfolio and scheme levels. These cover each stage of the process: scheme design (including awareness of UK SHORE), application and assessment phases, project mobilisation and delivery, and knowledge sharing.

The overarching process evaluation questions (EQs) are set out in Table 5

Table 5 **Process evaluation questions**

EQ	Question
1	To what extent have interventions been delivered as planned? What changed and why?
2	How far have delivery processes supported the realisation of intended activities and outputs?
3	Which elements of the scheme delivery are potentially transferable to other programmes?
4	What are the barriers to and enablers of delivery of the projects funded by UK SHORE?
5	What elements of the schemes have worked well to date, and what could be improved?
6	What are the experiences of applicants (successful and unsuccessful) in applying to the schemes?

Source: SYSTRA Ltd.

The process evaluation combines qualitative and quantitative insights from several evidence sources (as set out in Section 2.2), as no single source provided comprehensive evidence for each aspect of the process evaluation.

2.1.2 Impact evaluation

The impact evaluation draws on best-practice guidance for evaluation as outlined in the [Transport analysis guidance \(TAG\) unit E-1](#) and [the Magenta Book \(HMT, 2020\)](#). For each scheme, the impact evaluation is organised around a set of EQs, as set out in Table 6.

UK SHORE is a complex intervention with several objectives and a range of factors that influence success. As a result, a theory-based approach was adopted. At scheme level, contribution analysis is used to assess evidence for whether UK SHORE has contributed to observed outputs and outcomes, drawing on the underlying theory of change. At portfolio level, evidence from the scheme-level evaluations is drawn together alongside additional portfolio-wide evidence to assess the contribution of UK SHORE

Table 6 **Impact evaluation questions**

EQ	Question
1	To what extent, and through what mechanisms, did UK SHORE help to accelerate and support the development of clean maritime technologies relative to what would have happened in the absence of UK SHORE?
2	To what extent, and through what mechanisms, can environmental benefits be attributed to UK SHORE?
3	To what extent, and through what mechanisms, did UK SHORE improve the commercial prospects and opportunities for clean maritime in the UK?
4	To what extent is there evidence that UK SHORE has generated positive spillover benefits?
5	To what extent has UK SHORE achieved wider social objectives?

Source: *Frontier Economics*

Note: *Note that wording for the sub-EQs included in EQ2 were adjusted to more accurately reflect the nature of emissions reductions. Throughout, emissions reductions measured by CO₂e are considered.*

The final impact evaluation builds on the interim evaluation by:

- including schemes which were not included in the interim evaluation (CMDC3, CMDC4, TRIG23 and TRIG24 completed between the interim and final stages)
- including additional inflight data and qualitative evidence for ZEV1 which was available to inform emerging outputs and expected outcomes
- updating and synthesising interim findings for earlier schemes based on additional data. For CMDC1, CMDC2, TRIG21 and TRIG22, survey data is used to provide a limited update to interim evaluation findings, although with small sample sizes. For The Hub, there is now a larger amount of monitoring data and additional qualitative evidence.

2.1.3 VfM evaluation

The overarching VfM evaluation question is 'To what extent has UK SHORE delivered value for money?'. This is composed of 3 sub-questions:

1. To what extent have UK SHORE and its component schemes demonstrated strategic fit with government priorities?
2. To what extent have UK SHORE and its component schemes been delivered in an economical and effective way?
3. To what extent are the socioeconomic benefits (monetised and non-monetised) of UK SHORE and its component schemes likely to exceed the public costs of delivery?

The interim evaluation answered only the first 2 sub-questions. This final evaluation provides evidence for sub-question 3. and provides updated findings around strategic fit. No new evidence relating to economic and effective delivery was captured. The findings from the interim evaluation (Section 9.8.2) for sub-question 2. are therefore unchanged.

For sub-question 3. a detailed methodology is set out in Annex B At a high level, the evaluation considers the following 2 monetised benefits from UK SHORE where at least some evidence was available from the impact evaluation:

- **Gross value added (GVA) benefits** calculated using project-level jobs data and estimates derived from national statistics of the additional GVA of jobs supported by UK SHORE relative to a 'typical' job
- **Monetised emissions savings** based on a breakeven analysis to consider the required level of emissions savings to achieve VfM, and an assessment of whether such emissions savings are plausible.

2.2 Evidence sources

Evidence sources for the process, impact and VfM evaluations included online surveys, in-depth interviews, focus groups and monitoring data. For the VfM evaluation, external data from the Office for National Statistics (ONS), Department for Energy Security and Net Zero (DESNZ) carbon values and industry expert independent reviews from ERM were also used.

2.2.1 Online survey

The initial online survey (December 2023) received 52 responses. A second online survey (May 2025) received 39 responses. The second survey was extended to include the 2 later rounds of both CMDC and TRIG.

Both surveys were distributed by delivery partners to lead and collaborator organisations of projects that had **successfully** bid for funding at the time. Unsuccessful applicants were excluded from the survey. Those who responded to the 2023 survey were not excluded from the 2025 survey. Routing was designed to ensure respondents were asked relevant questions to their role (those not involved in bidding were not asked about the competition stage). To minimise burden on respondents, all questions were optional. Therefore, base sizes vary by question. As part of the survey, project representatives were invited to participate in an in-depth interview with the evaluators.

Questions across waves of the survey were the same where possible to allow for analysis across both waves together. In the second phase of the survey, however, additional impact and outcome questions were added for completed schemes. A small number of questions were not repeated in 2025 where it was felt there was no added value from asking them again. The final survey is provided in Annex C .

For the **process evaluation**, responses were considered across both 2023 and 2025. If there had been a response from the same project and organisation in both the 2023 and 2025 survey, the latter response was used.

For the **impact evaluation**, there are some questions where only responses from the 2025 survey were used. For other questions, responses from CMDC1 and CMDC2 and TRIG21/22 were taken from the 2023 survey, and all other schemes from the 2025 survey. This is because the impact evaluation seeks to capture project progress at a specific point in time and cannot compare responses across points in time. The sources of the survey analysis are made clear throughout the impact evaluation.

Survey responses were cleaned and analysed by:

- identifying and removing duplicate responses – where the same respondent had completed the survey twice (verified through consistency of responses to the open and closed questions and information provided for follow-up research), the most recent response was taken
- creating and cleaning variables, including creating new variables, condensing variables, (for example satisfaction scales) and creating banding for numeric responses, as required
- calculating frequency tables of all variables
- quality assurance and tidying, including re-labelling of unclear values and variables, reviewing missing data and undertaking a final routing check.

2.2.2 In-depth interviews and focus group

The in-depth interviews and focus group informed both the process and impact elements of this evaluation.

In May 2025, the following groups were invited to participate in an in-depth interview with a researcher: all successful and unsuccessful applicant organisations to CMDC3 and CMDC4, all successful applicant organisations to ZEVI, and The Hub lead. The applicant organisations which opted in to an interview were reviewed. Where opt-ins exceeded the interview slots available, organisations were selected to ensure a range of projects were represented. Factors considered included TRL, geography and the value of the project. Projects and organisations which had not previously been interviewed as part of this evaluation were also prioritised to ensure that as many organisations and projects as possible provided information for the evaluation. These interviews built on the evidence base of interviews conducted for the purposes of the interim evaluation, which were done with successful and unsuccessful applicant organisations to CMDC1, CMDC2, TRIG, ZEVI and The Hub.

Members of The Hub consortium were also invited to participate in a focus group discussion. A focus group was preferred for The Hub consortium members both for time efficiency (a one-time discussion rather than individual interviews) and to allow consortium members to reflect amongst themselves on the process and impacts of their involvement in The Hub.

A summary of the qualitative evidence collected from applicants is shown in Table 7.

Table 7 **Applicant interviews conducted across the evaluation**

Competition	Number of interviews with successful applicants	Number of interviews with unsuccessful applicants	Number of projects within scheme
CMDC1	2 (interim evaluation)	1 (interim evaluation)	55
CMDC2	3 (interim evaluation)	2 (interim evaluation)	31
CMDC3	1 (final evaluation)	1 (final evaluation)	19
CMDC4	1 (final evaluation)	1 (final evaluation)	33
ZEVI	2 (final evaluation)	2 (interim evaluation)	10 (reducing to 8 due to drop-out)
TRIG	2 (interim evaluation)	2 (interim evaluation)	42
The Hub	2 (1 for interim and 1 for final evaluation) with lead organisation 1 with focus group of consortium members	0	1

Source: Primary research

The majority of interview participants had been involved in a UK SHORE scheme from the bidding stage through to delivery. Some participants were only involved in the delivery stage. In addition, some participants had bid to other UK SHORE schemes than the scheme they were interviewed about. For example, both of the successful ZEVI organisations interviewed had been involved in CMDC rounds.

In addition to interviews and the focus group with scheme applicants, interviews were carried out with delivery partners (CPC, EPSRC and Innovate UK) as well as stakeholder organisations (DfT policy and delivery teams, MCA and the National Shipbuilding Office). A summary of the qualitative evidence collected from these other stakeholders is shown in Table 8.

Table 8 **Stakeholder, delivery partner and DfT interviews conducted across the evaluation**

Stakeholder	Number of interviews
DfT policy team	1 (interim evaluation)

DfT delivery team	1 (interim evaluation)
MCA	2 (interim and final evaluation)
National Shipbuilding Office	1 (final evaluation)
Innovate UK	2 (interim and final evaluation)
CPC	2 (interim and final evaluation)
EPSRC	1 (final evaluation)

Source: *Primary research*

Interviews were carried out over Microsoft Teams, each lasting around 1 hour. The Hub consortium focus group was also carried out over Microsoft Teams and lasted for 1.5 hours. It was attended by all but one of the consortium leads, who was unable to attend.

A semi-structured topic guide was designed to support qualitative research based on the process and impact evaluation questions set out in the evaluation framework. Topic guides were tailored to each participant group, and broadly covered the following points:

- **Process evaluation:** What worked well, or less well, across the following elements:
 - Competition phase: The scheme scoping and the process of bidding for funding, including competition design, roles of collaborators and consortiums, support and guidance from delivery partners and assessment phase
 - Mobilisation phase: The early stage activity following notification of bid outcome, including notification of funding, feedback and change control
 - Project delivery phase: The main active delivery phase and project next steps, including project set-up, the role of partners, suppliers and procurement, timelines, support from delivery partners, barriers and enablers, data reporting and knowledge sharing
- **Impact and VfM evaluation:** Project-level outcomes including emissions savings, commercial benefits, job creation and the extent to which objectives were met; additionality and displacement; enablers and barriers; the impact of UK SHORE on the wider industry; and whether organisations had been involved in other UK SHORE schemes.

Interview summaries were analysed using thematic analysis, with themes reflecting the evaluation framework. The write-up of each interview and the focus group underwent internal quality assurance procedures, which involved being read through by a different researcher to the one leading the interview to ensure clarity and consistency, and that a sufficient level of detail and context was added. In addition, researchers came together to share emerging findings and align on qualitative narratives to ensure a shared understanding and reduce possible researcher bias.

2.2.3 Monitoring data

Table 9 sets out the monitoring data collected by delivery partners and subsequently used for this evaluation. The exact questions and timing of monitoring data varied across schemes. All data is self-reported except The Hub's mid-term review.

The monitoring data was used in the following ways:

- Monitoring data included limited coverage of **process** aspects. Available data was cross-referenced with findings from the survey and in-depth interviews.
- Detail on the data used in the **impact** evaluation is set out in the relevant impact evaluation sections for each scheme. As not all monitoring data was fully complete, response rates and coverage are also set out in individual sections of the report.
- The **VfM** evaluation drew on data analysed for the impact evaluation, namely job creation reported in end-of-project or inflight data and emissions savings reported in end-of-project reports.

Table 9 Monitoring data used for this evaluation

Data source	Relevant schemes	Information
Baseline monitoring data	Collected for all schemes	Contains baseline information for benchmarking, including TRL at project start, and project-level measures of success
End-of-project or inflight data	End-of-project data: CMD1-4 and TRIG Inflight data: ZEV1 (mid-project) and The Hub (end of year 1, and mid-project)	Contains data such as TRL, CRL and MRL, collaboration, financial impacts, and realised and expected job creation and retention
Project reports	End-of-project reports: CMD1-4 and TRIG Inflight reports: end-of-year 1 and mid-term report	Submitted by project leads providing more qualitative information about project outcomes A subset of reports were reviewed (5 for CMD3, 8 for CMD4, and 4 for TRIG23-24). Four further CMD3 and CMD4 reports were also used for case study analysis as part of the VfM evaluation.
Independent reports	The Hub mid-term review (May 2025)	Independent peer review of The Hub conducted by academics working in related fields.

Source: Frontier Economics

The following steps were applied to clean and validate the data:

- **CMDC3 and CMDC4:** For CMDC3, 4 duplicated responses (where 2 answers were recorded for the same project) in the baseline data and 3 in the end-of-project data were removed. Additionally, 3 organisations that had incorrectly reported their project roles were corrected, such that each project had one lead, in line with UK SHORE records. For CMDC4, one duplicated response in the baseline data was removed. The retained response was chosen based on the response with more complete information, the more recent submission time and no mistakes in information provided (e.g. project role).
- **ZEVI:** Two projects dropped out of the scheme (that is, terminated before project completion) and were therefore removed from the baseline and end-of-project data. One organisation responded twice for the same project – in this case, the incomplete response was removed.
- **TRIG23 and TRIG24:** For TRIG23, one project was removed from the baseline data as it belonged to another category of TRIG project.

Case studies on emissions savings

In end-of-project reports, CMDC3 and CMDC4 projects reported expected, scaled and unscaled emissions savings. Savings from deployment at scale are based on a projection of deployment by each project using their own assumptions such as size of the eligible market. However, it is not possible to aggregate such figures, and projects make varying assumptions to calculate these figures (see Section 4.2).

Independent expert analysis was provided by ERM to develop 4 case study projects. The case studies were used in 2 different ways:

- To estimate the plausible emissions savings that could be achieved by CMDC3 and CMDC4 projects – this had 2 purposes: to inform early indications of benefit for the VfM evaluation and to provide contextual evidence for the CMDC impact evaluation on variation of emissions savings across technologies (Section 4.2)
- To understand the accuracy of project-level reporting and aid DfT in developing future reporting standards which better allow for standardisation (and potentially aggregation) across projects.

Purposive sampling was used to select the case studies. As only 4 case studies were considered, it was not possible to fully reflect the diversity of CMDC3 and CMDC4 projects. However, selection aimed to reflect a range of technologies, geography, vessel types and TRL at end of project.⁴ Projects were only considered as potential cases if they had both clear reporting of assumptions and emissions savings greater than zero (and therefore with potential to inform understanding of project-level reporting and potential VfM). This means they are not

⁴ The categories of technologies were identified as: electric powertrain vessel technologies (fuel cell or battery electric); combustion powertrain technologies (liquid or gaseous fuels – i.e. to distinguish between hydrogen/methanol for fuel cell and for combustion); supporting infrastructure/offboard technologies; and efficiency improvement technologies (including wind assistance).

‘representative’ projects and emissions savings from these projects are likely to be greater than the average CMD3 and CMD4 project.

The case study analysis relied on review and independent analysis of the end-of-project reports. Project claims were verified based on references from reputable sources such as the International Maritime Organisation and [DNV](#), other industry papers and private company reports.⁵ This evidence base was used to check specific sources of data or specific reference values used in the reports. The case studies were not able to address the inherent uncertainty about whether scaled emissions savings would be realised, as realisation depends on multiple factors.

2.2.4 External data

The VfM analysis relied in part on the following external data (set out in more detail in Annex B):

- **Companies House data on standard industrial classification (SIC) codes of registered companies**⁶ – data was used to calculate the proportion of organisations receiving UK SHORE funding in each sector of the economy
- **GVA per job by division of the economy** from the ONS⁷ – data was used to calculate the additional GVA of a clean maritime job compared to the average job in the economy
- **DESNZ carbon values**⁸ – data was used to monetise emissions savings
- **Discount rate** taken from the Green Book⁹
- **Inflation** data from the ONS used to adjust costs and benefits to a common base year.¹⁰

2.3 Limitations

The evidence sources set out above provide valuable insight for the evaluation of UK SHORE. However, these sources have inherent limitations that must be considered when interpreting findings. These limitations were largely identified at the stage of evaluation design and informed the choice of a mixed-methods, theory-based impact evaluation to avoid reliance on any single source of evidence and to triangulate findings based on a clear understanding of the limitations of the evidence to arrive at informed conclusions.

⁵ The International Maritime Organisation collects global vessel and fuel consumption data. The DNV provides shipping scenarios and collects data on vessels on order using alternative fuels.

⁶ https://download.companieshouse.gov.uk/en_output.html. Extracts taken on 01/08/2025 and 01/01/2023.

⁷ <https://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/labourproductivity/datasets/outputperjobbydivisionuk>

⁸ <https://www.gov.uk/government/publications/valuation-of-energy-use-and-greenhouse-gas-emissions-for-appraisal> Table 3

⁹ <https://www.gov.uk/government/publications/green-book-supplementary-guidance-discounting>

¹⁰ <https://www.ons.gov.uk/economy/inflationandpriceindices>

Across all sources, a key caveat is that the evaluation relies heavily on projects' own self-reporting. With the exception of the 4 case studies, it was not possible to validate self-reporting.

2.3.1 Online survey

The main limitations associated with the primary research survey are as follows:

- Participation in the primary research survey was optional (although applicant organisations were strongly encouraged to respond). Therefore, results are not representative of all projects in the UK SHORE portfolio. Sample sizes across the schemes and across the portfolio are relatively small and represent mixed proportions of successful projects (between 19% and 65% of projects for each scheme are represented). Table 10 outlines, for each scheme and survey round, the number of responses and the proportion of projects covered.
 - The response rates are likely to be reflective of the burden of responding to surveys alongside other project reporting requirements. They also likely reflect the fact that earlier schemes (CMDC1, CMDC2, TRIG21 and TRIG22) were less likely to be engaged with UK SHORE by the time of data collection of the second survey. The project team worked closely with DfT and delivery partners to maximise the response rate by extending the survey timescales, engaging directly with projects and issuing regular reminders.
 - Quantitative survey findings are reported in both percentages and absolute numbers to aid transparency. Graphs present absolute numbers only. Where response rates are lower, these are highlighted in the narrative. Results should be interpreted with caution given the low number of responses.
- There is a risk of voluntary response bias, where those who responded to the survey were more opinionated than non-respondents. This could mean that applicants who had either very positive or very negative experiences with UK SHORE funding were more likely to respond to the survey than applicants with neutral experiences.
- The online surveys were only distributed to successful applicant organisations, with unsuccessful applicants instead engaged through qualitative research. This could contribute to bias in the process evaluation, because applicants who were successful may have had more favourable views of the competition phase than those who were unsuccessful.

Table 10 Survey response rates

Scheme	Number of successful projects	Number of 2023 responses (% of projects represented)	Number of 2025 responses (% of projects represented)	% of projects represented in either survey*
CMDC1	55	9 (16%)	3 (5%)	18%
CMDC2	31	21 (52%)	3 (10%)	65%
CMDC3	19	8 (42%)	8 (37%)	58%
CMDC4	33	N/A	19 (55%)	55%
TRIG (2021-2024)	26 (2023)**; 42 (2025)	7 (27%)	2 (5%)	19%
ZEVI	10 (2023); 8 (2025)***	7 (70%)	4 (50%)	70%
The Hub	1	N/A	N/A	N/A

Source: SYSTRA Ltd.

Note: *% takes account of where multiple responses were received for any one project. **The 2023 survey did not include TRIG23 and TRIG24 (16 projects). ***Two ZEVI projects dropped out of the scheme during the evaluation and so are not included in the 2025 survey; their responses to the 2023 survey are included in the process evaluation as they still provide an indication of the competition phase, project mobilisation and earlier stages of project delivery.

2.3.2 In-depth interviews and focus groups

The main limitations associated with the qualitative research conducted for this evaluation are as follows:

- Research participants who represented scheme applicant organisations were recruited through non-probability self-selection sampling based on their association with UK SHORE. As with the survey, self-selection sampling can lead to the risk of voluntary response bias, as participants are likely to have strong opinions or characteristics compared to non-participants. This bias may be especially applicable for research conducted with scheme applicant organisations, whose opinions may be knowingly or unknowingly impacted by the outcome of their application.
- Stakeholders and delivery partners who were interviewed were selected through purposive sampling (i.e. selected based on their specific knowledge or experience), which may have limitations in terms of overlooked information if the stakeholders recruited do not represent all the relevant stakeholders.

2.3.3 Monitoring data

Limitations with the quantitative monitoring data include:

- The data cleaning process (as outlined in Section 2.2) required specific judgements, in particular in handling duplicate responses.¹¹ Further, in some cases where organisations were involved in multiple projects, it appeared that the same data had been provided. It was not possible to independently validate which response was accurate. Nor was it possible to independently validate potential outliers in responses. Responses were therefore taken at face value, which may have resulted in instances of double counting or figures being affected by outliers. These are identified throughout the report as needed.
- A particular issue for CMD3 and ZEVI is the high level of non-response. Table 11 sets out the response rates for the various sources of monitoring data. In many cases, organisations that responded to the monitoring data did not answer all questions. In some instances, organisations responded to either the baseline or end-of-project data but not both, introducing limitations when comparing between the 2 databases. As a result, some analysis is based on small sample sizes (noted throughout the report). There may also be a risk of voluntary response bias.
- In addition, questions asked were not consistent across schemes, which makes aggregation impossible. Innovate UK's monitoring process changed between CMD1 and CMD2, such that the data collection for CMD1 and CMD2 differed from CMD3, CMD4 and ZEVI). Some questions differed between CMD3 and CMD4. The CPC is the delivery partner for TRIG, which resulted in a different collection process.

With regard to qualitative monitoring data, only a sample of end-of-project reports were reviewed. These may not be representative of all projects.

Table 11 Response rates to monitoring data

	Baseline data	End-of-project / inflight data
CMD3	16 out of 19 projects (84%) 75 out of 93 organisations (81%)	12 out of 19 projects (63%), but only 6 project leads (32%) 35 out of 93 organisations (38%)
CMD4	All 33 projects (100%) 143 out of 143 organisations (100%)	30 out of 33 projects (91%) 114 out of 143 organisations (80%)

¹¹ The approach for dealing with duplicates changed between CMD1 and CMD2 and CMD3 and CMD4. For CMD1 and CMD2, it was not possible to determine the 'best' response and so all responses were kept and weighted (more detail is available in Section 4 of the interim report). For CMD3 and CMD4, the most complete and recent response was identified and all other responses were removed.

ZEVI**	All 8 projects (100%) 48 out of 49 organisations (98%)	7 out of 8 projects (88%) 21 out of 49 organisations (42%)
TRIG23*	7 out of 8 projects (87.5%)	All 8 projects (100%)
TRIG24*	6 out of 8 projects (75%)	All 8 projects (100%)
The Hub	For both baseline and end-of-year 1 data, all 13 organisations responded (100%)	12 out of 13 organisations (92%)

Source: Baseline and end-of-project monitoring data, CMD3, CMD4 and ZEVI winners data.

Note: Compared number of responses to baseline and end-of-project monitoring data against UK SHORE record of the number of winners. *Only the lead organisation was surveyed for each project. **Excludes drop-out projects.

3 Process evaluation findings

3.1 Introduction

The process evaluation for UK SHORE seeks to address the evaluation questions set out in Section 2.1 based on the evidence collected set out in Section 2.2. The evaluation provides evidence on lessons learned for improving the design and delivery of UK SHORE and other similar schemes in the future and includes a focus on the core inputs, activities and outputs outlined in the logic models.

Evidence was collected according to the different stages of the process of designing and delivering the UK SHORE schemes: awareness of UK SHORE and likelihood of participating in future similar schemes, the competition phase, project mobilisation and project delivery. The findings in this section are structured around these stages and include a summary of which elements worked well and which could be improved.

The findings are presented both at the portfolio-wide level and at the scheme level (CMDC1-4, ZEVI, TRIG 2022-2024 and The Hub) based on the experiences and reflections of applicants, organisations, fund designers and delivery partners. CMDC and TRIG evolved over each scheme round, and each round is distinctive. This is reflected upon where relevant. Findings related to The Hub are reported only on an individual project basis and are not included in the portfolio-wide chart presentations due to the different nature of this scheme. Funding through this scheme was only awarded to one successful applicant, with several organisations joining its consortium.

3.2 UK SHORE awareness

Awareness of the UK SHORE portfolio was high among both successful and unsuccessful applicant organisations across different schemes

The online survey conducted in 2023, with successful applicant organisations across CMDC, ZEVI and TRIG, asked about awareness of the wider set of schemes within the UK SHORE portfolio.¹² This showed that most respondents (over 90%) were aware of the 4 different CMDC scheme rounds, while fewest were aware of ZEVI (19% were 'not aware') and The Hub (35% were 'not aware'). In the in-depth interviews with both successful and unsuccessful applicants, many applicant organisations reported that they had also applied, both successfully and unsuccessfully, to other schemes within the UK SHORE portfolio (discussed further in Section 8.6).

Interviews conducted with unsuccessful applicant organisations showed that those who were familiar with other UK SHORE schemes attributed this to either their own organisation or their

¹² This question was only asked in the 2023 wave of the survey.

consortium partners, having applied to one or more UK SHORE schemes previously. Some had also participated in knowledge sharing activities.

Delivery partners also perceived awareness of UK SHORE to have increased over the course of the programme, as evidenced by increasing numbers of applications for each scheme round.

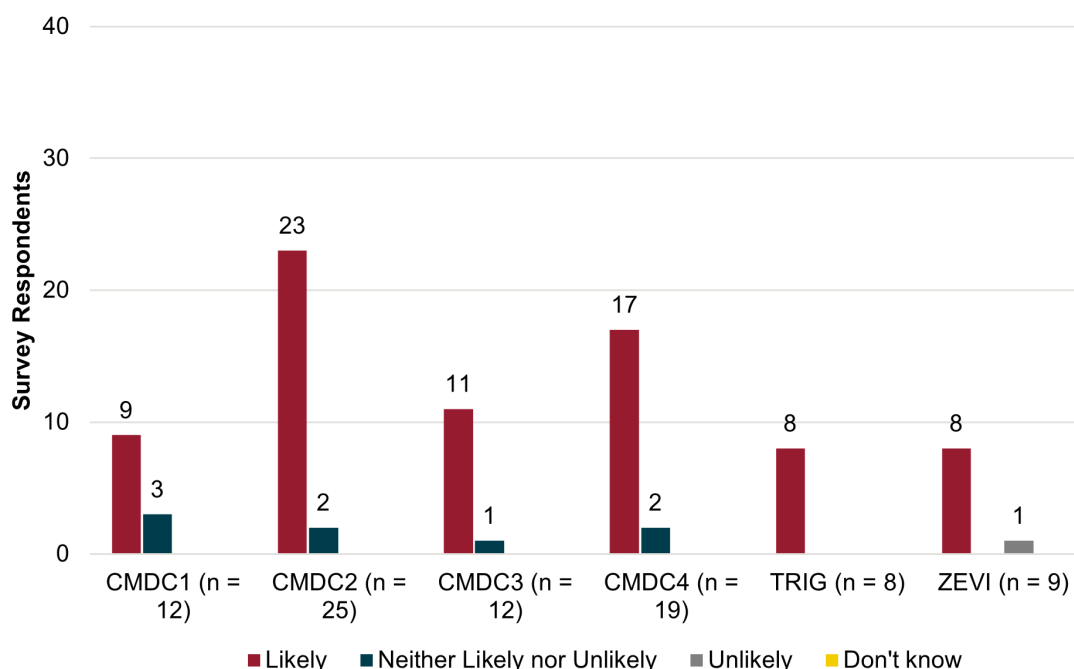
“We had the record number of applications for TRIG22 ... And then we had even more applications for TRIG23. I think that in itself is kind of showing the appetite.” – Delivery partner

3.3 Likelihood of participating in future similar schemes

There was a high likelihood of organisations participating in future similar schemes

The surveys conducted in 2023 and 2025, which represented 40% of projects across the UK SHORE portfolio, found that 76 out of 85 respondents (89%) were likely to participate in future similar schemes.

Figure 3 Following your participation in the project, how likely or unlikely are you to participate in future similar schemes? (By scheme/round)



Source: Online survey (2023 and 2025 collated)

Note: 'Likely' is comprised of those who responded 'very likely' and 'likely', and 'unlikely' is comprised of those who responded 'very unlikely' or 'unlikely' n = 85.

As shown in Figure 3, the results were fairly consistent across the schemes, although for TRIG2022-2024, respondents were unanimous in saying they were likely to participate in future similar schemes (noting that a limited proportion of projects were represented in the survey). One ZEV applicant organisation said it was unlikely that they would participate in a similar scheme again – the only respondent across all schemes to report this.

In in-depth interviews with successful applicant organisations, several cited the one-of-a-kind nature of UK SHORE funding as a central reason why they would want to apply to future schemes.

3.4 Competition phase

3.4.1 Competition design

The scope for each scheme was developed in partnership between the DfT, industry stakeholders (including the MCA, the Maritime Council and the National Shipbuilding Office) and the delivery partners (Innovate UK, CPC or ESPRC).

UK SHORE stakeholders and delivery partners took an iterative approach to competition design, using learnings from previous schemes and rounds to improve future schemes

Most delivery partners and stakeholders interviewed stated that they had found the strategic objectives of the overall UK SHORE programme and its schemes clear, and that this aided scheme design. In addition, the design drew upon learnings from previous innovation schemes, for instance ones funded by the Office for Zero Emission Vessels (OZEV).

Likewise, stakeholders and delivery partners noted that all schemes in the portfolio had evolved throughout the different scheme rounds to accommodate learnings and identified improvement needs. For instance, the pool of application assessors was expanded and a requirement for work and outcomes of CMDC3 and CMDC4 projects to be UK based was added.

*“We’ve honed it for [CMDC] 3 and 4, and definitely in 6, where we are a bit more clear about having commercial pathways as part of these projects, because it’s beneficial for everyone. It’s beneficial for business and the economy but also better ensures the decarbonisation efforts of UK SHORE, because if they can scale up the technology with an end user, they’re more likely to achieve the emissions reduction piece.” – **Delivery partner***

Stakeholders and delivery partners reported that several changes had been made to the scheme designs to ensure the schemes were more aligned with the strategic objectives of UK SHORE. This iterative approach to scheme design, which included keeping a log of lessons learned from the design and running of each scheme round, can be considered a strength of the portfolio.

*“Each [scheme], we continue to review, rewrite, review that and see what additional things we could potentially tweak or enhance as we go forward, for every competition.” – **Delivery partner***

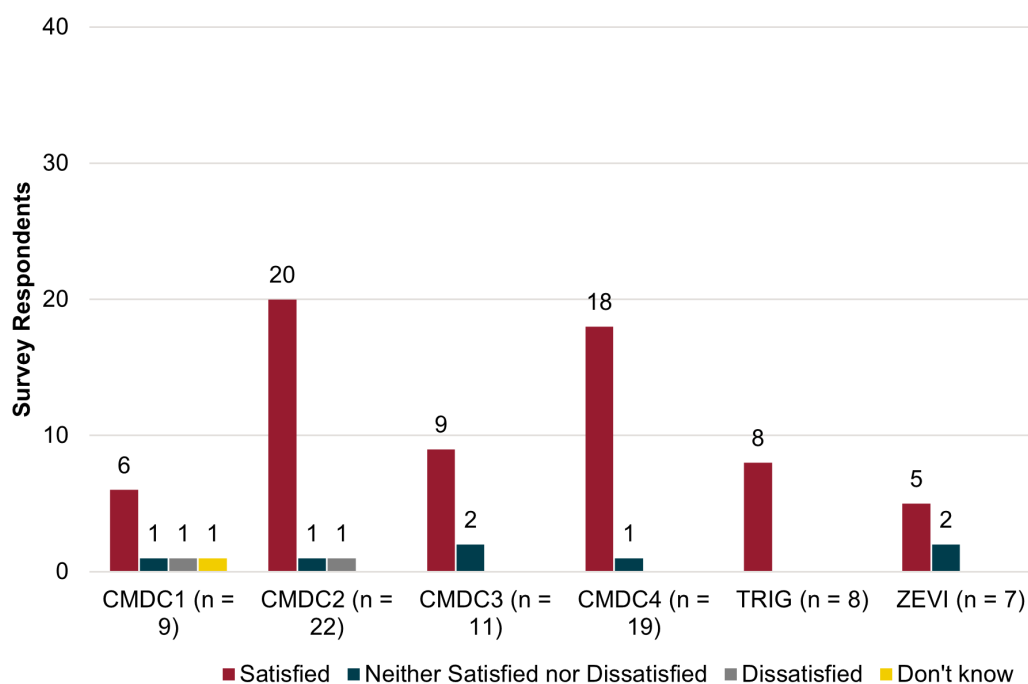
*“I think we’ve got much better collaboration and understanding within ... UK SHORE as a whole. There’s a much better understanding of what we’re all trying to achieve and the pathway that we’re all on. I think it’s improving all the time. It’s an iterative process.” – **Stakeholder organisation***

3.4.2 Knowledge about the bidding process

Organisations were satisfied with the information and guidance provided by DfT and delivery partners during the bidding process

The surveys conducted in 2023 and 2025 with organisations in the CMDC, ZEVI and TRIG schemes indicated that 66 out of 76 total respondents to this question (87%) were satisfied with the information and guidance provided by the delivery partner. Only 2 of 76 respondents (3%) reported being dissatisfied. Interviews with successful applicant organisations showed that they had found the information clear and questions had been adequately addressed. Both Innovate UK and CPC held a variety of briefing sessions during the bidding phase, and comprehensive information about dates, eligibility and scope was provided online on DfT’s website or delivery partner websites.

Figure 4 To what extent were you satisfied or dissatisfied with the information and guidance provided by the delivery partner? (By scheme/round)



Source: Online survey (2023 and 2025 collated)

Note: 'Satisfied' is comprised of those who responded 'very satisfied' and 'satisfied', and 'dissatisfied' is comprised of those who responded 'very dissatisfied' and 'dissatisfied'. N = 76.

Survey responses by scheme (and round where applicable) are presented in Figure 4, which shows that satisfaction on this point was particularly high for TRIG respondents and more mixed for ZEVI. However, the low response rate for TRIG projects (19%) and the small base size of ZEVI projects limits the strength of conclusions that can be drawn from this information. Satisfaction with the guidance and information provided by Innovate UK was generally high across all CMDC scheme round respondents – those participating in CMDC4 were nearly unanimously satisfied.

Similarly, the successful and unsuccessful applicant organisations across each scheme which were interviewed were largely positive about the bidding process, with most having found the requirements clear and some reporting that their questions had been answered well.

"It's [the eligibility and assessment criteria] very clear. It's long and complex and detailed, but it's clear." – **CMDC4 unsuccessful applicant organisation**

"If we had a query, it was quite efficiently answered really." – **CMDC2 successful applicant organisation**

Those applicant organisations with less experience of similar competitions would have liked more support, particularly on delivery and reporting expectations. Some had also required external support and resource to deliver their bids

In in-depth interviews, both successful and unsuccessful applicant organisations which were unfamiliar with the Innovate UK application process said they would have liked additional guidance on expectations, and businesses new to Innovate UK said they needed extra support on delivery and reporting expectations. Interviewed organisations which had been unfamiliar with the bidding process tended to have found the level of guidance and support to be insufficient.

"I think it's a challenge. Unless you've got that type of experience of capability, you have to go through the rounds of doing bids and bids and bids in order to finesse that expertise and capability." – **CMDC4 unsuccessful applicant organisation**

Likewise, in interviews, applicant organisations noted that communication from delivery partners could be improved to better support them in understanding the rules and requirements of the bidding process.

Some applicant organisations, across a range of schemes, described having used external partners or commissioning expert bid writers to support them with their applications, as they had found the process of preparing the application difficult.

3.4.3 Time and resources available for bid preparation

The time available to prepare bids and the scope in terms of project value and delivery period varied by scheme (and round where applicable). An overview of these timelines and scopes is presented in Table 12.

Bids were required to outline the need or challenge that the project was addressing; approach and focus of innovation; team and resourcing; market awareness; expected outcomes and route to markets; anticipated wider impacts; project management approach; risks; added value and costs. A question on knowledge sharing was added for ZEVI, CMDC3 and CMDC4. All applicants were required to complete an Equality, Diversity & Inclusion (ED&I) survey. Bids were also assessed through an interview panel stage.

The Clean Maritime Research Hub scheme called for consortia of UK research organisations, such as universities, to bid to establish and deliver the virtual research hub. Following a 12-week bidding process, including a written application and panel review in late 2022, £7,400,000 of funding was allocated in early 2023.

Table 12 Overview of scheme round timelines and scopes

	Total project cost, in grant and match funding (£)	Application format	Competition opened	Competition closed	Duration of bidding period (weeks)	Duration of delivery period (months)
CMDC1	25,000-1 million	Written	22 March 2021	7 June 2021	11	7
CMDC2	100,000-1 million	Written	25 May 2022	14 July 2022	7	9
CMDC3	2-10 million	Written and panel interview	29 September 2022	9 November 2022	6	24
CMDC4	100,000-8 million	Written and panel interview	2 August 2023	27 September 2023	8	12
ZEVI	3-40 million	Written and panel interview	6 February 2023	19 April 2023	10	17 (plus 36 for demonstration)
TRIG2022	Up to 30,000	Written and interview	13 December 2022	15 January 2023	5	6
TRIG23	Up to 45,000	Written and interview	23 October 2023	27 November 2023	5	6
TRIG24	Up to 45,000	Written and interview	17 April 2024	21 May 2024	5	6

Source: SYSTRA Ltd.

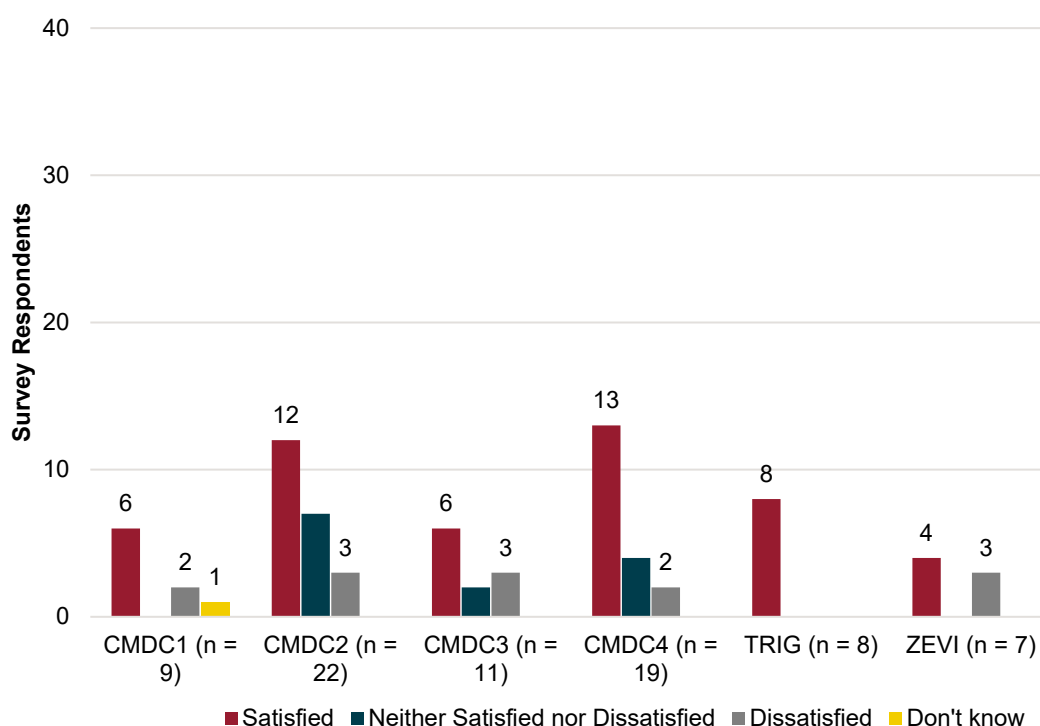
Satisfaction with time available to prepare bids varied by type of applicant and scheme, with particular challenges noted in the ZEV1 scheme. The time-consuming nature of putting together an application and gathering partners or a consortium tended to be highlighted as reasons for dissatisfaction

Surveys conducted in 2023 and 2025 with successful CDMC, ZEV1 and TRIG applicant organisations found that 49 out of 76 respondents (64%) were satisfied with the amount of time to prepare their bid, 13 (17%) were neither satisfied nor dissatisfied, and 13 (17%) were dissatisfied.

Satisfaction with the duration of time to prepare bids varied by the scheme and round (Figure 5). The majority of CDMC respondents were satisfied with the process. Around half of ZEV1 respondents reported being satisfied, and all TRIG respondents were satisfied. The number of respondents from the TRIG and ZEV1 schemes was limited, meaning it is difficult to draw strong conclusions about variation in satisfaction across these schemes.

Satisfaction with the time permitted for preparing bids may have been impacted by the duration of application periods which, along with scope, varied across the schemes (see Table 12). For example, the application period for ZEV1 was 10 weeks, with a delivery period of 17 months plus an additional 36 months for demonstration, while the application period for CDMC1 was longer (11 weeks) despite a much shorter delivery period.

Figure 5 To what extent were you satisfied or dissatisfied with the amount of time you had for preparing your bid? (By scheme/round)



Source: Online survey (2023 and 2025 collated)

Note: 'Satisfied' is comprised of those who responded 'very satisfied' and 'satisfied', and 'dissatisfied' is comprised of those who responded 'very dissatisfied' and 'dissatisfied'. N = 76.

In interviews with both successful and unsuccessful applicant organisations to the different schemes, opinions were divided on whether there was sufficient time between the scheme announcements and the deadline for bid submission. Some found the time allowed to have been sufficient. Others, especially some ZEV1 applicants (successful and unsuccessful), described the timescales as very tight.

"I don't think I would bother doing another bid unless there was something where you felt like you would hit exactly everything they're looking for. It's very, very labour intensive."

– MDC unsuccessful applicant organisation

Some applicant organisations suggested application periods should be 3 months long, as they had found this to be the standard duration of application periods for schemes run by Innovate UK.

Based on the survey respondents, two-thirds of small and medium-sized enterprises (SMEs) were 'satisfied' with the time available compared with 8 in 10 large private businesses. Similar proportions were dissatisfied between the 2 groups. It should be noted that fewer large businesses (7) responded to the survey than SMEs (60), therefore, findings should be considered with caution.

In interviews, some of the applicant organisations which represented small businesses noted that the timelines felt particularly demanding for them due to the size of their businesses.

"It's a poor commercial decision, especially for an SME, to spend that period of time without being paid on a completely speculative bid. It doesn't work, you know, and my feedback to Innovate at the time was ... You need to have an expression of interest stage."

– ZEV1 unsuccessful applicant organisation

However, other small enterprises highlighted their company size as a reason for being able to prepare bids quickly.

"I quite like the [application period] timetables. ... As a small, agile company who's quite aware of what's going on, ... we get it done."

– TRIG23 successful applicant organisation

All stakeholders and delivery partners noted that they would have preferred scheme rounds to have been announced earlier, allowing a longer period for applications to be prepared (particularly for organisations which might be less well resourced), although it was recognised that this was not always possible due to government processes. Despite this, all stakeholders and delivery partners interviewed also felt satisfied with the quantity and quality of bids received.

“If they [potential applicants] knew that these things were happening in advance, we’d probably get a lot more interest and even better-quality applications ... we did get good quality applications, but we could have had more.” – Delivery partner

“...sometimes politics and clearances got in the way of [...] being able to announce far in advance of the bidding window. I think in an ideal world, if we did this again, we would have a very clear programme.” – DfT

Learnings from the running of previous scheme rounds had been utilised to improve the design of subsequent schemes. However, a delivery partner noted in 2025 that the learning about the timing of competition announcements and the time allowed for applicants to prepare bids had not yet been realised.

“One thing we’ve learned that we didn’t necessarily implement was the timely announcement of the competitions. ... We could see the effect of it not being implemented in some of the quotes in the submissions.” – Delivery partner

On the other hand, the timeline for preparing bids for each of the TRIG scheme rounds was extended in response to applicant feedback that the application timelines for previous rounds of TRIG were too short.

“We’ve also tried to extend the timelines of the competition window by an extra week or so, because that again gives them additional time to do that. ... Having a longer application window does help.” – Delivery partner

In interviews, delivery partners and applicant organisations (regardless of the outcome of their applications) noted that the length of time that competitions were open for could affect the quality of consortia if this did not allow sufficient time to get all suitable partners on board.

Several end-of-project reports from CMD4 indicated that these organisations had applied for follow-on funding from CMD6, suggesting this scheme round was appropriately timed to allow projects to pursue follow-on funding opportunities for their technologies.

Delivery partners, stakeholders and applicants observed how all the competitions had become increasingly competitive and oversubscribed over the course of the UK SHORE programme. One delivery partner highlighted in 2024 that reviewing the volume of applications for one particular competition was a challenge.

“We had way, way too many applications for the number of technical reviewers that were lined up internally, which clearly didn’t help, making the process much longer in terms of being able to sort of go through and review everything. So, everyone had quite a hefty workload.” – Delivery partner

3.4.4 Assessment and evaluation criteria

Most successful applicant organisations across schemes were satisfied with the assessment and evaluation criteria

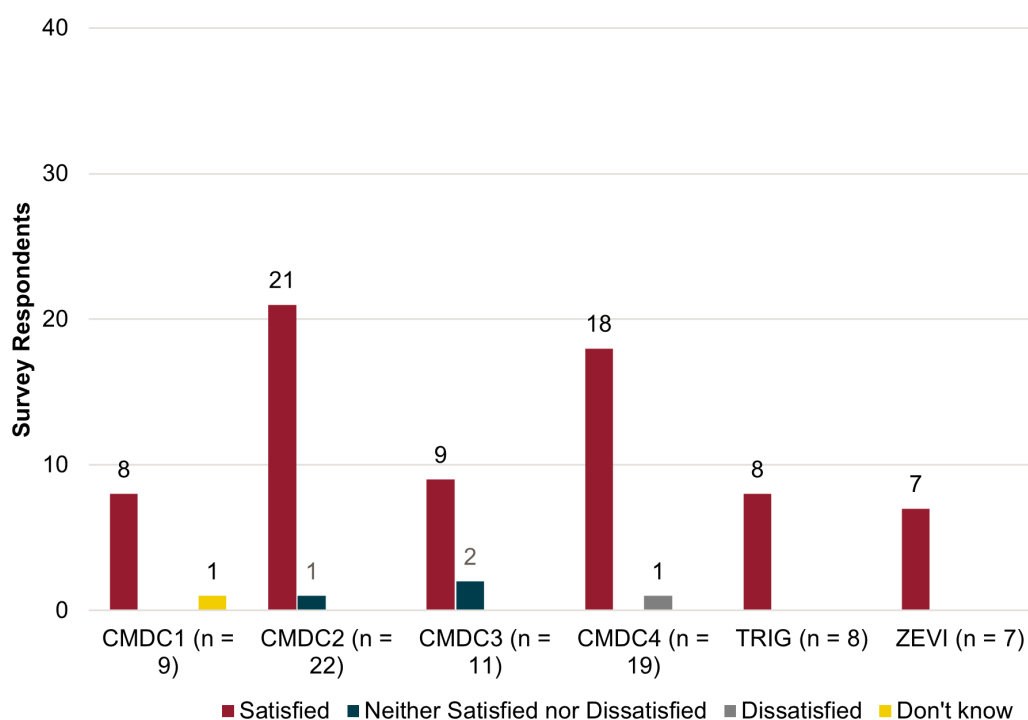
Surveys conducted in 2023 and 2025 with organisations in the CMDC, ZEVI and TRIG schemes found that 71 of 76 respondents (93%) were satisfied with the clarity of the eligibility criteria and scope of the schemes. Across all schemes, the relevant information was available online and shared through various webinars and events, such as roadshows held across the UK.

Satisfaction with the clarity of assessment and evaluation criteria was consistently high across UK SHORE schemes, as shown in Figure 6. Interview participants made no comments about this aspect of the schemes regardless of whether their applications had been successful or not, suggesting a broad level of content among applicants.

In in-depth interviews at the interim stage, delivery partners for ZEVI and TRIG felt that both schemes could have benefitted from further clarity on scope, as they had received a high volume of queries. In particular, the ‘capital’ element of ZEVI and the ‘challenge’ scope for TRIG were noted to have caused some confusion. Since the interim stage, steps have been taken to address the clarity and accessibility of scheme design. For example, questions in the earlier TRIG rounds that had been perceived as too broad were refined for 2024.

“The one element that we’ve tried to incorporate specifically this year is to make the application questions more accessible and the whole process more accessible ... based on feedback from last time. The questions, for instance, have been rephrased both for the application form and also for the interview questions.” – Delivery partner

Figure 6 To what extent were you satisfied or dissatisfied with the clarity of the eligibility criteria and scope of the scheme? (By scheme/round)



Source: Online survey (2023 and 2025 collated)

Note: 'Likely' is comprised of those who responded 'very likely' and 'likely', and 'unlikely' is comprised of those who responded 'very unlikely' or 'unlikely'. N = 76.

3.4.5 Experiences with the assessment stage

As delivery partners, Innovate UK, CPC and EPSRC were responsible for the bid administration and assessment process. Assessors and interviewers were independently contracted by the delivery partners. The final selections for funding via UK SHORE were reviewed and approved by DfT, with support from the MCA on regulatory issues.

Experiences of the assessment stage of the process were mixed, often depending on whether applicants had been successful or not

In-depth interviews conducted with applicants to the ZEVI, TRIG and CMDC schemes showed that some unsuccessful applicant organisations were dissatisfied with the interview stage of the assessment, with the main points of contention being perceptions that the interview panel had insufficient technical knowledge and industry experience, and a perceived discrepancy between different stages of assessment.

"I got the feeling that they didn't quite understand our technology and how innovative it is, and sort of the impact it can have on costs and greenhouse gas emissions." – CMDC3 unsuccessful applicant organisation

Other applicant organisations, typically ones whose applications had been successful, praised the proficiency of assessors and how delivery partners had organised the assessment of applications.

"I certainly felt like every single panel that we have attended was led by people who really knew their stuff. If I was Innovate, I would do it exactly the same way." – Applicant organisation (both successful and unsuccessful) to multiple UK SHORE scheme rounds

Delivery partners had worked to increase the pool of assessors but noted the challenges of recruiting those with the required level of technical expertise

Delivery partners had worked to address perceived issues with the assessment stages over the course of the evaluation period. Despite a limited pool of assessors (given the niche nature of the industry), steps had been taken to increase the number of assessors, for instance by having 3 assessors per application for TRIG and expanding their diversity across the range of technical expertise and backgrounds in both academia and industry. Delivery partners perceived this as beneficial through assessors being better able to identify projects that align with the strategic aims of UK SHORE.

"You get a better range of views, having a range of backgrounds shows different experiences from the sector. People know what's deliverable in the sector, then we'll get good projects that want to deliver on DfT's objectives." – Delivery partner

It is too soon to assess how these changes affected the perceptions of applicants as they were made at the end of the evaluation period. One stakeholder organisation interviewed in 2025 argued that there was still scope for improving the skills represented by assessor panels. They felt that it was important to ensure that projects likely to contribute to UK SHORE objectives, including enabling reductions in carbon emissions, received funding.

“There’s a few more expert assessors, but I think that’s [assessor competence] still quite a weakness. ... The assessors don’t necessarily understand how the maritime sector operates. We’re still seeing a lot of smaller projects ..., they’re not necessarily the best bang for buck. ... The assessors [are] very project management interested ... but the technical content might not be there. ... Assessors aren’t as ruthless as they should be in terms of expecting these projects to be focused on the reduction of emissions.”
– Stakeholder organisation

3.4.6 Feedback and outcomes

Table 13 sets out the timelines for competition close and announcement of winners.

Table 13 Overview of timelines for competition close and announcement of winners

	Competition close	Announcement of competition outcome	Weeks between competition close and announcement
CMDC1	7 June 2021	15 September 2021	14
CMDC2	14 July 2022	29 September 2022	11
CMDC3	9 November 2022	15 February 2023	14
CMDC4	27 September 2023	25 January 2024	17
ZEVI	19 April 2023	11 September 2023	20
TRIG2022	15 January 2022	13 April 2022	12
TRIG23	27 November 2023	21 March 2024	16
TRIG24	21 May 2024	23 October 2024	22

Source: DfT / CPC / InnovateUK websites

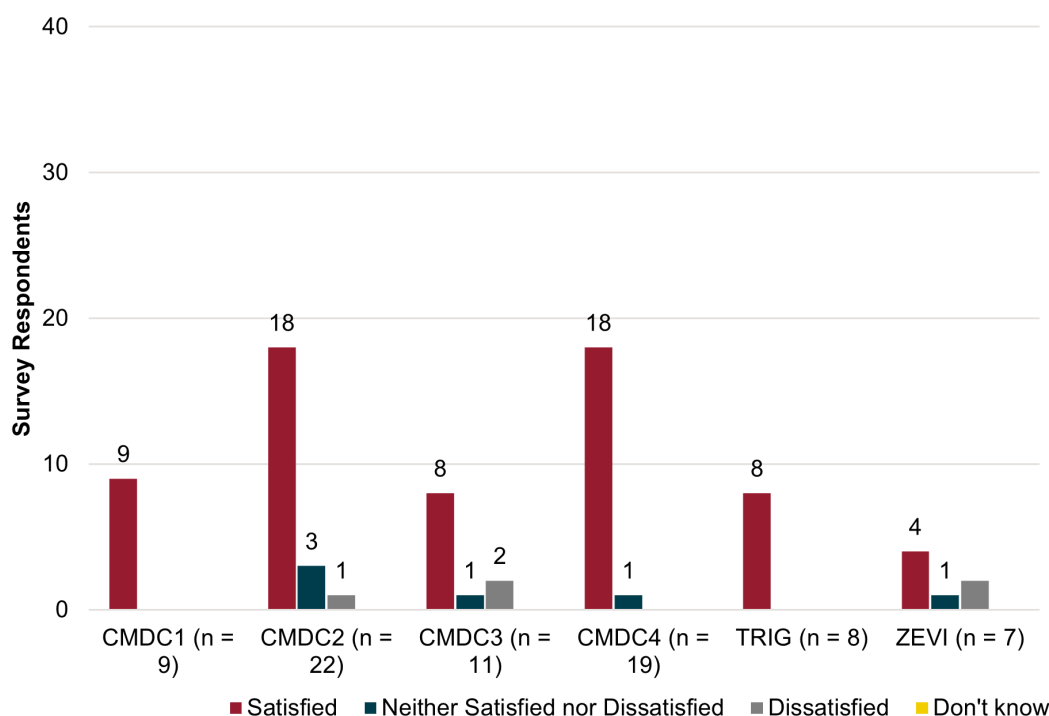
Most organisations were satisfied with the timeliness of notification of bids. Satisfaction was more mixed for ZEVI applicant organisations

Surveys conducted in 2023 and 2025 with organisations in the CMDC, ZEVI and TRIG schemes found that 65 out of 76 survey respondents (86%) were satisfied with the timeliness of bid outcome notification. In-depth interviews with applicants were consistent with the survey

findings, with most of those interviewed finding that the outcome of their bids had been communicated in a timely manner.

Satisfaction was more mixed for successful ZEVl applicant organisations than for other schemes, as shown in Figure 7. For successful ZEVl applicants, this may be tied to the 20-week period between the application deadline and when winners were announced.

Figure 7 To what extent were you satisfied or dissatisfied with the timeliness of notification of bid outcome? (By scheme/round)



Source: Online survey (2023 and 2025 collated)

Note: 'Satisfied' is comprised of those who responded 'very satisfied' and 'satisfied'; and 'dissatisfied' is comprised of those who responded 'very dissatisfied' and 'dissatisfied'. N = 76.

Both applicants and delivery partners noted that feedback on bids was limited

Of the successful and unsuccessful applicant organisations which spoke about bid feedback in their in-depth interviews, most described having found the feedback relatively high level and not particularly informative. For example, one unsuccessful TRIG applicant organisation wanted greater transparency on the successful bids, an understanding of what criteria deemed it successful and the panel's feedback, as it felt this would aid confidence in the process and help them shape future bids.

Delivery partners accepted they did not have the resources to provide detailed feedback to all applicants.

*“I’d like to say we can improve on the feedback we give applicants from the interview panel, but I just don’t quite know what’s possible with the time that’s available.” – **Delivery partner***

Some applicant organisations, particularly unsuccessful ones across different schemes, felt that the same organisations were consistently successful (see Section 8.6 for further discussion of this issue). This was also observed by delivery partners and DfT but was not necessarily considered a negative outcome.

*“[Attending maritime industry events] my gut feeling was ..., I could see the same winners receiving significant funding.” – **TRIG 2022 unsuccessful applicant organisation***

*“We did want projects to feed through and we do have some projects now that have [...] gone from initial idea only two years ago or kind of a very early concept through to something that’s commercial – brilliant. [...] That’s kind of the strategic aim. There are obviously some dominant companies who appear a lot ...” – **DfT***

Aligned with the UK SHORE programme objectives, DfT noted that the scheme rounds were, to some extent, designed to ‘ramp up’ projects through different stages and TRLs and provide an ‘innovation pipeline’. One successful ZEV1 applicant who had previously won funding through CMDC scheme rounds, noted:

*“The involvement in all the CMDC projects then led us to the ZEV1 project. I’m not sure we would have got to the ZEV1 if we hadn’t done all those previous, smaller projects. ... The previous ones [rounds of funding] gave us the ability to understand things, it gave the company a bit more of an understanding of what needed to be done.” – **ZEV1 successful applicant organisation***

One organisation, which had successfully bid for funding from several schemes under the UK SHORE portfolio, reported that it had perceived that some assessors were sceptical about granting its organisation funding due to its success in previous scheme rounds, although the organisation was not aware that prior success would be considered a negative.

*“I feel like some assessors ... were like ‘don’t fund this, ... these guys have been through many competitions’, and that came through in the feedback. ... Just because people have been successful in other rounds of competition doesn’t mean to say they shouldn’t be successful in that round.” – **ZEV1 successful applicant***

3.4.7 Competition phase summary

Aligned with the process evaluation questions, the following were identified as areas that worked well and areas that could be improved across the different stages of the competition phase.

What worked well:

- There was a high level of **awareness** of the schemes within the UK SHORE portfolio.

- The **number of applications** received continued to increase over the course of the scheme rounds.
- **Bidding requirements** were straightforward and easy-to-understand.
- The **information** provided on DfT and delivery partner websites was useful.
- **Scheme design** evolved iteratively over time to accommodate learnings and identified improvement needs.
- Satisfaction with the **timeliness of notification of bid outcomes** was high.

What could be improved:

- Delivery partners and stakeholders recognised the need to **announce schemes** sooner.
- **Timescales for bidding** were in some cases perceived as too short, especially for ZEVI.
- Organisations unfamiliar with the bidding process needed more **support** to bid, and some had hired professional bid writers.
- Some applicants expressed lack of confidence in assessors' technical knowledge, and delivery partners and stakeholders recognised there was still scope to improve the competency of the pool of **assessors**.
- Applicants and delivery partners noted that **feedback** on unsuccessful bids was limited.

3.5 Project mobilisation

Innovate UK, CPC and EPSRC, as delivery partners, were responsible for issuing funding and due diligence procedures at the project mobilisation stage. As well as access to this funding, evaluation of the project mobilisation stage also considered set-up processes, project governance, and any changes in scope and how these were managed by organisations.

3.5.1 Timescales

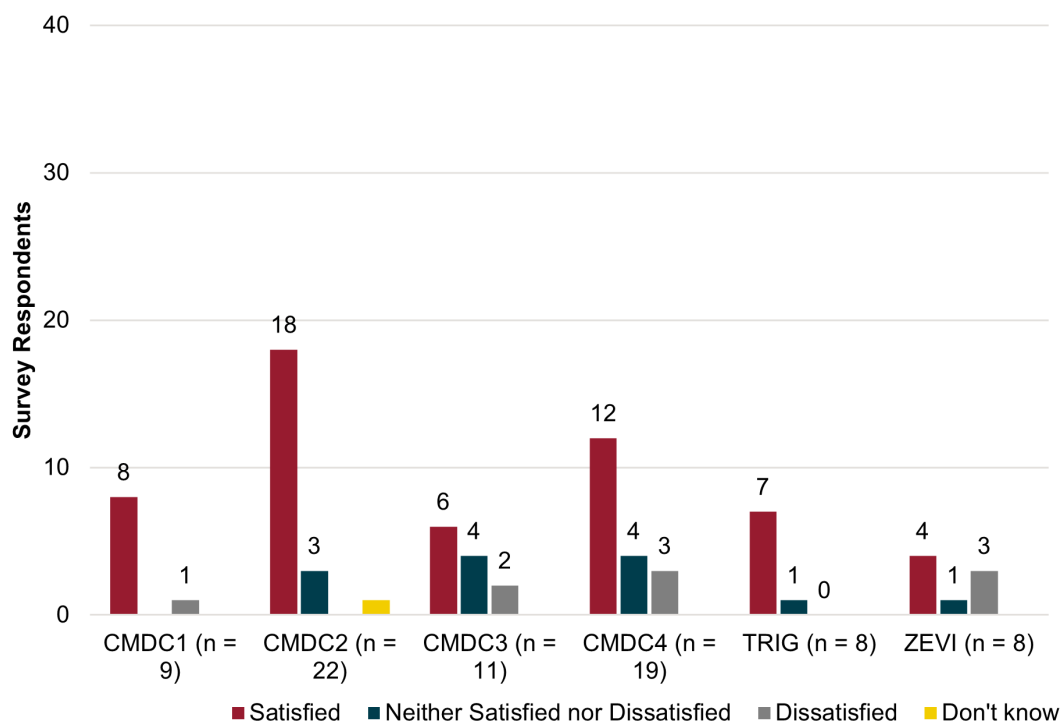
Satisfaction with the timeliness of funding being allocated varied more for ZEVI, CMD3 and CMD4 organisations than it did for the other schemes. Delays to receiving funding had some impact on project delivery

In in-depth interviews, successful scheme applicants were asked about the next steps with their project following notification of funding. Activities that had taken place during project mobilisation included early stage data collection; kick-off of regular meetings led by project leads; notifying partners; start of regulatory processes; set-up of steering groups; review and adjustments of project scope, plans and timelines; setting up agreements between collaborators; and setting up monitoring arrangements.

Survey results show that most respondents were satisfied with the allocation of funding timeliness. Of 76 respondents to surveys conducted in 2023 and 2025 with organisations in the CMD3, ZEVI and TRIG schemes, 55 (70%) were satisfied with the time it had taken for funding to be allocated to them, 13 (17%) were neither satisfied nor dissatisfied and 9 (12%)

were dissatisfied. Satisfaction with this element varied more for ZEVI, CMD3 and CMD4 organisations than it did for the other schemes (Figure 8).

Figure 8 To what extent were you satisfied or dissatisfied with the timeliness of allocation of funding for the scheme? (By scheme/round)



Source: Online survey (2023 and 2025 collated)

Note: 'Satisfied' is comprised of those who responded 'very satisfied' and 'satisfied', and 'dissatisfied' is comprised of those who responded 'very dissatisfied' and 'dissatisfied'. N = 78.

One organisation noted that it had already started working on the project 'at risk' prior to confirmation of funding, and another stated that it had taken out a loan to support overheads and immediate costs.

"You really want the payment upfront, so you can get on with things – so you don't have to take on loans....we did [take on a loan]. We went to our business bank, and got a very low cost loan, to finance us into the project." – CMD1 organisation

In the in-depth interviews, some organisations said that, due to the short turnaround time between notification of successful outcome and project start, even minor setbacks in the project mobilisation could affect delivery times. The timescale between notification and having to commence work for The Hub was perceived by The Hub lead to be particularly short.

"The biggest challenge was actually that we didn't know that we'd got The Hub until a very, very short time before we had to start. ... So we had to turn around and start really quickly." – The Hub lead organisation

One ZEVI organisation described how a delay between it receiving its grant offer letter and the funding being issued had led to difficulties with its project delivery, as the spend deadline had not been moved to accommodate for the delay in funds being issued to it.

“The period of time between when you hear you’re successful, ... it will be a few months before you actually get your grant offer letter. ... The March 25 [spend] deadline never, never changes, so all the funding had to be spent by March 25, and that was our biggest challenge. There’s no buffer to move anything across, which means that every single problem that you have at the beginning just compounds at the end.” – ZEVI organisation

Delivery partners cited management of project spend as a key issue across the CMDC3, CMDC4 and ZEVI schemes, and highlighted risks around end of financial year expenditure deadlines. One delivery partner explained it was open to being flexible, with options to facilitate monthly instead of quarterly payments to support cashflow, but that the end of financial year deadlines were not moveable.

“The biggest issue from the finance perspective is this hard cut off at the end of the financial year. If there was more flex in the time frame, potentially not to finish it at the end of the fiscal year, but to finish it end of December, and then you’ve got that three month flex. But in this instance that would have just shortened the project duration even more, which obviously isn’t what we would want.” – Delivery partner

3.5.2 Change control

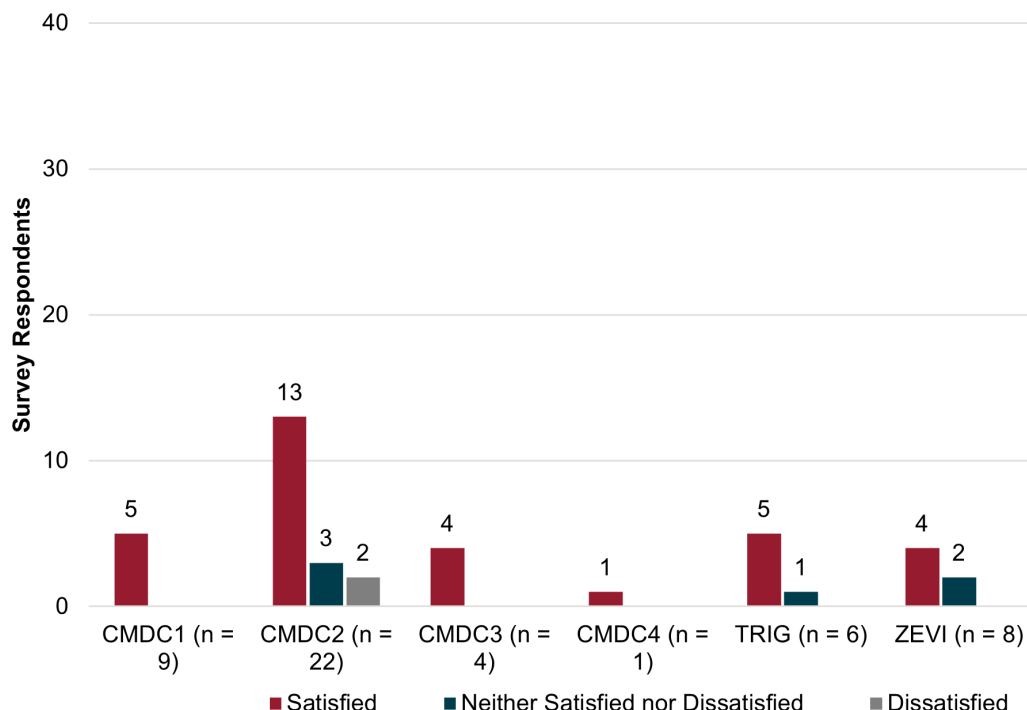
Most organisations were satisfied with how any change control requests were managed

Respondents to the 2023 survey were largely satisfied with how change requests had been managed.¹³ Excluding those who responded ‘don’t know’ (indicating perhaps that change requests were not relevant to their project), across all schemes (CMDC1-3, TRIG 2022-2024 and ZEVI), 32 of the 40 respondents (80%) indicated that they were satisfied with how change control requests had been managed. Only 2 of 40 respondents (5%) indicated that they had been dissatisfied with the change control request.

Looking at variation by scheme (Figure 9), CMDC2 was the only scheme round where any respondents reported being dissatisfied (2 of 22). However, the base sizes for other schemes were small.

¹³ This question was only asked in the 2023 wave of the survey.

Figure 9 To what extent were you satisfied or dissatisfied with how change requests were managed? (By scheme/round)



Source: Online survey (2023 and 2025 collated)

Note: 'Satisfied' is comprised of those who responded 'very satisfied' and 'satisfied', and 'dissatisfied' is comprised of those who responded 'very dissatisfied' and 'dissatisfied'. N = 50.

In-depth interviews with organisations provided more insight on experiences with the management of change requests, though with limited feedback as not all projects experienced this process. One interviewed organisation, successful in CMD2, noted that during scope revision mid-project, it had received a good level of support from project delivery partners and the monitoring officer, especially in replanning the scope and reallocating resources with a tight deadline.

"Towards the end of the project we had a couple of like project change requests, or it got a bit complicated. Sometimes the communication was a bit more confusing, but the monitoring officer was brilliant, he helped sort out that problem we had." – **CMD2 organisation**

However, another CMD2 interviewee explained that they had found the change control process to be quite onerous and that it had potential to cause knock-on impacts with funding claims.

"... the change process is quite involved ... if you're not really on top of it, and usually you're so busy doing the project, the project management side can lag until it's time to start making a claim. That means that your claims get delayed which could be a bit frustrating"

if you've got your finance team asking why you haven't claimed yet.” – CMDC2 organisation

In the in-depth interviews conducted in summer 2025, delivery partners also acknowledged some difficulties they had experienced with change control procedures. They explained that an element of this governance process now involved sign-off from DfT, and this was perceived as causing delays to projects.

“The way the governance of changes within projects works, I think that could be a lot more efficient. ... DfT have asked for an extra layer of governance, so that they approve the [change] request as well. I can understand why they want to keep a close eye on their projects. ... But it does have a direct impact on the projects because sometimes they can't spend costs or work or keep motivated while the process is going on.” – Delivery partner

3.5.3 Project mobilisation summary

Aligned with the process evaluation questions, the following were identified as areas that worked well and areas that could be improved in the project mobilisation phase.

What worked well:

- Most organisations were satisfied with the **timeliness of allocation of funding**.
- Respondents were generally satisfied with how **change requests** had been managed.

What could be improved:

- In some cases, **delayed funding allocation** had impacted project delivery negatively.
- Some had found **change control processes** onerous and that an additional layer of governance had been added, making these processes more time-consuming.

3.6 Project delivery

3.6.1 Views on delivery period

Most organisations stated they were meeting their objectives and milestones for their project. However, the delivery period for ZEV1 was seen as a challenge and around half of projects in this scheme were delayed

Most TRIG and CMDC organisations interviewed felt they had met or were on track to meet the planned objectives and milestones for their projects within the delivery time period, despite delivery challenges.

“We met all of the objectives....like I said, we finished everything in the end on time and we came out with all of the answers that we were expecting.” – CMDC2 organisation

In interviews with delivery partners, the delays to ZEV-funded projects were attributed to the long-running nature of these projects and what was described as unrealistic timelines for delivery.

“The ZEV projects, about half of them are kind of on track, maybe a bit less to deliver on time. ... The overarching reason [for ZEV project delays] is the timelines they had to begin with, to do the vast amounts of work they had to do. You had 18 months to do some pretty big projects.” – Delivery partner

Consortium members and the lead organisation for The Hub described being somewhat behind on their policy deliverables due to delays in hiring a policy fellow.

3.6.2 Barriers and enablers to delivery

The most frequently reported barriers to project delivery across all schemes related to procurement or supplier challenges, regulatory barriers, technological limitations and challenges with partners or collaborators

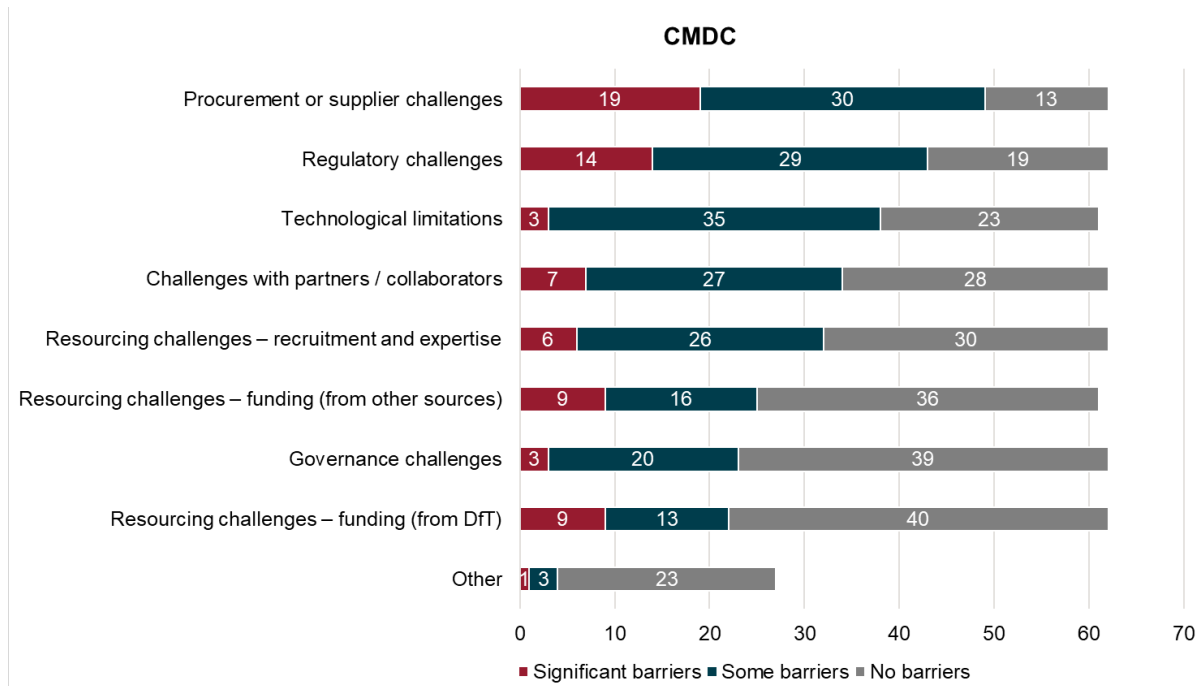
Based on surveys conducted in 2023 and 2025 with organisations in the CMDC, ZEV and TRIG schemes, the most frequently cited barriers to project delivery were ‘procurement or supplier challenges’, in which 61 of 78 respondents (78%) said they had experienced ‘some barriers’ or ‘significant barriers’. This was followed by ‘regulatory challenges’ (56 out of 78 respondents, 72%) and then ‘technological limitations’ (49 out of 77 respondents, 64%). In addition, 45 of 78 respondents (58%) cited ‘challenges with partners/collaborators’ as a barrier.

Barriers were similar for CMDC and ZEV respondents but differed for TRIG. For CMDC (where responses represent 43% of CMDC projects, see Figure 10), ‘procurement and supplier’ challenges, followed by ‘regulatory challenges’ were the most frequently cited (either ‘some’ or ‘significant’ barriers). Similarly, for ZEV (in which 90% of ZEV projects were represented, see Figure 11), ‘regulatory challenges’ were the most frequently cited, followed by ‘procurement and supplier’ challenges. For TRIG, this differed slightly with ‘technological limitations’ most frequently cited (7 out of 8 respondents selected ‘some barriers’, representative of 19% of projects; see Figure 12).

There was no notable difference in responses by organisation type/size, with small sample sizes making meaningful comparisons difficult. Across all schemes, large private businesses appeared to have faced fewer barriers related to funding challenges than SMEs. Two (29%) of large businesses reported ‘some’ or ‘significant’ barriers to funding from non-DfT sources, compared with 28 (45%) of SMEs.

The impact of the barriers and enablers on the ability of projects to achieve expected outputs and outcomes is discussed throughout the impact evaluation.

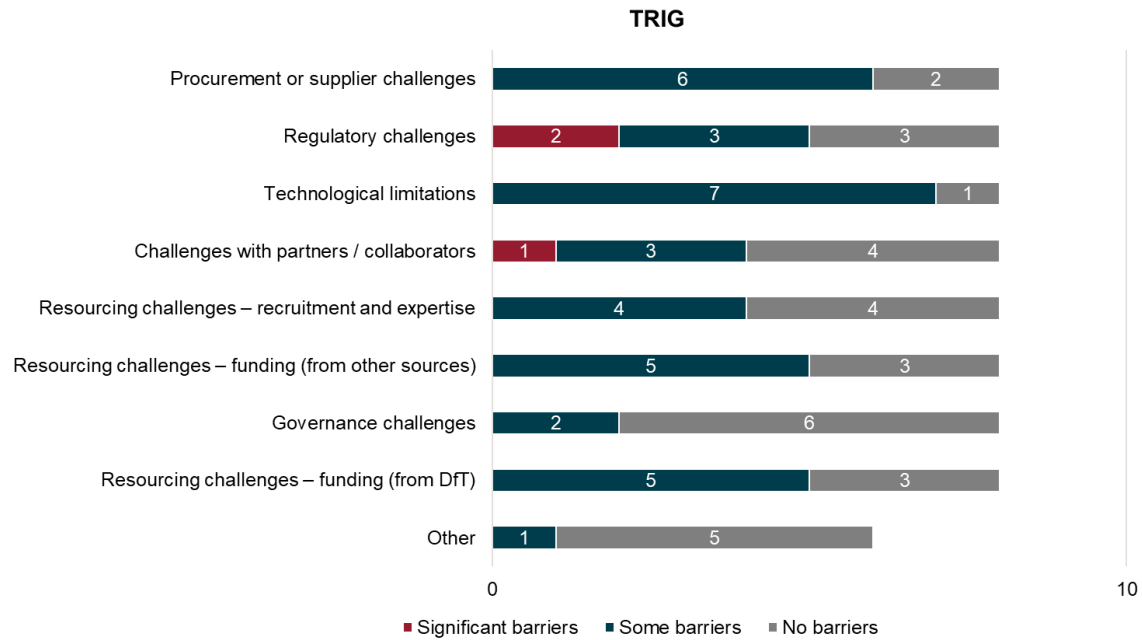
Figure 10 To what extent did you experience any of the below barriers, in the delivery phase of your project? (Multi-response, CMDC1-4)



Source: Online survey (2023 and 2025 combined)

Note: Respondents could select multiple types of barriers but, for each barrier, could only select one option out of: 'some barriers', 'significant barriers' or 'no barriers'. N = 26 – 72 (multiple options).

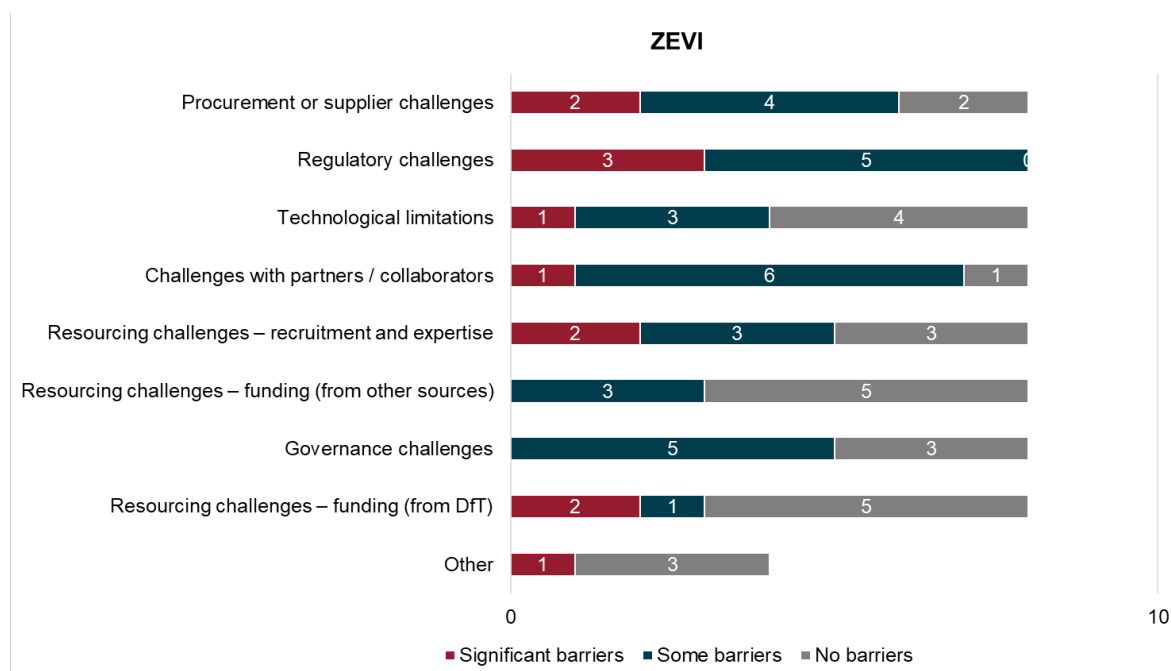
Figure 11 To what extent did you experience any of the below barriers, in the delivery phase of your project? (Multi-response, TRIG)



Source: Online survey (2023 and 2025 combined)

Note: Respondents could select multiple types of barriers but, for each barrier, could only select one option out of: 'some barriers', 'significant barriers' or 'no barriers'. N = 6 – 8, multiple options.

Figure 12 To what extent did you experience any of the below barriers, in the delivery phase of your project? (Multi-response, ZEVI)



Source: Online survey (2023 and 2025 combined)

Note: Respondents could select multiple types of barriers but, for each barrier, could only select one option out of: 'some barriers', 'significant barriers' or 'no barriers'. N = 4 – 8, multiple options.

Survey respondents were also given the option to describe the nature of any of the challenges they had experienced. Written responses were provided by 20 respondents, across several themes. Seven respondents reported difficulties with consortium partners, such as partners dropping out or disagreements about aspects of delivery or contractual issues. Six projects reported supply chain or procurement issues, such as the time required to identify suppliers or long lead times. Four projects had experienced delays to their trials, for example due to weather conditions.

Regardless of scheme, all projects explored through in-depth interviews had experienced some challenges with delivery or delivery timescales. Challenges reported align with the survey findings. In interviews, the issue of the share of funding between consortia organisations was raised. Two participants explained that there had been a lack of equal contribution among consortia organisations, and that the funding arrangements did not support this effectively.

“... It’s quite demoralising for the other partners who are really committing and working hard when they see the other partners, they’re not really doing very much.” – CMDC2 organisation

“If a [consortium] partner fails, there’s the risk that either the project fails, or in our instance ... the cost of that partner failing and the time, resource, and distraction has been really challenging. ... More needs to be done to make sure that [consortium] partners on project are either easy to replace, that there is a mechanism for making funding more equally distributed, or there are safety mechanisms built in.” – CMDC3 organisation

Further to the survey evidence that projects frequently encountered technological barriers, another respondent shared their experience of technical challenges such as unexpected issues with the testing partner, including limited access to test laboratories, staffing problems at the university, health and safety issues, equipment failures and difficulty completing testing for the project. The participant noted a lack of flexibility in the R&D programme and emphasised the importance of building flexibility into research programmes to reflect that ‘things can go wrong’, especially with new developments. One CMDC2 organisation explained the importance of communication, which reflects similar sentiments from other organisations.

“We set up really regular meetings and we had a lot of communication which I think helped massively.” – CMDC2 organisation

Accessing data was described as a barrier to delivery by some of The Hub consortium organisations during the focus group. They reported finding that some commercial operators and ports could be reluctant to share data they perceived as commercially sensitive but which may have produced enhanced insights for the researchers. A suggested solution to this barrier was to get support from government in accessing this data.

“I think at the government level, they can help the universities doing research to get more full-scale data from industry. Otherwise, it’s always going to be a critical challenge ... for the research.” – The Hub consortium organisation

“In some countries, like for example in the USA, the government have more data about the cargo, containers that come into the port; where they will go, and that kind of information. But what I heard is that in the UK, the government does not have the authority to do that. This information ... is so important for the researcher. [Access to that data] would improve the accuracy [of the research].” – The Hub consortium member

In particular, TRIG and The Hub organisations interviewed flagged an issue of recruitment and retention. The funding was perceived as being useful to hire early career researchers, but these contracts were generally short term and there was a perception that graduates currently view academia as less lucrative than other career paths, making recruitment of early career researchers challenging. Similarly, recruiting from abroad and obtaining work visas is increasingly difficult. As described above, The Hub had experienced some delays in recruiting a policy fellow but found that, once this position had been filled, it had generated a number of high quality deliverables (see Section 7.1). In addition, members of the Hub noted that recruiting and retaining a project manager had been a challenge for them.

“It’s primarily about not being able to recruit from the UK. We don’t have people coming through with PhDs [...] and it’s a real problem, and I don’t know if that’s to do with the status

of, 'why do a PhD?', and also money ... So we primarily recruit from abroad, the post-doctoral researchers, and then it's tied up with visas and all sorts of long HR processes. So, it's really quite tricky." – **The Hub lead organisation**

ZEVI organisations and delivery partners noted particular challenges around regulatory approvals and timelines. Regulatory processes had frequently resulted in delays, particularly as multiple regulatory bodies were often involved. Likewise, timelines and costs for all ZEVI projects were perceived to be ambitious, with several projects having to de-scope.

"The overarching reason [for ZEVI project delays] is the timelines they had to begin with, to do the vast amounts of work they had to do. ... there was very little room for risk realisation and, therefore, flexibility in their timelines. ... Project lengths just weren't quite long enough for them." – **Delivery partner**

A CMDC3 organisation also described regulation as a significant barrier. Regulation is further discussed in Section 3.6.7.

"[Regulation] has been the single biggest barrier and risk to the project. ... We are starting to see a little bit of progress, but not enough." – **CMDC3 organisation**

3.6.3 Working as a consortium

Schemes within the UK SHORE programme had different requirements for consortia. All CMDC1-4 and ZEVI applications had to involve a consortium. While there was no consortium requirement for the TRIG scheme rounds, consortia were still eligible to apply.

Survey data showed that a range of organisation types were involved in consortia. For CMDC projects which responded to the survey (representing almost half of CMDC1-4 projects), the most common form of organisation to work with as part of a consortium was a private SME, which 30 of the project respondents reported working with. Seventeen of the 34 CMDC projects also had an academic institution in their consortium, while 12 projects collaborated with a large private business. For ZEVI projects which responded to the survey, the most common collaborator was a private business (SME), which all 4 of the projects which responded to the survey had collaborated with. Three ZEVI projects were partnered with a research and technology organisation (RTO), and 2 projects collaborated with an academic institution (Table 14).

The majority of CMDC1, CMDC2 and CMDC4 projects are made up of small consortia (1 to 4 collaborators). CMDC3 and ZEVI have a more even distribution between small and medium consortia. Large consortia of more than 10 organisations are rare for all schemes. In addition, the data outlined in the interim report further confirms consortia organisations are primarily private businesses. Further details are included in Section 3 of the interim report.

Table 14 What other organisations form part of your consortium? (Multi-response)

Consortium organisation type	CMDC1 (n = 3)	CMDC2 (n = 3)	CMDC3 (n = 8)	CMDC4 (n = 19)	ZEVI (n = 4)
Private business (SME)	3	3	7	17	4
Academic institution	1	1	4	11	2
Research and technology organisation (RTO)	1	1	1	4	3
Private business (large)	2	1	2	7	1
Public sector organisation	3	0	1	2	0
Other non-profit organisations	0	0	1	2	0

Source: Online survey 2025

Note: From a base of 74 respondents across the CMDC1-4, TRIG 2022-2024, as well as to ZEVI.

Consortium working appeared to be effective for most funded projects, although some projects had experienced challenges due to consortium members not delivering as intended or withdrawing from the project during delivery

The self-reported project output data from CMDC1 and CMDC2 showed that out of 312 respondents (across both lead and collaborator organisation responses) who responded to the relevant question, 86% (270) were very satisfied or satisfied with how effective the consortium had been in terms of delivering the project. Of those that provided commentary on this, some noted that there had been a high level of positive collaboration between consortium organisation partners, and others noted that most issues related to delivery and project management had been due to external reasons such as technical difficulties and lack of time. This aligns with the feedback provided in the survey.

Projects reported that benefits gained from consortium working included enhanced cross-disciplinary working and, for The Hub, enhanced legitimacy of research outputs

In the in-depth interviews conducted in the summer of 2025, The Hub consortium organisations reflected on the added value of working as a consortium to deliver the project's objectives. Benefits of consortium working highlighted included improved systemic understanding, improved understanding of different fuels and technologies, working across

disciplines to address complex issues, improved translation of research findings into policy and greater perceived legitimacy of research outputs.

*“To me, the power of The Hub is bringing all those bits of information together so that you can work out how it works as a system, not how one little bit might work, because actually that might stop another bit working.” – **The Hub consortium member***

*“One of the straplines we use a lot is about being a fresh approach to maritime decarbonisation. That is very much about harnessing new skillsets that have not previously been tapped into.” – **The Hub lead organisation***

The benefits of a consortium design were supported by a stakeholder organisation involved in the design and running of The Hub scheme. It felt that one of the intentions behind The Hub scheme was to establish a “critical mass” of cross-disciplinary research and competence. This group would be able to deliver both research and policy benefits and something greater than what individual research projects could deliver.

*“I think the nature of the investment in itself has helped, because it is about creating a hub, as opposed to just, say, you know, 10 more individual research projects. You get that sort of added benefit as a result of that. ... It’s a group of researchers that have got connections and fingers in many pies, which enables them to bring in that expertise and have knowledge creation in different directions.” – **Stakeholder organisation***

On the other hand, the focus group with The Hub consortium organisations also revealed some difficulties posed by consortium working. This included finding it difficult to communicate across research strands due to the size of the consortium. In-person gatherings, in addition to online meetings and other online communication, were felt to have aided this issue through allowing for more informal conversations.

*“It really helps getting together because you have random conversations with people, and then you find out things that you wouldn’t have found out from a kind of structured, formal thing. And it really helps, because, you know, we’re in themes, but in actual fact, the themes need to work across each other. ... Those in person meetings are hugely important in terms of understanding what everyone else is doing and also coming up with new ideas.” – **The Hub consortium member***

The coordination and project management of The Hub, provided by Durham University, received high praise. The Hub mid-term review further supports this by evidencing that the scheme is ahead of schedule on the number of published papers, citations and conference papers.

*“I would say Durham is doing an excellent job managing this project with all sorts of complicated things.” – **The Hub consortium organisation***

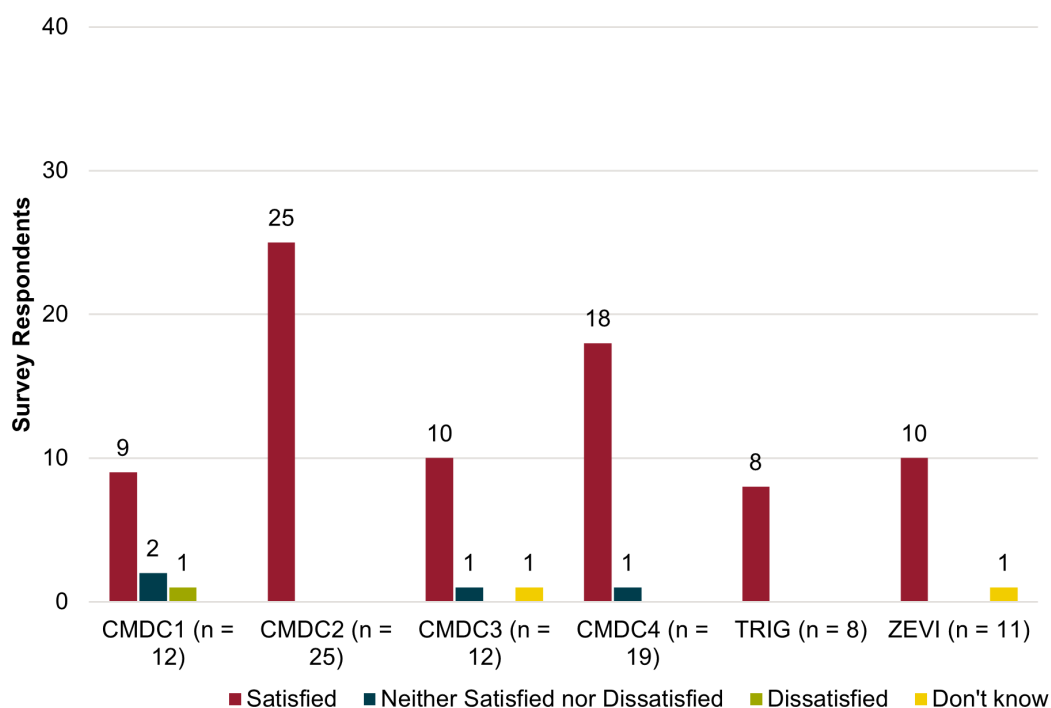
3.6.4 Support from delivery partners

Delivery partners were responsible for supporting projects with change control procedures and any complaints.

Delivery partners and their monitoring officers were seen to be a key strength of the UK SHORE portfolio

In the survey, 80 of the 87 project respondents (92%) were satisfied with the guidance provided by the CPC (TRIG) or Innovate UK (ZEV1 and CMDC) during project delivery. Satisfaction with this point was nearly universal across the schemes, as illustrated in Figure 13.

Figure 13 To what extent were you satisfied or dissatisfied with the information and guidance provided by the CPC or Innovate UK? (By scheme/round)



Source: Online survey (2023 and 2025 collated)

Note: 'Satisfied' is comprised of those who responded 'very satisfied' and 'satisfied', and 'dissatisfied' is comprised of those who responded 'very dissatisfied' and 'dissatisfied'. N=87.

Further, survey respondents were asked if they would have liked any additional support for the delivery of their projects. Seventeen out of 27 responses to this question stated that no further support had been needed, with several commenting they were pleased with the support

they had received from monitoring officers. The remaining 10 survey respondents indicated that they would have liked support with several aspects, including:

- support with cash flow challenges, caused by payments being in arrears or due to costs being higher than expected
- more flexibility on deadlines for project delivery
- more guidance and support on regulation, including more engagement from the MCA
- support with the match funding requirement
- more flexibility regarding changes to project design
- faster response times and the provision of a direct contact within Innovate UK
- provision of media support and more opportunities for networking
- improved Innovate UK submission systems
- legal and administrative investment support and support with commercialisation.

In-depth interviews indicated a more mixed level of satisfaction with the support provided by these delivery partners and their monitoring officers.

In some interviews, organisations said they had experienced delays in communication and response times and had found delivery partners inflexible in their approach to funding projects. Some said they had found that monitoring officers had not had sufficient technical knowledge to provide the support required. In contrast, some organisations said they had had a good level of engagement from their monitoring officer and queries had been responded to promptly.

“Our monitoring officer perhaps wasn’t technically best suited to our project ... the level of depth of requirement of project management seemed to be required from one end, wasn’t necessarily in parallel or in agreement with how much we felt we had to do. So, there was an interesting tension there.” – CMDC2 organisation

“We have been very fortunate to have an outstanding monitoring officer on this project. ... He understood the project before he got into it, and he’s followed us into future projects. He really is outstanding.” – CMDC3 organisation

In CMDC1 and CMDC2 end-of-project monitoring data, responding organisations showed high levels of satisfaction with the project monitoring provided by Innovate UK.¹⁴ Over 90% of the 300 responding organisations were either very satisfied or satisfied with this support, and the remaining felt neutral about the support provided.

In in-depth interviews, Innovate UK received praise for being as flexible and accommodating as its remit permitted. For example, one project which had had issues with delays to delivery described finding Innovate UK and DfT accommodating and having a positive working

¹⁴ CMDC3 and CMDC4 end-of-project monitoring data did not ask this question.

relationship with it. Project members were able to be honest about the barriers they had experienced, and Innovate UK had made allowances which were within their control.

“I would say Innovate UK have been very forward leaning.... They’ve been pretty pragmatic in most instances.” – CMDC3 organisation

In in-depth interviews, all delivery partners expressed that adequate support had been generally provided to projects. They noted that DfT had valued their role and any input they provided on scheme design and delivery. However, 2 delivery partners observed that it had not always been able to provide sufficient general financial or investment advice. One noted that they had raised this with DfT to consider for future schemes. They also said that they would like to be more accommodating on flexibility and cash flow in future schemes.

“The biggest issue from the finance perspective is this hard cut off at the end of the financial year.. ... We’ve had some projects come to us asking if there’s a way they can get more funding. Whether that is something that potentially could be available in other [schemes], it’s not for us to say, that’d be more for UK SHORE.” – Delivery partner

3.6.5 Data reporting

As delivery partners, Innovate UK, CPC and EPSRC were responsible for management of data reporting, including data sharing with DfT (which was managed by dedicated monitoring officers) and administration of quarterly, annual and end-of-project reports.

Organisations mostly reported being satisfied with elements of the monitoring and reporting requirements during project delivery. However, some frustration was expressed with the templates and inconsistency of reporting requests

As shown in Table 15, from the survey of CMDC1-4, TRIG23 and TRIG24 and ZEVI organisations, 76 of 87 respondents (87%) agreed that the nature of the data and information requested had been appropriate. Seventy-six out of 87 (87%) agreed that the timescale of the requests had been appropriate. A slightly lower number (70, 80%) felt that the format of templates and reports had been clear and easy to understand. For each element, between 5 and 6 respondents disagreed with the above statements.

Table 15 Satisfaction with data reporting

Level of agreement	The nature of the data and information requested was appropriate	The timescale of the requests was appropriate	The format of the templates and reports was clear and easy to understand
Agree	76	76	70

Neither agree nor disagree	5	5	9
Disagree	5	5	6
Don't know	1	1	2
Total	87	87	87

Source: Online survey (2023 and 2025 collated)

Note: 'Agree' is comprised of those who responded 'strongly agree' and 'agree', and 'disagree' is comprised of those who responded 'strongly disagree' and 'disagree'.

Thirty-nine survey respondents provided further written feedback on monitoring and reporting. Based on a thematic analysis, this included:

- Monitoring officers were helpful (11 comments).
- The monitoring requirements were clear (10 comments).
- Some had experienced formatting or technical difficulties with reporting templates (6 comments).
- The requirements for reporting changed over time, and/or were not clear at the outset (4 comments).

The in-depth interviews with organisations illustrated some of the reasons for dissatisfaction with templates for monitoring and reporting. One CMDC organisation explained that it had been instructed to structure the final report according to a fixed template at a late stage, leading to additional time and resource allocation during a busy period in December. In addition, it had been required to produce more documentation, reshape existing information and generate specific data to meet reporting requirements. This sentiment was shared by another CMDC organisation which felt “the information submitted was a bit repetitive”, especially for the final review. It had had difficulty understanding the requirements of the review, which had not been communicated by its monitoring officer. In summary, it felt that additional work had been involved in reporting the same content in a different format.

In in-depth interviews, a similar sentiment was expressed by a ZEVI organisation which felt the reporting requirements had not reflected the work being carried out. Another CMDC interviewee described disagreeing with some of the metrics of reporting and measuring programme success, finding it too focused on value for money in terms of pounds spent and generated rather than on outputs.

“You're delivering something which people have pushed themselves on ... And yes, people want value for money, but it should be about what we're delivering, not about whether we've overspent and we were on budget pretty much every single time.” – CMDC1 organisation

Interviews with organisations from 2 of the 8 ZEVI projects conducted in summer 2025 indicated that there were some unresolved issues with data reporting on their projects. The projects described that the scope and scale of project reporting had not been set out in their

grant offer letter, and they expressed concerns about sharing commercially sensitive data with a third-party organisation commissioned by Innovate UK to deliver the ZEVl data reporting. Additionally, the scale of reporting requirements was described as laborious, a sentiment that was echoed by The Hub focus group participants. Data collection for the ZEVl technical study coincided with delivery and standard progress reporting for these projects. This may have exacerbated the feeling of being overwhelmed that these projects experienced about reporting.

"It [the reporting requirement] certainly wasn't spelled out at the beginning. ... I don't think that list had been established at the stage of this project being initiated." – **ZEVl organisation**

"One of the challenges from my perspective ... is the regularity of reporting that we're having to do. Every three months, a report to the DfT that we have to fill in, and we only have so much time that we're costed to work on this. If you spend all your time reporting, I don't have any time to do the actual doing. ... It's a little bit onerous and it's detracting from the ability to do the actual work that we're trying to do." – **The Hub consortium member**

Delivery partners felt they offered an adequate level of support to successful projects. They felt that monitoring processes were generally working well and had been adapted in response to feedback. In addition, they noted that monitoring processes enabled "early warning" of issues and therefore mitigations to be put in place.

"Our [project monitoring and reporting] process is quite standard across all of our programmes. So, once you're familiar with Innovate UK, you know kind of the stages that has to be done, which is quite good because then there's no kind of surprises." – **Delivery partner**

3.6.6 Knowledge sharing activities

At early stages of schemes, or prior to scheme launches, online and in-person regional roadshow events were held across the UK. For most schemes, online events to bring together successful projects were carried out at the beginning, middle and end of the project delivery period. In addition, UK SHORE stakeholders and projects attended some wider industry events, such as London International Shipping Week, which included Clean Maritime Day, led by UK SHORE.

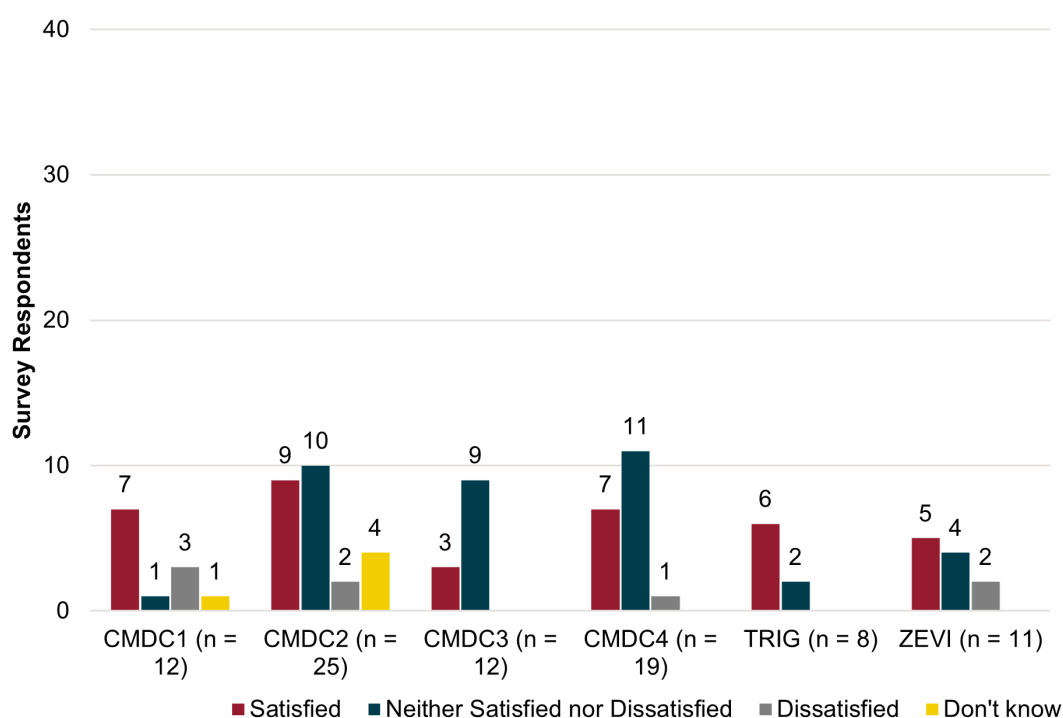
Organisations had mixed levels of satisfaction with the level of engagement and knowledge sharing with other projects. Organisations and delivery partners expressed a desire for more technical knowledge sharing and networking opportunities both within and between UK SHORE schemes

In the survey of CMD2, CMD3, CMD4, TRIG2022 and ZEVl organisations, 37 out of 87 respondents (43%) stated they were satisfied with engagement and knowledge sharing with

other projects. The same number stated they were neither satisfied nor dissatisfied, while 8 (9%) respondents were dissatisfied.

At scheme round level, for CMDC3 and CMDC4, the number of respondents who reported being neither satisfied nor dissatisfied with this was greater than the number of respondents who were satisfied (see Figure 14).

Figure 14 To what extent were you satisfied or dissatisfied with the level of engagement and knowledge sharing you had with other projects within the scheme? (By scheme/round)



Source: Online survey (2023 and 2025 collated)

Note: 'Satisfied' is comprised of those who responded 'very satisfied' and 'satisfied', and 'dissatisfied' is comprised of those who responded 'very dissatisfied' and 'dissatisfied'. N = 87.

In 2025, CMDC1-4 and ZEVI survey respondents also indicated which forms of engagement, knowledge sharing, marketing or promotion activities they had undertaken or taken part in for their project. The most common forms of activity to have taken part in were UK-based conferences, seminars and webinars, as shown in Table 16. There were no particular patterns in satisfaction based on the type of activity the organisation had participated in. All respondents stated they had participated in at least one type of knowledge sharing activity, with an average of 4 types of knowledge sharing across 2025 respondents.

Table 16 Participation in engagement, knowledge sharing, marketing or promotion activities (portfolio-wide; multi-response)

Type of engagement, knowledge sharing, marketing or promotion activity	Number of projects that participated in the activity
UK-based conferences, seminars, webinars	31
Articles in organisations' own websites/social media	30
Networking events led by Innovate UK, CPC or DfT	24
International conferences, seminars, webinars	19
Academic papers/articles	14
Roadshow/showcase events	12
Bespoke branding for the project/technology	10

Source: Online Survey (2025)

Note: $n = 37$.

Most organisations spoken to during the in-depth interviews mentioned the UK SHORE events. Many had attended these events and had their own stand, although they did not give a strong opinion about the value of their participation. Some stated that there had not been enough opportunity to engage with other projects during and after project delivery, and another noted a lack of knowledge sharing activities at the end of the project. Some organisations new to maritime described finding the industry less open to knowledge sharing than other industries. They attributed this to fear of 'IP leakage' rather than to any fault of the UK SHORE programme.

"The industry wide lessons aren't really filtered out there because everybody's keeping all the information close to their chests. ... At the end of a [scheme], there's a bit of a showcase and I think industry are so cautious and worried about IP and IP leakage that it probably makes people a bit less keen to discuss their learnings and their challenges."

– Organisation involved in multiple CMDC scheme rounds

Others described attending knowledge sharing events as a chance to market their project and to make connections, and were more satisfied with the opportunities presented.

"As we've gone through the UK SHORE process, we've got to meet other companies ... it's like the ecosystem is growing a little bit, which I think is lovely." – **ZEVI organisation**

"Overall, I've been very impressed with the support and opportunities and ideas created through the networking system of the TRIG 24 grant." – **TRIG24 organisation (end-of-project monitoring)**

One delivery partner expressed a similar sentiment, and welcomed events being 'UK SHORE' events (for example Clean Maritime Day at London Shipping Week) as they enabled networking across the different schemes. This delivery partner had also carried out targeted regional events for CMDC3 and CMDC4. Events for these 2 scheme rounds had been well attended, more frequent and more targeted than events for CMDC1 and CMDC2.

Funded projects also reported establishing connections through participation in schemes, suggesting a link between delivery process and potential outcomes (discussed further in Sections 4.1, 5.1, 6.1 and 7.1).

In the interim evaluation, both delivery partners, representing CMDC, TRIG and ZEVI, recognised there was room for improvement to knowledge sharing. One expressed an ambition to agree knowledge sharing plans sooner, and another noted retaining contact with organisations that had received funding as a challenge and an ambition to create an 'alumni network', recognising that this was something they had not had resources to do in the past. There was still scope to action these ambitions to create an alumni network to facilitate knowledge sharing and engagement across the UK SHORE schemes.

3.6.7 Engagement with regulatory bodies

In the maritime sector, there are a number of regulatory bodies which uphold maritime safety, environmental and compliance standards. For UK SHORE, the MCA, as an executive agency to the DfT in the UK, plays a key role in the regulatory processes involved in UK SHORE-funded projects, and has been involved since the early stages. Other organisations that play a role in regulation include Classification Societies.

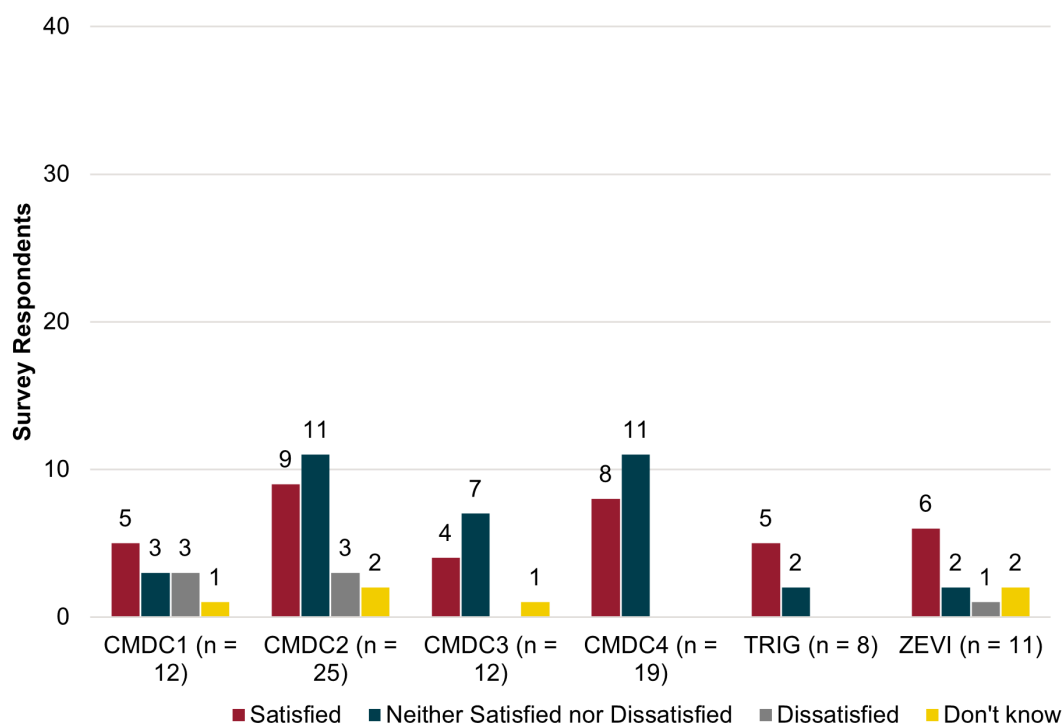
Organisations had mixed views on their engagement with regulatory bodies. Regulatory issues had been a barrier to project delivery in some cases, although satisfaction with engagement with regulatory bodies for CMDC organisations had increased as scheme rounds progressed

Across all 87 respondents to the survey of CMDC1-4, TRIG 2022-2024 and ZEVI projects, 37 (43%) reported being satisfied with the support they had received for necessary regulatory approvals, while 36 (41%) were neither satisfied nor dissatisfied. Eight (9%) reported being unsatisfied, and 6 (7%) responded that they did not know, suggesting regulatory approvals may not have been relevant to a minority of projects.

Relatively fewer CMDC organisations expressed dissatisfaction as the CMDC scheme rounds progressed (Figure 15). Increased satisfaction from organisations with the support received with regulatory approvals may be related to the MCA taking on a more active role in UK SHORE from CMDC3 onwards. This increased role was because projects became closer to delivery and moved away from feasibility studies. In an in-depth interview, the MCA welcomed becoming more involved as the UK SHORE schemes had progressed.

"I would argue that the early rounds of the CMDC, we were not sufficiently involved in the appropriate fashion. We were involved, but we were involved as a recipient of the project, not as a designer of the programme. That's a failing from both the UK SHORE and an MCA point of view, because corporately, neither group really understood what would be needed, and I think we've collectively learned and fixed that as we've moved forward ... We are taking a much more active role now." – MCA

Figure 15 To what extent were you satisfied or dissatisfied with the support you received regarding necessary regulatory approvals? (By scheme/round)



Source: Online survey (2023 and 2025 collated)

Note: 'Satisfied' is comprised of those who responded 'very satisfied' and 'satisfied', and 'dissatisfied' is comprised of those who responded 'very dissatisfied' and 'dissatisfied'. N = 87.

In interviews conducted in summer 2025, some organisations described experiencing delays to delivery due to unforeseen issues with regulatory compliance. This was also recognised as a barrier to delivery, incurring delays and unforeseen costs to projects by some delivery partners.

"We had things that we weren't really expecting would apply to our technology. ... We had kind of gone in with the assumption that those kinds of rules just wouldn't apply, because it doesn't match our technology, but there's been a lot of stuff that we've had to comply with those rules that we weren't really anticipating." – ZEVI organisation

“I would actually argue that the regulatory stuff does take a bit of a long time. We’ve seen some people who know the regulatory stuff back to front, and it still takes ages to get through all the class rules and regulations, and then go through, when appropriate, the MCA bits and pieces. ... Not only are the regulatory bits incurring delays in the projects, there’s increased costs to participants as well. Those projects that are delayed, they then have to self-fund anything that comes after.” – Delivery partner

Similarly, the National Shipbuilding Office cited a need to focus on ‘enablers’, including regulation, throughout the funding progress. In addition, the MCA itself described how it had input on the design of CMDC3 and subsequent schemes to steer funding towards projects with a lead possessing maritime expertise and projects that were more likely to deliver on UK SHORE’s strategic objectives and make a tangible difference to the maritime industry. It found that, during the course of UK SHORE, funded projects had become more aligned with strategic objectives and that collaboration between the UK SHORE delivery partners and stakeholders was continually improving.

3.6.8 Project delivery summary

Aligned with the process evaluation questions, the following were identified as areas that worked well and areas that could be improved in the project delivery phase.

What worked well:

- **Consortium working** was regarded as beneficial by most and facilitated cross-disciplinary collaboration and understanding.
- **Support provided by delivery partners** was well received, and organisations appreciated their flexibility.
- **Monitoring officers** received praise from organisations for the support they provided for project reporting.
- **Reporting requirements** were generally perceived as reasonable and deliverable.
- Opportunities to **network and share knowledge** with the wider UK SHORE ‘ecosystem’ was appreciated.
- **Increased engagement from the MCA** was perceived as beneficial during project delivery.

What could be improved:

- Some projects, especially those funded through ZEVI, had experienced **delays to delivery**.
- Challenges with **procurement/suppliers and regulation** were the most reported significant barriers faced by projects. **Technological limitations** were most frequently reported as something that projects had experienced “some barriers” with, but relatively few reported finding this a significant barrier.

- Some projects had also experienced **consortium organisation partners not delivering as expected or dropping out**.
- Some projects requested more **flexibility in funding provided and deadlines** for delivery when barriers caused delays.
- **Recruitment and retention of academic staff** was a challenge for The Hub and some TRIG projects.
- Some projects would like to have seen **reporting and data requirements more clearly set out** at the outset to better manage the resource requirements for this.
- While **monitoring officers** received praise for their support with reporting, others found that monitoring officers did not have the necessary technical understanding to support projects during delivery. As such, this indicates some areas for improvement.
- Some organisations would like **more opportunities for knowledge sharing and networking** within and across schemes.

3.7 Overall findings and future considerations

Table 17 summarises the findings presented above, and sets out considerations for future UK SHORE, or similar, schemes.

Table 17 Summary of findings and future considerations

Phase	Finding	Consideration
Application phase	Some stakeholders and delivery partners had found the time to bid to be insufficient, but this learning had not yet been translated into longer application periods.	Announce schemes (and rounds where applicable) earlier, and/or allow more time for applicants to prepare their applications.
Application phase	Some ZEVI applicant organisations had found the time permitted to prepare their applications too short and argued their bids may have been more feasible if they had had more time to prepare their application. The ZEVI delivery partner expressed a similar sentiment.	Tailor application timelines to the scale and scope of each scheme round.
Application phase	Some applicant organisations described the process of applying for schemes as time consuming, and some organisations which	Continue to provide support at the early stage of the competition process for prospective applicants to discuss and test ideas.

	were less familiar with applying for funding from Innovate UK had experienced the application as challenging.	The possibility of providing follow-on funding for projects that have achieved their desired objectives but would not be able to pursue next steps (for example bringing technology to market) without funding could help reach wider objectives of UK SHORE.
Assessment of applications	The maritime-specific industry knowledge of assessors was questioned by some applicants, and delivery partners acknowledged recruitment of assessors continued to be a challenge.	Consider exploring different avenues for recruitment of assessors with the desired level of technical and project management competence.
Feedback for unsuccessful applicants	Some unsuccessful applicant organisations wanted more feedback on their applications, and delivery partners acknowledged they struggled to make time for this.	Consider allowing more time to provide feedback on unsuccessful applications to aid organisations in future attempts, and ensure applicants have clarity on the level of feedback they may expect.
Distribution of funding	Several organisations had been successful in multiple UK SHORE schemes and rounds, but some unsuccessful applicants expressed dissatisfaction that the same players received funding from multiple scheme rounds. Some organisations expressed dissatisfaction with the timeliness of allocation of funding and, for some, funding allocation taking place later than they had expected had led to challenges with project delivery.	Highlight the ramping up of ideas and technologies through TRLs as an intended output of UK SHORE and communicate success stories of organisations that have utilised several rounds of UK SHORE funding to benefit their business, contribute to the economy and to develop groundbreaking technology. Ensure clear communication to applicants on timelines for issuing funding and consider giving extensions to delivery deadlines where funding has been issued later than initially stated.
Change control	Some organisations and delivery partners argued that change control processes were onerous and that governance requirements could cause project	Consider streamlining the change control process and critically assess the value of additional governance processes against how these may impact project delivery.

	delays and incur costs on organisations.	
Regulatory barriers	Regulation remained one of the barriers experienced as significant by the most projects and caused delays to project delivery. Others were not fully aware of the need for regulatory processes.	Continue to have close engagement with MCA in the scoping, design and delivery of schemes, and explore methods for providing more support for projects as they encounter regulatory issues. Factor in contingency in case of regulatory delays in scheme design and ensure applicants have awareness of the need for regulatory processes. Ensure the new innovation unit within the MCA collaborates with UK SHORE. Consider placing additional weight on questions regarding regulation in application assessments.
Meeting deadlines for delivery	Some projects had struggled to meet deadlines for delivery; for instance, around half of ZEVI projects had been able to deliver on time. Stakeholders and organisations described the timeline for delivery of ZEVI projects as challenging.	Continue to provide flexibility on deadlines and set expectations for delivery which are realistic to the scale and scope of the scheme. Consider how hard deadlines, such as end of financial year, can be better managed.
Follow-on funding	The application process is resource intensive; some projects had received funding through multiple schemes or scheme rounds (see Section 8.6).	Consider the option of designing schemes to allow projects to apply for follow-on funding, or stage-based/milestone-based funding, to ensure progression of their technologies towards commercialisation.
Reporting and data sharing	Some projects described the reporting process and data sharing requirements as time-consuming and that the scale of reporting and data sharing required had been greater than they had expected. Additionally,	Ensure that expectations of frequency, scale, scope and format of project reporting and data sharing are clear to organisations as early as possible. Ensure necessary data sharing or non-disclosure agreements are in

	some ZEVl organisations expressed reluctance at sharing data with third parties commissioned by Innovate UK.	place at the start of the project to ensure information can be shared with relevant third parties.
Knowledge sharing and engagement	Some projects expressed a desire that UK SHORE would provide more opportunities for technical knowledge sharing and networking within and across schemes. Most engagement occurred online. Stakeholders expressed a desire to create a network of UK SHORE alumni to foster this, but this had not yet been achieved.	Provide more opportunities for technical knowledge sharing and networking both within individual schemes and across the UK SHORE portfolio. Explore possibility of setting up and better maintaining a UK SHORE alumni network to continue to support the industry and technological development. Consider running more engagement events in person or hybrid, to facilitate more opportunities for networking and informal communication between projects.
Process evaluation	Some process metrics that were measured in surveys distributed by CPC and Innovate UK for early CMDc and TRIG rounds have not been included in these surveys for later rounds of these schemes. This means that the evidence base for evaluating process has grown smaller.	Restart monitoring of organisations' satisfaction with process elements, to support the evaluation of scheme delivery.

Source: SYSTRA Ltd.

4 Impact evaluation findings – CMDC

This section presents the following impact findings for CMDC scheme rounds:

- For CMDC3 and CMDC4, findings are organised by evaluation question (EQ). These schemes were not included in the interim report.
- For CMDC1 and CMDC2, additional findings (compared to the interim report) are based on new survey data.

Table 18 sets out the evidence sources used for the CMDC3 and CMDC4 evaluation. It includes the sample size and response rate across each (percentages refer to the percentage of all organisations or projects).

Table 18 Evidence sources used for the CMDC3 and CMDC4 evaluation

Data source	CMDC3 response rates	CMDC4 response rates
Baseline monitoring data	75 organisations (81%) across 16 projects (84%)	143 organisations (100%) across 33 projects (100%)
End-of-project monitoring data	35 organisations (38%) across 12 projects (63%)	114 organisations (80%) across 33 projects (100%)
End-of-project reports	Submitted by 15 out of 19 projects. Five reports were reviewed.	Submitted by 26 out of 33 projects. Eight reports were reviewed.
Stakeholder interviews	One successful and one unsuccessful applicant	One successful and one unsuccessful applicant
Online survey (2025 only)	27 organisations across CMDC3 and CMDC4	27 organisations across CMDC3 and CMDC4

Source: Frontier Economics

Note: Response rates are rounded to the nearest per cent. See Section 2.2 for a more detailed discussion of evidence sources.

The following limitations relate to the CMDC3 and CMDC4 monitoring data:

- **Sample size:** As shown in Table 18, the samples are incomplete. Response rates are especially low for CMDC3, where less than half of the organisations provided end-of-project monitoring data. The number of organisations that responded to each individual question is sometimes even lower than the monitoring data sample size. As a result:
 - Responding organisations are not necessarily representative of all CMDC3 and CMDC4 organisations. This is particularly true as the sample size is a smaller

proportion of all organisations. Where the sample size is particularly small, data is not reported or the lack of representativeness is highlighted.

- The totals reported are likely to underestimate the total across all CMDC3 and CMDC4 projects due to the lack of complete response. Totals are not scaled up for non-respondent organisations, as this would require assuming that responding organisations are representative.
- Where relevant, percentages of organisations that reported particular response options are presented. These use the total number of organisations that provided monitoring data as the base (referred to as ‘responding organisations’ in the subsequent text), rather than the number that responded to individual questions. Where there are materially higher levels of non-response, the analysis and presentation of this data is adjusted accordingly.¹⁵
- There may be a degree of **double counting** in some total figures, whereby different organisations in the same project reported the same outputs. This is true for outputs and outcomes which would be expected at the project level (for example demonstrations or deployments), but not those for outputs which would be expected at the organisation level (for example job creation). Where this is a potential issue, it is explicitly noted.

4.1 Development of clean maritime technologies

This section presents findings on EQ1: To what extent, and through what mechanisms, did CMDC help to accelerate and support the development of clean maritime technologies relative to what would have happened in the absence of CMDC? The relevant data and data sources for each sub-question under EQ1 are reported in Table 19.

Table 19 EQ1 data sources

Sub-question	Data	Data source
To what extent did the projects funded through CMDC deliver the outputs as anticipated in the business cases (e.g. feasibility studies, pre-deployment trials, demonstrations, deployment trials in operational settings and market-readiness plans)?	Number of projects and outputs delivered	Monitoring data

¹⁵ In some cases, some non-response is driven by the question wording where Innovate UK stated: ‘This question is not required for public sector organisations, academic institutes or individuals. Please select “Not Applicable”’. However, some organisations which elsewhere marked themselves as these types of organisations still provided a response to these questions. These responses have been kept in the analysis. This was relevant for response rates to the following topics: job creation, financial impacts (e.g. profit), and new or improved products, services or processes. It is indicated in footnotes where relevant.

	Stakeholder views on project success	End-of-project reports, interviews
To what extent did CMDC support technologies through the TRL scale?	Change in TRL	Monitoring data
	Expected end-of-project TRL for CMDC3	Monitoring data
	Stakeholder views on change in project scopes	Survey data
What role did CMDC play in facilitating parties to come together to advance the development of clean maritime technologies?	Number of new or maintained collaborations through CMDC	Monitoring data
What factors or investments played a role in enhancing the influence of CMDC in meeting its aims for accelerating UK clean maritime?	Stakeholder views on remaining barriers to project development	End-of-project reports, interviews
	Stakeholder views on the impact on their projects if they did not receive CMDC funding	Interviews, survey data

Source: *Frontier Economics*

Each is discussed in turn through the rest of this section. In addition, a further sub-question for this EQ on evidence relating to the ‘factors [that] played a role in enhancing the influence of CMDC in meeting its aims for accelerating UK clean maritime’ is discussed throughout exploration of each of the other sub-questions.

4.1.1 Evaluation evidence

To what extent did the projects funded through CMDC deliver the outputs as anticipated in the business cases?

There is evidence of deployment and demonstration, an expectation in the business case

According to the business case, CMDC3 and CMDC4 projects were expected to undertake deployments and real-world demonstration of novel clean maritime technologies.¹⁶

In the end-of-project monitoring data:¹⁷

- 30 total deployments were reported by 13 CMDC3 organisations across 8 projects, representing 37% of responding organisations
- 73 total deployments were reported by 28 CMDC4 organisations across 15 projects, representing 25% of responding organisations
- 40 CMDC4 organisations across 19 projects responded 'yes' to completing demonstration post project, representing 65% of organisations that responded to the question (62).

The CMDC4 organisation interviewed reported good progress with its demonstration.

"We have been running demonstrations within the limits of our regulatory approvals as they stand today. So we have got sea time, the vessel is going out to sea, she is performing better than expected. We were expecting, being a first of class vessel, that there would be more challenges, but so far, so good. There is nothing hugely untoward to report at this stage." – **CMDC4 organisation**

There is evidence of other real-world innovation outcomes

Organisations reported the number of innovations launched as a result of UK SHORE support in the end-of-project monitoring data:¹⁸

- 76 total innovations were launched by 18 CMDC3 organisations across 9 projects, or 51% of responding organisations.
- 156 total innovations were launched by 52 CMDC4 organisations across 27 projects, or 46% of responding organisations.

¹⁶ Demonstration refers to testing and validation of a technology in real-world or near real-world conditions. Deployment refers to rollout or commercial implementation of the technology after successful demonstration of feasibility.

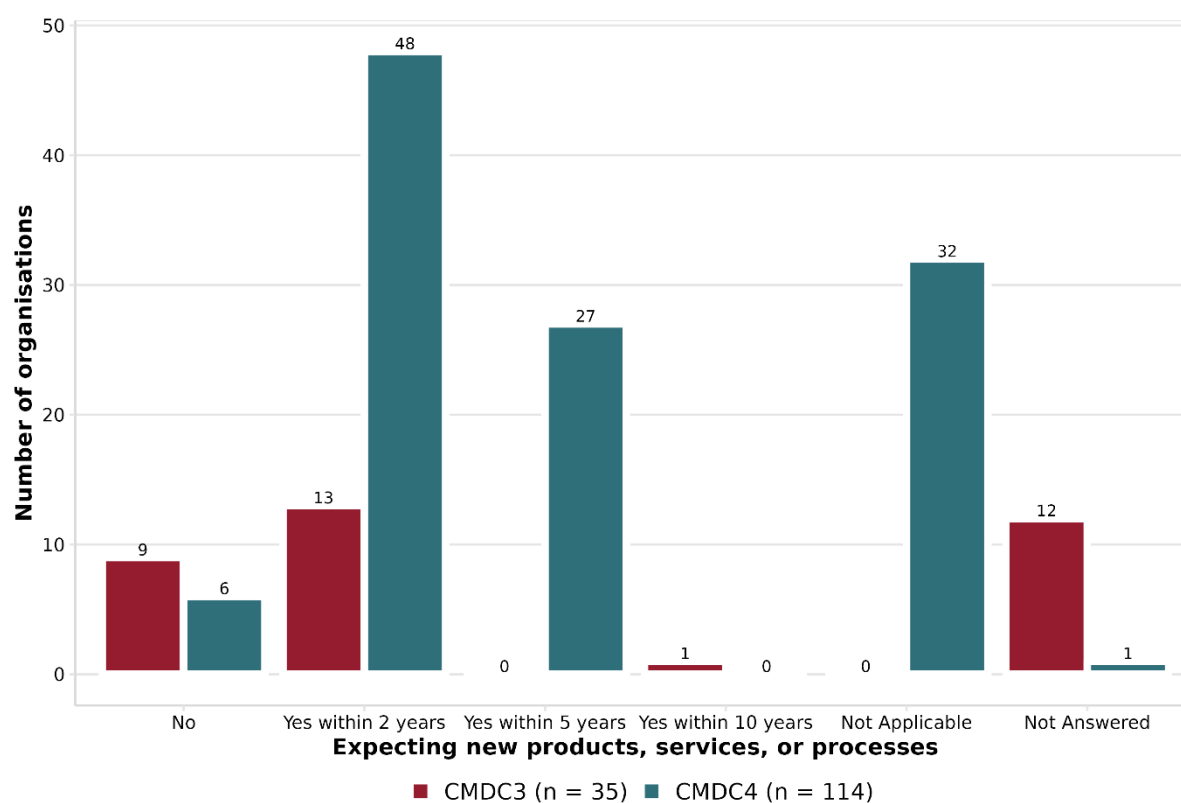
¹⁷ The questions were 'How many technologies have been deployed in real-world settings during this project?' (numeric response), and 'Real-world demonstration of products or services related to Innovate UK support post project' ('yes' or 'no' response).

¹⁸ The end-of-project monitoring data asked organisations to report the number of new or improved products, services and processes launched as a result of UK SHORE support separately. They are aggregated here into the number of innovations. Innovate UK stated 'This question is not required for public sector organisations, academic institutes or individuals. Please select "Not Applicable"'.

Responding organisations also expected more innovations to be launched in the near future. Based on end-of-project monitoring data, Figure 16 shows that:

- Of the 23 CMDC3 organisations that provided a response to this question, 14 expected new products, services or processes to be launched within 10 years, with almost all of these expecting launch within 2 years
- Of the 81 CMDC4 organisations that provided a response to this question, 75 expected innovation within 10 years, with 48 expecting innovation within 2 years – this equates to 91% of these organisations expecting innovation within 10 years.

Figure 16 Number of organisations that expected new products, services or processes



Source: Frontier analysis of end-of-project monitoring data

Note: $n = 35$ for CMDC3, $n = 115$ for CMDC4. The question asked 'expected new products, services or processes as a result of this support'. Options included 'No', 'Yes within 2 years', 'Yes within 5 years', and 'Yes within 10 years'. Innovate UK stated 'This question is not required for public sector organisations, academic institutes or individuals. Please select "Not Applicable"', though it's unclear whether a 'Not Applicable' option was included for CMDC3.

There is evidence of delays and barriers – but these are not necessarily of concern

Eight CMDC3 projects (42% of all CMDC3 projects) and 2 CMDC4 projects (6%) were delayed beyond the original completion date of 31 March 2025. Sections 3.6.2 and 3.6.7 discuss the delays to projects and barriers to delivery from a process perspective.

In interviews, Innovate UK indicated that the delays were within expectation given the R&D nature of the projects.

“Being R&D projects, however, there have been a few changes and delays in some of the projects. Some of the demonstrators have yet to demonstrate, but they have plans in place to do so, and some of them are still finding their feet slightly with the commercialisation aspects.” – Innovate UK interview

In addition, delays did not necessarily prevent project success. In interviews, one project noted challenges including supplier delays and technical issues, which meant it had tested the engine less than it would have liked. It still reported that its project had been very successful.

“It was a very, very successful project for us. We did get the engine to run on ammonia and we broke a few things in the process, but that’s life. And we ended the project with a design, which we know needs some modification, but we know how we’ve got to modify it and are all ready for the next step.” – CMD4 organisation

The online survey asked if significant changes in scale or scope had occurred during project delivery.¹⁹ Only 7 (26%) CMD3 and CMD4 survey respondents (out of 24 who answered the question) reported changes to the scale or scope of their project. Of those that reported a change:

- 5 survey respondents reported a reduction in scope or scale (19%) – one was due to the pressure of tight timelines, and 4 were due to external complications, such as financial barriers, partner delays and cancellations, and supply chain challenges
- 2 reported positive changes in scope or scale (7%) – one survey respondent had discovered a new opportunity to improve the product, while another had expanded the number of demonstrations.

“The only significant change was the change of location from [the original location] to two other sites, but this was a very positive change for the project as it allowed us to show case the project in 2 different locations to 2 different sectors.” – CMD3 survey response

The majority of survey respondents would not have progressed without CMD3

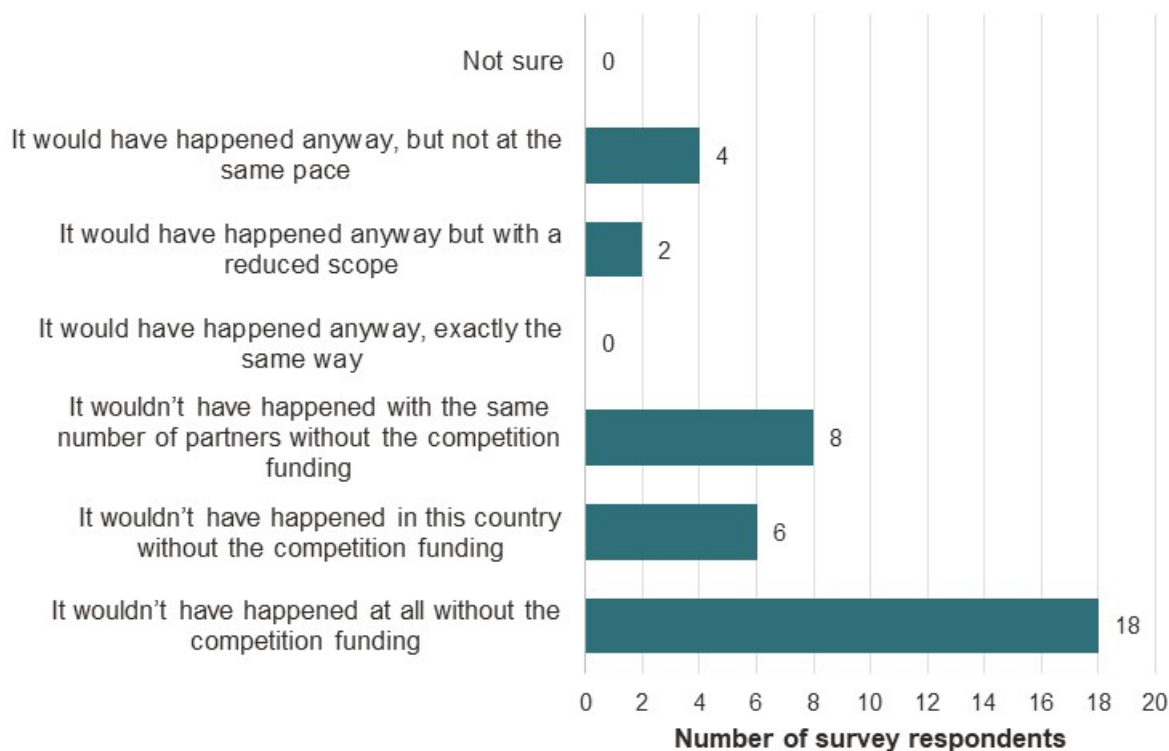
Based on online survey responses, UK SHORE significantly impacted project development and demonstrated additionality. As shown in Figure 17:

- 18 out of 27 survey respondents (67%) said their project would not have happened without UK SHORE funding
- no survey respondent said it would have happened in exactly the same way without UK SHORE
- some survey respondents also felt that UK SHORE funding had increased the number of partners working on their project (8, 30%), had allowed the technology to be developed

¹⁹ ‘Have there been any significant changes in the scope or scale of your project during delivery? If yes, please can you tell us briefly about the nature of these changes and the reasons.’ Open text response.

in the UK (6, 22%) or had increased the pace (4, 15%) and scope (2, 7%) of the technology development.

Figure 17 Impact on technology development without UK SHORE

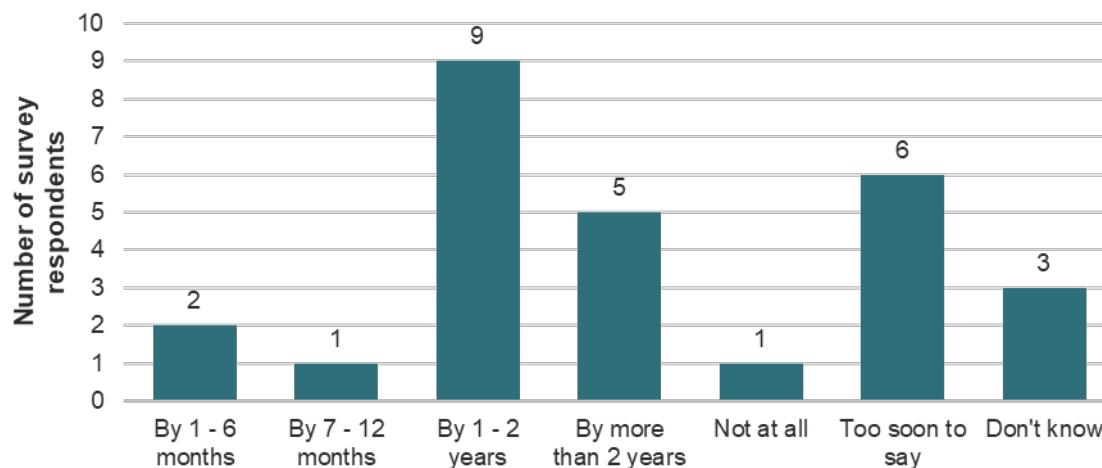


Source: 2025 survey (CMDC3 and CMDC4 organisations only)

Note: $n=27$. 'To what extent, if any, has your participation in this competition [scheme] supported the development of your technology? Please select all that apply.' Options as shown.

Most survey respondents also reported that UK SHORE participation had sped up technology development. As shown in Figure 18:

- 14 (52%) survey respondents reported that participation in UK SHORE had sped up their technology development by a year or more
- only one (7%) respondent felt there had been no effect on the development timeline
- 9 (33%) respondents were not able to quantify the effect to date.

Figure 18 Amount of technology development time reduced by UK SHORE

Source: 2025 survey (CMDC3 and CMDC4 organisations only)

Note: n=27. 'To what extent, if any, has your participation in this [scheme] reduced the time required to develop your technology? Select one.' Options as shown.

In interviews, both successful and unsuccessful applicant organisations interviewed expressed the importance of UK SHORE funding for the technology to develop.

An unsuccessful CMDC3 applicant organisation explained that the lost bid had meant that commercialisation had become more difficult to achieve. Prospective ports were unwilling to trial its technology without cost subsidies and it did not have the financial means to cover the trialling cost since applying to the grant.

Both organisations interviewed for CMDC3 and CMDC4 said that their projects would not have happened without UK SHORE. The CMDC3 organisation said that UK SHORE had allowed it to progress to the early stages of product development.

"Without a doubt, the project wouldn't have happened without UK SHORE." – **CMDC4 organisation**

"CMDC3 has taken what was an idea into a reality, a built operational first of a class vessel that has been seen by hundreds of people [...] We've done really impressive stuff that wouldn't have existed. The boat would never have been built without CMDC3." – **CMDC3 organisation**

UK SHORE has led to a degree of displacement of other resources

Survey evidence suggests that participation in UK SHORE caused diversion of resources, suggesting a degree of displacement. The majority of survey respondents (16 of 27) reported that they had diverted resources away from other activities to complete their UK SHORE

project.²⁰ Of these, 14 had diverted resources from other R&D activities and 10 from non-R&D activities.²¹

On average, survey respondents reported that 43% of their project costs had been diverted from other activities.²² This is indicative of the level of displacement. However, the exact figure should be treated with caution: the number of respondents to the survey was relatively low, and it is unclear whether respondents interpreted project costs as only the proportion of project cost which they funded or the overall project cost.

To what extent did CMDC support technologies through the TRL scale?

Analysis of TRL development uses responses by project leads, comparing baseline and end-of-project monitoring data. This is consistent with the interim report.²³

In interpreting the findings, the following issues should be considered:

- The sample size is low for CMDC3: only 4 (out of 19) CMDC3 projects reported baseline and end-of-project TRL. These projects may not be representative of CMDC3. In contrast, TRL data was available for 27 of 33 CMDC4 projects (82%).
- Project leads reported TRL at the end of their project without seeing the TRL they reported at baseline. This data collection design was a deliberate choice to ensure that projects were not prompted to claim progress and was intended to provide a more accurate view of TRL at the end of the project. However, it may have led to a degree of inconsistency in reporting, particularly where different individuals within the organisation responded to the baseline and end-of-project data collection.
- TRL development is typically seen as a measure of success. However, TRL regression also represents a valuable outcome of innovation funding: 'failing faster' is a legitimate benefit from public funding and, as part of R&D schemes, some projects are expected to fail or generate new learnings about the true readiness of their technologies, in some instances allowing them to adapt to these challenges in the future. Examples of TRL regression should therefore not be seen as a negative outcome.

²⁰ 'Have you diverted internal resources away from other activities in order to complete the funded project?' Options included 'Yes', 'No', 'Don't know'.

²¹ 'Which type of activities have you diverted internal resources from? Tick all that apply.' Options included 'Other R&D activities' and 'Non-R&D activities'. Note that 8 survey respondents selected both.

²² 'Approximately what proportion of the project's total costs would you say were diverted from other activities? Please state a % amount from 1% to 100%.' Open text response. Respondents to 2025 survey (CMDC3 and CMDC4 organisations only).

²³ For CMDC3 and CMDC4, all private organisations working on a project were asked about TRL in monitoring data. However, organisations within the same project often reported different levels of start and end TRL. This might be expected given that different organisations work on different aspects of the technology. Focusing only on project lead responses aimed to assess the primary innovation of the project (which the lead was likely working on) and ensured continuity with the previous analysis (thereby aiding portfolio-wide analysis in Section 8).

The sample size for CMDC3 TRL development is too small to draw conclusions across the scheme

Of the 4 CMDC3 project leads that reported both baseline and end-of-project TRL, 3 reported TRL progression and one reported no change:

- one reported TRL 6 at the start and remained unchanged
- one moved from TRL 6 to TRL 9
- one moved from TRL 4 to TRL 6
- one moved from TRL 3 to TRL 5.

Three project leads had reached their expected TRL as reported at baseline, and one was one TRL below their expectation (the project which had moved from TRL 3 to TRL 5).

In interviews, the CMDC3 organisation highlighted that its TRL development was limited because of a partner failure, which meant that it did not have hydrogen infrastructure to fuel its boat.

The majority of reporting CMDC4 project leads experienced TRL progression. On average, responding CMDC4 project leads reported an increase of one TRL

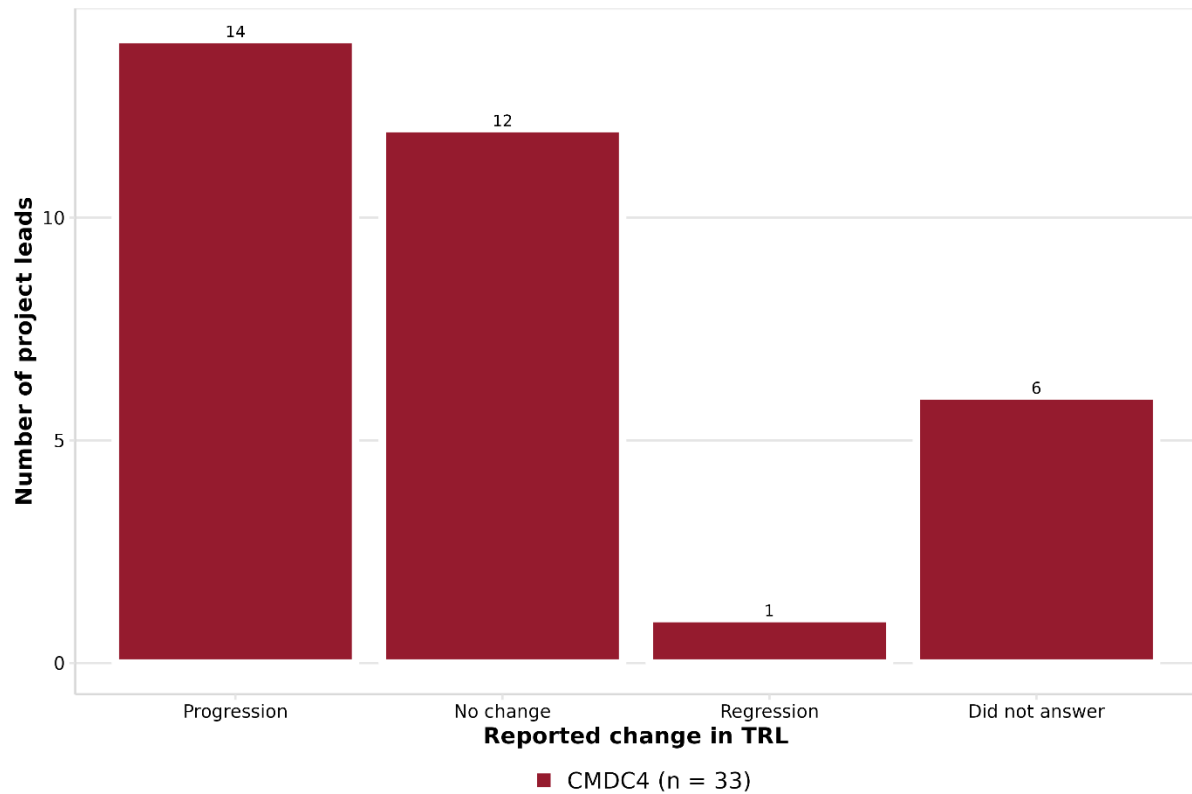
Of the 27 CMDC4 project leads who reported both start and end TRL, 14 reported a progression, 12 reported no change and one reported regression (Figure 19).

Not all projects would necessarily have expected to increase TRL: one CMDC4 end-of-project report highlighted that it had not expected to see TRL development.²⁴

“The project was a feasibility study aimed at the technical and operational aspects associated with offshore charging as opposed to the direct development of the specific system/product.” – CMDC4 end-of-project report

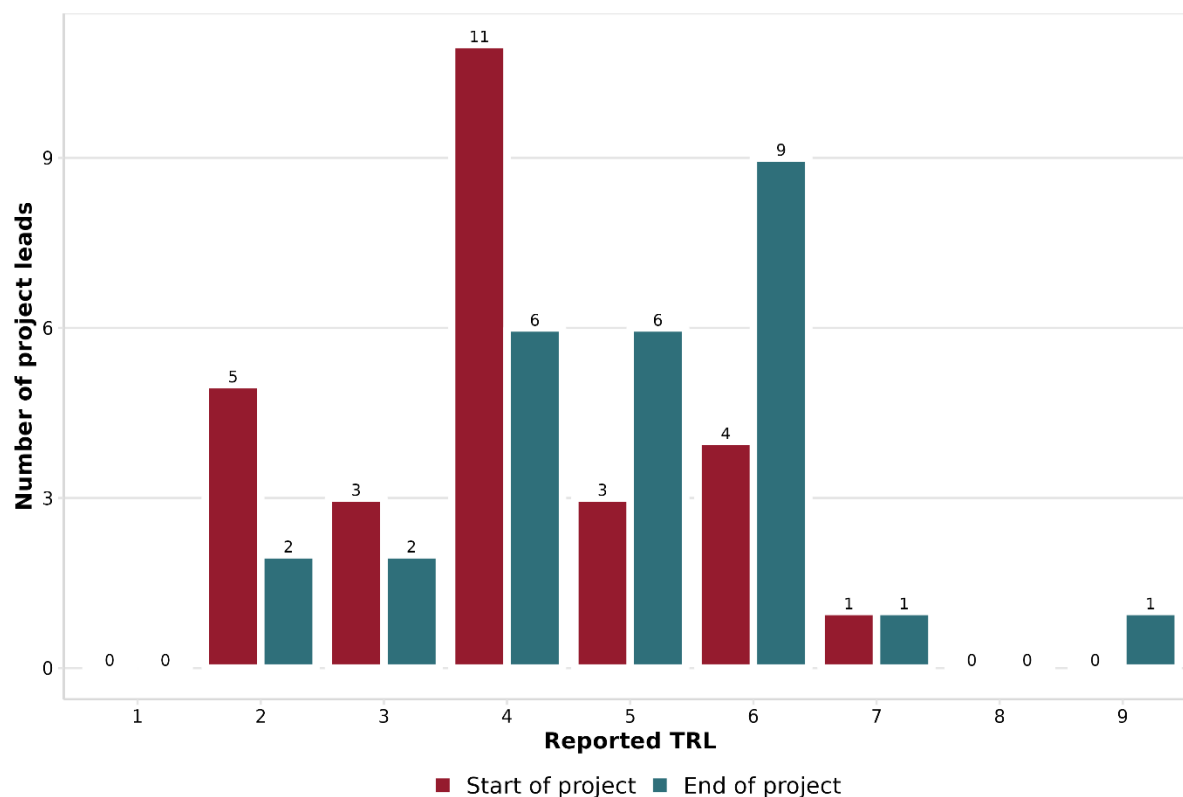
For CMDC4, the average TRL reported by project leads at baseline was 4, while the average TRL at the end of project was 5. As shown in Figure 20, project leads most frequently reported TRL 4 at the start of their project (11). By the end of the project, TRL 6 was the most frequently reported (9).

²⁴ This project did not report start and end TRL in monitoring data.

Figure 19 CMDC4 – Changes in TRL

Source: Frontier analysis of baseline and end-of-project monitoring data

Note: Compared answers to the question 'Start of project TRL of primary innovation associated with the project' asked at the start of projects to the question 'In relation to this Innovate support, what is the Technology Readiness Level (TRL) of the product or service to date?' asked at the end of projects.

Figure 20 CMDC4 – Start and end TRL

Source: Frontier analysis of baseline and end-of-project monitoring data

Note: $n = 33$, of which 6 did not answer TRL. Compared answers to the question 'Start of project TRL of primary innovation associated with the project' asked at the start of projects to the question 'In relation to this Innovate support, what is the Technology Readiness Level (TRL) of the product or service to date?' asked at the end of projects.

The sample size is too small to draw conclusions about differences in TRL development across CMDC4 strands, and across CMDC3 and CMDC4 technologies and fuels

It is helpful to understand how TRL development differs across project types (namely the scheme strand that a project sits in, technologies and fuels). However, for each of these breakdowns, the sample size is small, limiting the strength of any conclusions.

The breakdown by CMDC4 strand is presented in Table 20. CMDC4 includes 3 strands projects that focus on either vessel or infrastructure (strand 1), both vessel and infrastructure (strand 2), and feasibility studies and pre-deployment trials (strand 3). As the sample size is only large enough (at least 10 projects) for strand 3, no conclusions can be drawn across strands.

Table 20 CMDC4 – Changes in TRL by strand

Strand	Potential sample size	Actual sample size	Average TRL increase	TRL progression (n projects)	No change in TRL (n projects)	TRL regression (n projects)
Strand 1	6	5	1.6	3	2	0
Strand 2	4	1	0	0	1	0
Strand 3	23	21	0.8	11	9	1

Source: Frontier analysis of baseline and end-of-project monitoring data

Note: Compared answers to the question 'Start of project TRL of primary innovation associated with the project' asked at the start of projects to the question 'In relation to this Innovate support, what is the Technology Readiness Level (TRL) of the product or service to date?' asked at the end of projects.

Analysis of application and fuel type combined CMDC3 and CMDC4. Table 21 presents analysis by the application of projects' technology and Table 22 by fuel used. Comparison can only be made between infrastructure and vessel projects (Table 21) which had similar proportions of projects progressing TRL and similar levels of average TRL development. No comparison can be made for fuel type.

Table 21 CMDC3 and CMDC4 – Average TRL progression by application type

Application	Potential sample size	Actual sample size	Average TRL increase	TRL progression (n projects)	No change in TRL (n projects)	TRL regression (n projects)
Infrastructure	11	10	1.10	6	4	0
Vessel	25	17	1.12	10	6	1
Infrastructure and vessel	14	3	0.67	1	2	0

Source: Frontier analysis of baseline and end-of-project monitoring data

Note: n = 51 (18 CMDC3 and 33 CMDC4). One CMDC4 project had no information on application type. Compared answers to the question 'Start of project TRL of primary innovation associated with the project' asked at the start of projects to the question 'In relation to this Innovate support, what is the Technology Readiness Level (TRL) of the product or service to date?' asked at the end of projects.

Table 22 CMDC3 and CMDC4 – Average TRL progression by energy source

Energy	Potential sample size	Actual sample size	Average TRL progression	TRL progression (n projects)	No change in TRL (n projects)	TRL regression (n projects)
Ammonia	3	3	1.33	3	0	0

E-diesel & bio-diesel	1	1	1	1	0	0
Electric	10	4	1.25	2	2	0
Hydrogen	5	3	0	0	3	0
Methanol	3	2	0	0	2	0
Multiple	9	5	0.8	3	2	0
Shore power	3	2	1	1	1	0
Not specified	9	6	1	4	1	1
Wind power	7	4	2.5	3	1	0

Source: Frontier analysis of baseline and end-of-project monitoring data

Note: $n = 51$ (18 CMDC3 and 33 CMDC4). One project provided no information on energy source. Compared answers to the question 'Start of project TRL of primary innovation associated with the project' asked at the start of projects to the question 'In relation to this Innovate support, what is the Technology Readiness Level (TRL) of the product or service to date?' asked at the end of projects.

What role did CMDC play in facilitating parties to come together to advance the development of clean maritime technologies?

Most responding organisations reported new collaborations facilitated by CMDC

As part of the end-of-project monitoring data, organisations were asked about collaborations generated as a result of UK SHORE.²⁵ Eighty-six percent of responding CMDC3 organisations (30 out of 35) reported at least one new collaboration, with 25 reporting 2 or more new collaborations. Of the CMDC4 responding organisations, 74% (85 out of 114) reported at least one new collaboration, the majority of which (48) reported 2 to 5 new collaborations.

Evidence suggests projects place high value on networks fostered by UK SHORE

In the interview, the CMDC3 organisation remarked that the key enablers were networking communities. Around 120 suppliers, 8 partners and 40 to 50 subcontractors had contributed to their project. Over the course of the project, the team had also grown from 5 to 6 organisations to 21 to 22.²⁶

In the end-of-project reports, 2 CMDC4 projects noted the importance of UK SHORE in enabling collaboration, which was a key condition for success.

"The project would not have been successful without grant funding, enabling cross-sector collaboration, which is essential to the development of [technology]." – CMDC4 end-of-project report

²⁵ 'As a result of this Innovate UK support, how many new collaborations have you made with external organisations to date?' Numeric answer.

²⁶ Ranges used by the project in the interview (they were unable to provide exact numbers).

“This is a three-way collaboration which only exists because of the opportunity created by the CMDC funding and is a venture which may lead to significant commercial opportunities for all three parties.” – CMDC4 end-of-project report

On the other hand, the CMDC4 organisation interviewed indicated that it would have liked more opportunities to network and learn from other CMDC projects. It reported that organic networking and knowledge sharing occurs less in the maritime industry than in the automotive industry, partly due to the fragmented nature of the maritime industry. The feedback demonstrates the importance for UK SHORE to encourage networking in an industry where networks are difficult to form organically and aligns with evidence in the process evaluation (see Section 3.6.6).

What factors or investments played a role in enhancing the influence of UK SHORE in meeting its aims for accelerating UK clean maritime?

CMDC3 and CMDC4 projects listed a range of barriers for future success in end-of-project reports

In the end-of-project reports, projects listed barriers to commercial adoption of their technology. Thirteen end-of-project reports were reviewed systematically to understand these barriers. These barriers may not be representative of all CMDC3 and CMDC4 projects.

Of the sampled projects, the main barriers were:

- technical barriers to their technology which may be overcome by future research (all 13 projects)
- regulation, including uncertainty about how regulation will develop and the fact that current frameworks limit the development of their technology (11 projects)
- the high costs of clean maritime technology and the lack of economic incentive for companies to uptake these technologies (11 projects)
- a lack of infrastructure such as hydrogen bunkering infrastructure or the build out of the grid (7 projects)
- a lack of understanding and perceived fears about the technology (7 projects).

Other barriers included supply chain issues (4 projects) and difficulty gaining private investment (3 projects).

4.2 Environmental benefits

This section presents findings on EQ2: To what extent, and through what mechanisms, can environmental benefits be attributed to UK SHORE? The relevant data and data sources for each sub-question under EQ2 are reported in Table 23.

Table 23 EQ2 data sources

Sub-question	Data	Data source
To what extent has CMDC facilitated GHG [greenhouse gas] emissions and air pollutants to be reduced from UK maritime?	Scope and scale of carbon savings expected	Monitoring data, survey data
	Potential emissions savings identified	End-of-project reports, case studies
What factors enabled or hindered the ability for CMDC to contribute towards changes in GHG emissions or air pollutants from UK maritime?	Scope of projects	Interviews
Did changes in GHG emissions facilitated by CMDC vary by sub-sector or technology type?	Potential emissions savings identified	End-of-project reports, case studies

Source: *Frontier Economics*

4.2.1 Evaluation evidence

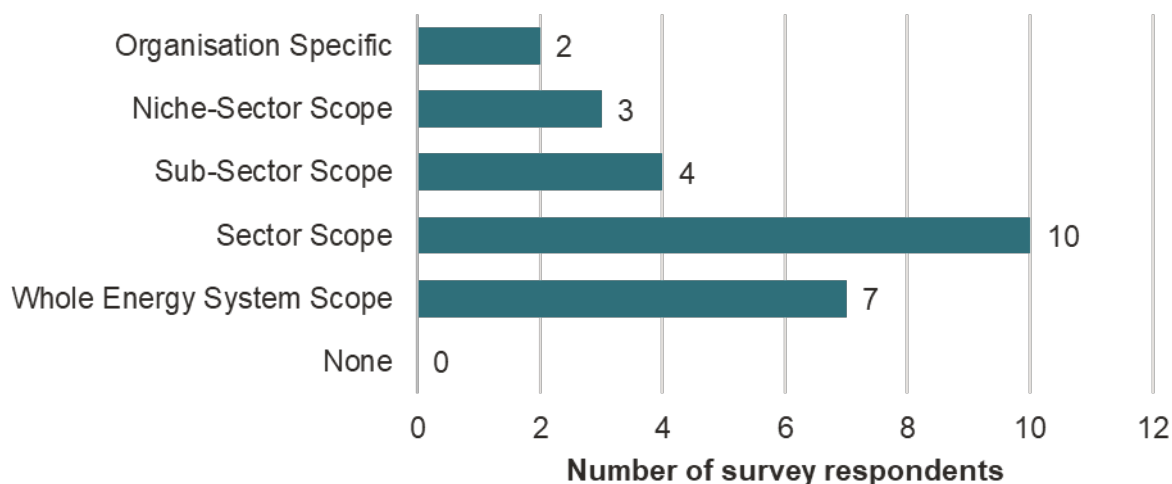
To what extent has CMDC facilitated GHG emissions and air pollutants to be reduced from UK maritime?

This section focuses on GHG emissions measured in CO₂e as evidence is not available to assess the impact on air pollutants.

Most survey respondents expected their environmental impact to be sector wide or beyond once fully scaled, although there may be a degree of optimism bias

As shown in Figure 21, the majority of CMDC3 and CMDC4 survey respondents (17 out of 27) expected the scope of their environmental benefits to be sector wide and beyond. Four survey respondents expected sub-sector benefits, 3 expected niche sector benefits and 2 expected organisation-specific benefits.

Figure 21 CMDC3 and CMDC4 project expectations of scope of environmental benefit



Source: 2025 survey (CMDC3 and CMDC4 organisations only)

Note: $n = 27$. 'Based on your current expectations, what do you think is going to be the scope of environmental benefit – in terms of Net Zero: reducing carbon and other GHG emissions – of your project?' Options as shown.

In the baseline monitoring data, CMDC3 project leads also reported the expected scope and scale of their environmental benefits:²⁷

- Of the 15 CMDC3 project leads that reported expected scope, the most common response was 'sector/regional scope' (7), followed by 'sub-sector/sub-regional scope' (5). Two project leads said 'whole energy system scope' and one said 'niche-sector/district scope'.
- Of the 17 CMDC3 project leads that reported expected scale, 8 said 'paradigm shift/gamechanger' and 9 said considerable effect.

The results suggest a degree of optimism bias because it seems unlikely that such a large proportion of projects will have impact on the whole energy system (especially when considering market overlap between projects). Nonetheless, the results suggest high expected potential environmental benefits from CMDC3 and CMDC4 projects with responses.

²⁷ CMDC3 baseline monitoring data asked 'estimated scope of environmental benefit at the start of the project in terms of Net Zero once fully scaled' (options included 'Sub-sector/sub-regional scope', 'Sector/regional scope', 'Whole energy system scope', and 'Niche-sector/district scope'); and 'estimated scale of this environmental benefit at the end of the project' (options included 'Some effect', 'Considerable effect', and 'Paradigm shift/gamechanger'). CMDC4 baseline monitoring data did not ask these questions.

There is one example of large-scale emissions savings to date

In the end-of-project reports, projects set out the annual unscaled and scaled emissions savings *potential* of their projects (defined in Section 1.2.2). Future potential emissions are reported because most CMDC3 and CMDC4 projects are not yet deployed in the market.

However, one CMDC4 project had already achieved significant estimated annual emissions savings of 43,362tCO₂e. This had been achieved by decarbonising an entire shipyard, changing the energy source from diesel to shore power.

No other projects that had achieved emission savings were identified to date, in line with expectations of CMDC3 and CMDC4 projects.

Reporting of emissions savings remains too varied to draw conclusions on aggregate emissions savings

Consistency in reporting has improved since CMDC1 and CMDC2, where issues such as reporting of emissions savings only in percentages or with numerical savings without any units were identified (more details can be found in Section 6.2 of the interim report).

However, the figures remain too unstandardised for aggregate analysis because:

- Projects did not always present emissions savings in the standard unit (e.g. reporting in percentages).
- Even when reported in the same unit, there was variation in methodology:
 - Some projects conducted life cycle assessment, while others only accounted for either operational or upstream emissions.
 - The 'unit' used for the unscaled emissions varied across projects. For example, projects that develop engines may have reported emissions savings per engine or per vessel that uses the engine.
 - Differing assumptions were made about counterfactuals (such as the particular size, fuel use and model of the baseline vessel) and for usage per year (for example 4 trips per day and 220 days per year vs. 2 trips per day and 300 days per year).
- Given the varying stages of end-of-project TRL, some projects based their estimates on evidence from trials while others were based on projections.
- For scaled emissions, the assumptions varied across projects. This includes percentage of market captured (ranging from a few vessels to 45% of market), the timescale of scaling and the definition of the market (UK vs. worldwide). While some of this will reflect the actual difference in potential scale-up across projects, it will also depend on a project's interpretation and own assumption.

Even if figures could be standardised, further issues would remain with aggregation. This includes the fact that multiple technologies are being developed to decarbonise the same vessel type or infrastructure. In some instances, projects are competing against each other for

the same market, including with technologies being developed outside of the UK SHORE portfolio which cannot be accounted for. In practice, this would result in lower overall emissions savings than the aggregated total.

No conclusions can be drawn from across the range of unscaled emissions

Of the 40 CMDC3 and CMDC4 projects that submitted end-of-project reports, 31 reported unscaled emissions savings in standard units. The results are presented here to provide an initial view of the possible range of emissions savings from CMDC3 and CMDC4 projects. Table 24 and Table 25 present the range of unscaled emissions savings, split by application and types of energy sources respectively. The reporting remains wide ranging, with no clear pattern across types of application and energy sources.

These figures typically refer to projected emissions savings per unit.

Table 24 **Unscaled emissions savings split by types of application**

Application	Range of unscaled emissions savings (tCO ₂ / year)	Number of projects
Multiple*	1,430-43,362**	2
Offshore	4,158-8,570	3
Large vessel	30-3,309	3
Unspecified vessel	30-6,830	8
Small vessel	7-643	6
Port	10-2,792	5
Green corridor	126	1
Harbour	11	1

Source: End-of-project reports

Note: 31 projects reported emissions savings in standard units, of which 2 did not have technology split information. *The 2 projects grouped under 'multiple' reported application to 'shipyard and large vessel' and 'port and large vessel'. **One project reported unscaled emissions savings of 43,362tCO₂ / year because it estimated per unit of shipyard, while most other projects estimated per unit of vessel or engine. The project changed the energy sources of a shipyard from diesel power to shore power and estimated its emissions savings from said change.

Table 25 **Unscaled emissions savings split by energy sources**

Energy	Range of unscaled emissions savings (tCO ₂ / year)	Number of projects
--------	---	--------------------

Unspecified	126-6,830	2
Wind power	7-3,637	5
Hybrid	1,068	1
Shore power	10-43,362	8
Electric	11-5,400	6
Alternative fuels	24-3,158	7

Source: End-of-project reports

Note: 31 projects reported emissions savings in standard units, of which 2 did not have technology split information. *The 2 projects grouped under 'unspecified' reported energy sources as 'energy efficiency' and 'ferries' without specifying the type of energy used.

Case study assessment of 4 end-of-project reports provides an indication of the potential range of emissions savings

ERM conducted an independent review of 4 end-of-project reports which reported positive emissions savings to test the assumptions and provide an independent assessment of carbon saving potential. Purposive sampling was used to select these case studies, which are not necessarily representative of other CMDC3 and CMDC4 projects (see Section 2.2.3).

Table 26 sets out an updated set of scaled and unscaled emissions from each case study based on ERM's review of assumptions. Across the case studies, unscaled emissions ranged between 337 and 2,813tCO₂e per unit deployed and scaled emissions ranged from 2,024 and 173,699tCO₂e. Emissions varied across technologies and applications.

Table 26 Emissions savings generated by case study projects

Case study	Technology type	Vessel application	Unscaled emissions (tCO ₂ e)	Scaled emissions (tCO ₂ e)
1	Combustion powertrain	Medium size ships (cargo vessels and others)	623	18,553
2	Efficiency improvement	Medium to large ships (bulk carrier)	2,032	173,699
3	Electric powertrain	Small 12-14m crew transfer vessels	337	2,024
4	Supporting infrastructure or offboard	Crew transfer and offshore wind support vessels	2,813	11,822

Source: Frontier Economics and ERM

Note: Unscaled emissions refer to 'an estimate for the emissions savings achieved by a single demonstrator project in comparison to the relevant counterfactual that exists in the maritime sector'. Scaled emissions are 'an estimate for the emissions savings that could be achieved by the potential deployment at scale of the technology in the wider maritime market'.

What factors enabled or hindered the ability of CMDC to contribute towards changes in GHG emissions or air pollutants from UK maritime?

In in-depth interviews, some unsuccessful CMDC applicants expressed concerns with the focus of CMDC in that it did not necessarily focus on technologies which could deliver emission savings. These comments, alongside other discussions about technology focus, are discussed further across Section 8.

4.3 Commercial opportunities

This section presents findings on EQ3: To what extent, and through what mechanisms, did UK SHORE improve the commercial prospects and opportunities for clean maritime in the UK? The relevant data and data sources for each sub-question under EQ3 are reported in Table 27.

Table 27 EQ3 data sources

Sub-question	Data	Data source
To what extent was additional private investment crowded in for developing clean maritime technologies?	Follow-on funding received	Monitoring data
How far have commercial benefits for UK businesses been realised or are expected to be realised in the future, for clean maritime technologies?	Changes in CRL or MRL	Monitoring data
	Financial benefits realised	Monitoring data
	Plans to take the projects further towards commercialisation	Survey data
	Expected future benefits	End-of-project reports, interviews

To what extent did CMDC facilitate intellectual property (IP) to be generated and retained in the UK for clean maritime technologies?

Number of organisations reporting IP rights

Monitoring data

Source: Frontier Economics

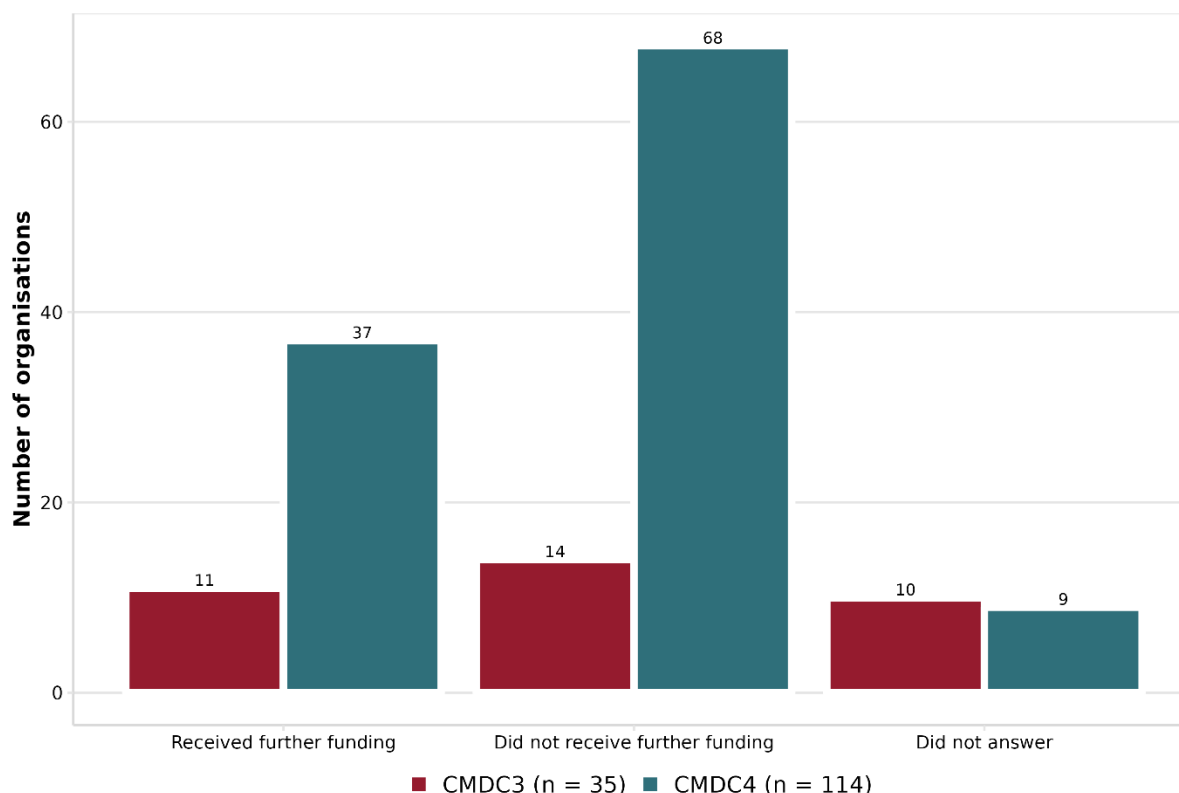
4.3.1 Evaluation evidence

To what extent was additional private investment crowded in for developing clean maritime technologies?

Around a third of reporting organisations raised additional funding during their project

On top of the matched funding that projects were required to generate, a significant minority of responding organisations to end-of-project monitoring data reported raising no follow-on private or public funding during the project.

Figure 22 Has your organisation been able to raise further funds, in addition to the match funding?



Source: Frontier analysis of end-of-project monitoring data

Note: Respondents who reported either public or private funding received. For private funding, the end-of-project monitoring data asked 'As a result of this Innovate UK support, estimate the total value of any follow-on private funding you have received to date? You should only include funding that would not have been received without this Innovate UK support'. For public funding, the question was 'As a result of this Innovate UK support, estimate the total value of any further public sector funding you have received to date'.

As shown in Figure 22, 11 CMD3 organisations across 9 projects received further funding (31% of responding organisations). Thirty-seven CMD4 organisations across 22 projects received further funding (32% of responding organisations).

Reporting CMD4 organisations were more likely to receive funding from private than public sources, while reporting CMD3 organisations were equally likely to receive funding from either

Of the 11 CMD3 organisations which reported receiving additional funding above, 8 reported receiving public funding, and 8 received private funding. For CMD4, 18 reported receiving public funding and 27 received private funding. The figures are not additive as some organisations (5 CMD3 and 8 CMD4) received both public and private funding.

Interviews provided specific examples of successful investment funding. For example, a CMD3 organisation reported significant private funding raised after UK SHORE participation.

"Following success in the UK market, they have raised additional private venture capital funding worth around \$2 million USD." – CMD3 organisation

The proportion of responding organisations that received further funding varied across regions

Table 28 shows the percentage of responding CMD3 and CMD4 organisations which received further funding for each region, out of all responding organisations in that region.

Considering regions with a sample size greater than 10, between 11% and 40% of CMD3 and CMD4 responding organisations received further funding:

- The likelihood of receiving funding was slightly higher in Scotland and London (40%) compared to the rest of the country.
- The likelihood of receiving funding in the South East did not differ from the average likelihood for CMD3 and CMD4.
- Organisations in the South West and North East were less likely to receive further funding (11% and 18%, respectively).

Table 28 Regional distribution of CMDC3 and CMDC4 organisations raising further funding during project delivery

Region	% of responding organisations that received further funding	Number of responding organisations in the region
South East	34% (13)	38
Scotland	40% (10)	25
London	40% (8)	20
South West	11% (2)	18
North East	18% (2)	11
North West	43% (3)	7
West Midlands	29% (2)	7
Northern Ireland	33% (2)	6
East Midlands	0% (0)	5
East of England	80% (4)	5
Wales	0% (0)	1
Yorkshire and The Humber	-	0
Not available	33% (2)	6

Source: Frontier analysis of end-of-project monitoring data

Note: *n* = 149 (35 CMDC3 and 114 CMDC4). No organisation in Yorkshire and The Humber answered. Six projects in CMDC3 and CMDC4 combined did not have region information. Table shows respondents who reported either public or private funding received. For private funding, the end-of-project monitoring data asked 'As a result of this Innovate UK support, estimate the total value of any follow-on private funding you have received to date. You should only include funding that would not have been received without this Innovate UK support'. For public funding, the question was 'As a result of this Innovate UK support, estimate the total value of any further public sector funding you have received to date'.

Across responding organisations, receipt of further funding did not differ materially by firm size

Table 29 shows the distribution of CMDC3 and CMDC4 responding organisations across firm size, and the percentage of organisations of each size that received further funding. Sample size is relatively small for large and medium organisations but can provide indicative conclusions.

Across firm sizes, the proportion of responding organisations that received further funding varied between 25% and 37%. Micro or small organisations (37%) were slightly more likely to have received further funding than other organisations (25-28%). However, this difference is not material.

Table 29 **Distribution of CMD3 and CMD4 organisations raising further funding during project delivery, across firm size**

	% of organisations that received further funding	Number of organisations
Large	28% (5)	18
Medium	25% (4)	16
Micro or small	37% (31)	82
No size data	24% (8)	33

Source: Frontier analysis of end-of-project monitoring data

A total of £20 million of further funding was secured by reporting CMD3 and CMD4 organisations

The total level of funding reported in monitoring data likely underestimates the total funding actually generated, given incomplete response rates.

CMD3 organisations reported generating £4 million of further funding in monitoring data, and CMD4 organisations reported generating £16 million. There is considerable variation in the amounts reported: for example, 6 out of 36 CMD4 organisations reported more than £1 million of further funding.

These figures can be contextualised by UK SHORE funding, match funding, and – for CMD3 only – funding raised by the organisation 12 months prior to the project (see Table 30). Direct comparison is not possible due to incomplete reporting.

Table 30 **Total levels of funding reported across CMD3 and CMD4 organisations**

Time frame	Type of funding	CMD3 (sample size)	CMD4 (sample size)	Source
Prior to project	Funding raised by organisation 12 months prior to project	£26 million (44)	NA	Baseline monitoring data
During project	UK SHORE funding	£43 million (72)	£33 million (133)	Project administrative data

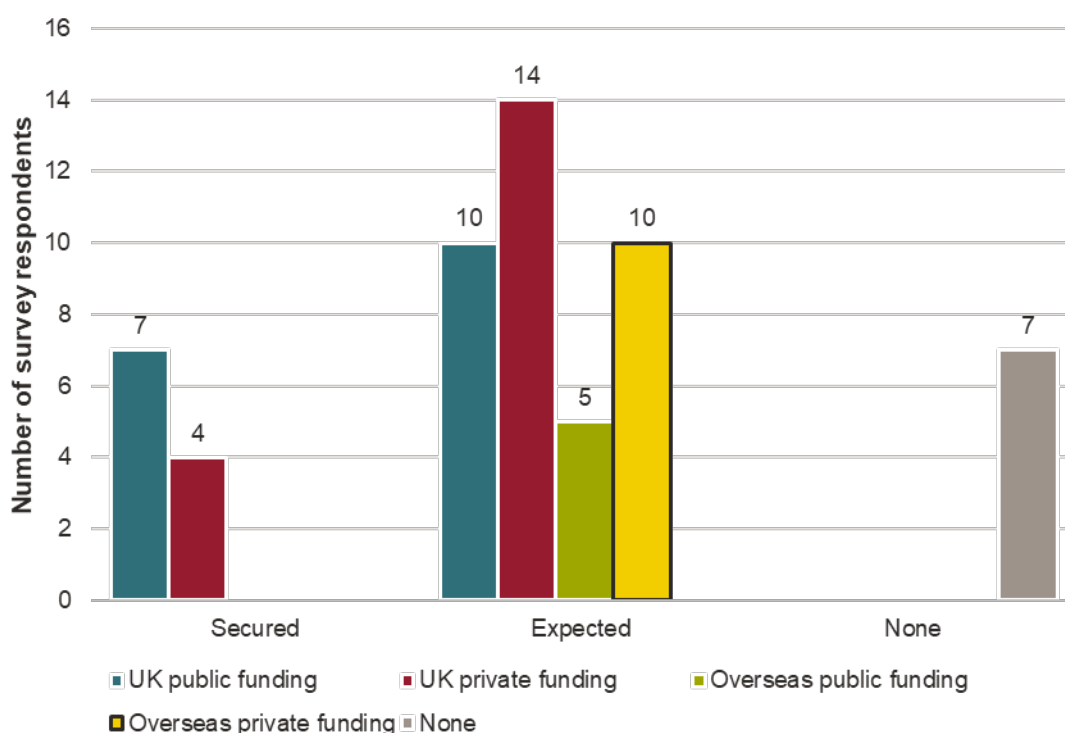
Match funding	£19 million (59)	£17 million (108)	Project administrative data
Further funding secured	£4 million (11)	£16 million (36)	End-of-project monitoring data

Source: As reported in table

Note: No information was collected from CMDC4 prior to project funding. CMDC3 n = 44. For UK SHORE funding, CMDC3 n = 72, CMDC4 n = 133. For match funding, CMDC3 n = 59, CMDC4 n = 108. For follow-on funding secured, CMDC3 n = 10, CMDC4 n = 36. Funding levels reported in the follow-on funding based on survey evidence below is not reliable and so are not included in this analysis

Survey evidence suggests that some respondents continued to secure additional funding after project completion

Figure 23 Number of survey respondents that secured or expected post-project funding in the next 2 years



Source: 2025 survey (CMDC3 and CMDC4 organisations only)

Note: n=27. Respondents were asked 'Have you secured, or do you expect to secure within the next two years, any follow-on funding to further develop the technology after the delivery phase of this project? Select all that apply for each column'. Therefore, columns do not sum to equal total 'expected' and 'secured'.

As shown in Figure 23, among the 27 CMDC3 and CMDC4 survey respondents:

- 9 had secured funding at the time of online survey (33%), 7 (26%) had received public sector funding and 4 (15%) had received private sector funding – all funding received was UK based

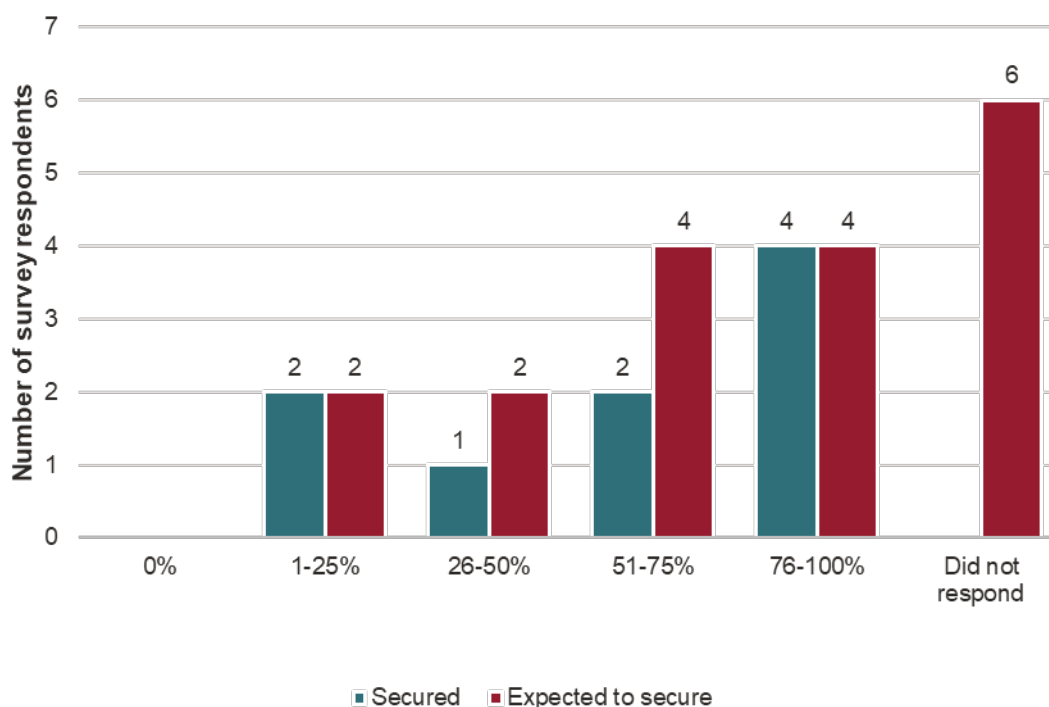
- 18 expected to generate further funding in the next 2 years (67%), 10 (27%) expected UK-based public funding, 5 (19%) expected overseas public funding, 14 (52%) expected UK-based private funding and 10 (37%) expected overseas private funding.
- 7 reported 'none secured' for all types of funding and did not expect to generate post-project funding (26%).

Most survey respondents attributed additional investment secured to participation in UK SHORE

Survey respondents who reported that they had secured or expected to secure follow-on funding typically attributed the funding to UK SHORE to some extent. As shown in Figure 24:

- of the 9 who had secured funding, 6 (67%) attributed more than 50% of funding secured to UK SHORE
- for those who expected to secure funding, 8 out of 12 (67%) attributed more than 50% to UK SHORE
- no survey respondent reported that the follow-on funding secured or expected was unrelated to UK SHORE participation.

Figure 24 Percentage of post-project funding secured or expected in the next 2 years attributable to UK SHORE participation



Source: 2025 survey (CMDC3 and CMDC4 organisations only)

Note: n=27. Respondents who reported expecting to secure or securing follow-on funding answered the question 'Of follow-on funding secured or expected within the next two years, what proportion do you think was received as a result of your participation in UK SHORE?'. Options as shown.

In the end-of-project reports, projects expressed that CMDC3 and CMDC4 participation had enabled technological development that had strengthened their investment cases and increased trust among private investors.

“Enabled by the CMDC3 Project, [we have secured] a strategic investor/co-development partner, who actively guide technology advancement and hold first rights of refusal on the first 1,000 marine engines.” – CMDC3 end-of-project report

“The project also significantly strengthened [our] investment case, demonstrating technical feasibility at pilot scale and expanding its technology pipeline from lab-stage systems to field-tested, modular infrastructure. This has helped build confidence among private investors and positioned the company for follow-on funding.” – CMDC4 end-of-project report

Some interviewees expressed continued difficulty in obtaining loans

In the interviews, organisations noted that because CMDC funding was not a sufficient guarantee to banks, it remained difficult to obtain loans. One organisation expressed scepticism over banks which offered high interest loans, which it believed targeted small start-ups like CMDC participants. As a solution, it suggested that Innovate UK or UK SHORE could offer loans instead.

“There are plenty of ... sharks out there who circle around and they see your name pop up on a successful Innovate scheme. But some of these companies, I wouldn't touch them with a barge pole because the strings that are attached are incredible.” – CMDC3 organisation

How far have commercial benefits for UK businesses been realised or are expected to be realised in the future, for clean maritime technologies?

The CMDC3 monitoring data collected information on commercial readiness level (CRL) while CMDC4 data collected information on market readiness level (MRL). These measures are similar but are not directly comparable (see Section 1.2.1) and so are reported separately.

As with TRL reporting and evaluation of CMDC1 and CMDC2 in the interim report, CRL and MRL are evaluated at the project level using information from project leads. The sample size for CMDC3 is too small to draw robust findings but is presented here for information.

All 4 reporting CMDC3 project leads saw CRL development, but this sample size is too small to draw conclusions across the scheme

All 4 responding CMDC3 project leads reported CRL progression. The level of increase ranged from 1 to 4 CRLs:

- 2 started at CRL 3, of which one reached CRL 5 and another reached CRL 7
- one started at CRL 5 and reached CRL 6

- one started at CRL 6 and reached CRL 9.

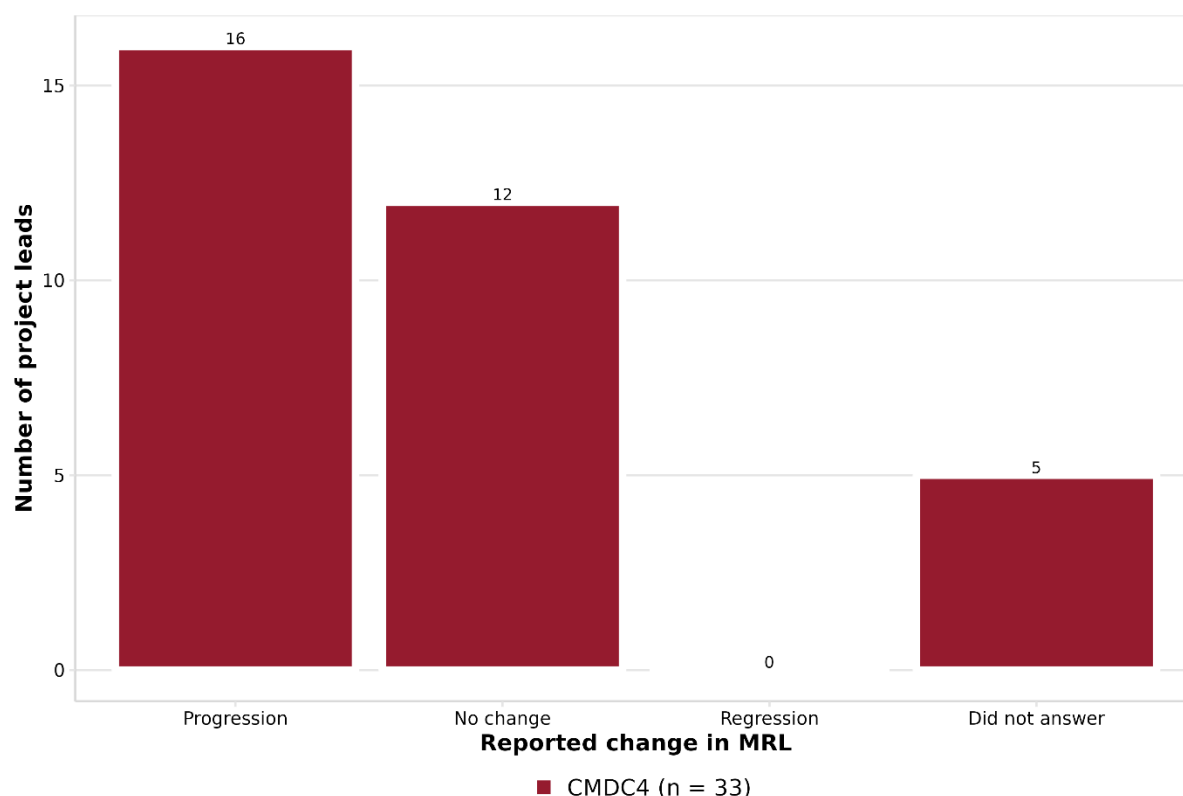
CRL development from these 4 project leads is in line with expectations in the baseline monitoring data, where 14 out of 15 responding project leads expected progression in CRL by the end of the project.

The majority of responding CMDC4 project leads saw MRL progression

Figure 25 below shows the number of CMDC4 project leads that reported MRL progression, no change and regression. Data is available for 28 of the 33 projects, so response rates are reasonably high.

Of the 28 project leads that responded to both baseline and end-of-project monitoring data, 16 reported MRL progression and 12 reported no change. No project lead reported MRL regression.

Figure 25 CMDC4 – Changes in MRL



Source: Frontier analysis of baseline and end-of-project monitoring data

Note: Compared answers to the question 'market readiness level related to this support' asked at the start and the end of project.

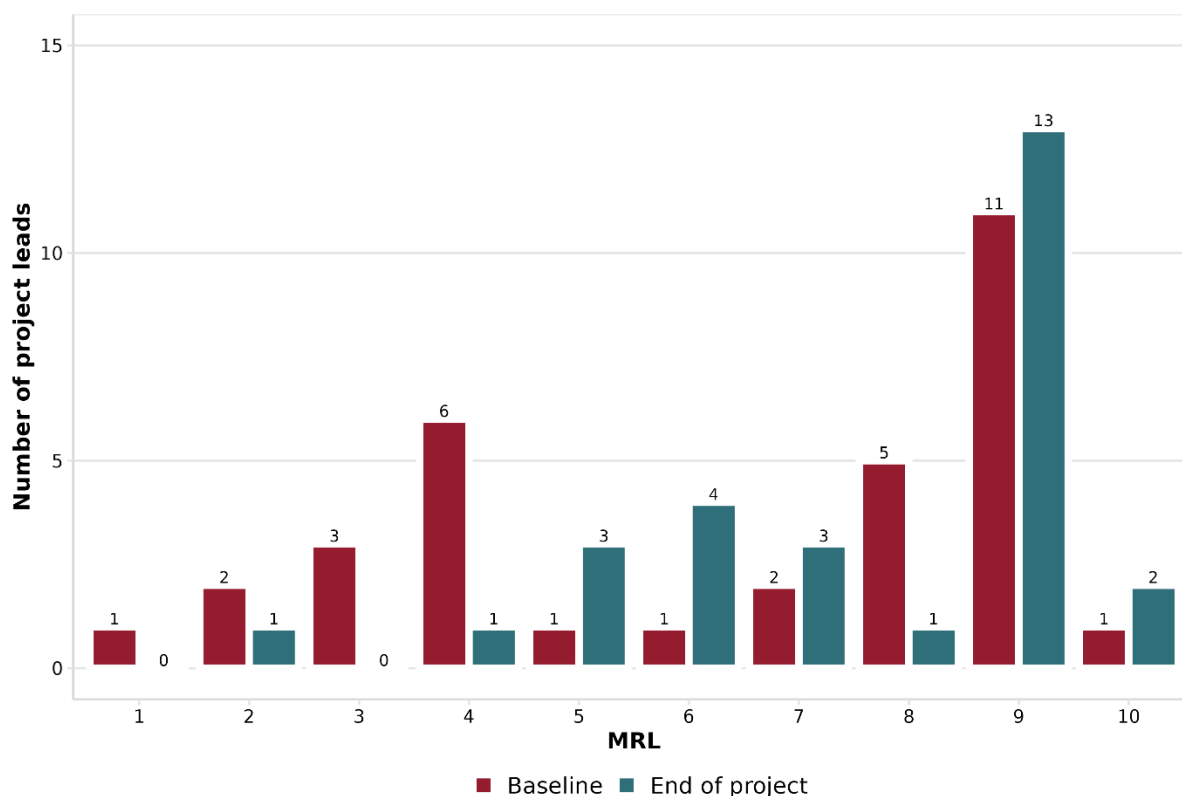
On average, reporting CMDC4 projects progressed by just over 1 MRL level

At baseline, the average MRL of reporting CMDC4 projects was 6.4. By the end of project, this had risen to 7.5, representing an average increase of 1.1 MRL.

Among projects that had progressed, average MRL progression was just over 2 levels (from 5.1 to 7.5). This indicates that projects that had progressed started from a lower average MRL (5.1) than the overall average (6.4), consistent with progression being easier to achieve from a lower starting point.

Figure 26 shows the distribution of projects across the MRL scale at baseline and end of project. There was a large fall in the number of projects below MRL 5 at the end of project (2) compared to baseline (14).

Figure 26 CMDC4 – Start and end MRL



Source: Frontier analysis of baseline and end-of-project monitoring data

Note: Five CMDC4 project leads did not answer end-of-project MRL. Compared answers to the question 'market readiness level related to this support' asked at the start and the end of project.

The sample size is too small to draw conclusions on differences across technology and fuel applications

The number of CMDC3 project leads who reported complete CRL information is too few to break down by types of technology.

For CMDC4, Table 31 and Table 32 present the split of MRL reported by project leads across application type (vessel, infrastructure, and both vessel and infrastructure) and by energy source (such as ammonia, hydrogen, electric). Again, at this level of granularity sample sizes are too low to make meaningful comparisons. This information is provided for context only.

Table 31 CMDC4 – Average MRL progression by application type

Energy	Potential sample size	Actual sample size	Average TRL progression	MRL progression (n projects)	No change in TRL (n projects)	MRL regression (n projects)
Infrastructure	9	9	1.44	5	4	0
Vessel	18	16	0.94	9	7	0
Infrastructure and vessel	5	2	4.50	1	1	0

Source: Frontier analysis of baseline and end-of-project monitoring data

Note: $n = 33$. One project lead had no application type information. Compared answers to the question 'market readiness level related to this support' asked at the start and the end of project.

Table 32 CMDC4 – Average MRL progression by energy source

Energy	Potential sample size	Actual sample size	Average TRL progression	MRL progression (n projects)	No change in TRL (n projects)	MRL regression (n projects)
Ammonia	2	2	2	2	0	0
E-diesel & bio-diesel	1	1	5	1	0	0
Electric	4	3	4	2	1	0
Hydrogen	3	3	0	0	3	0
Methanol	3	2	0.50	1	1	0
Multiple	5	4	0.75	2	2	0
Not specified	7	6	1.33	4	2	0
Shore power	3	2	0.5	1	1	0
Wind power	4	4	0.75	2	2	0

Source: Frontier analysis of baseline and end-of-project monitoring data

Note: $n = 33$. One project lead had no energy source information. Compared answers to the question 'market readiness level related to this support' asked at the start and the end of project.

There is evidence of cost saving, revenue generation and/or profit gain from reporting CMDC3 and CMDC4 organisations

In the end-of-project monitoring data, organisations were asked to report their cost savings, operating profit and turnover generated to date as a result of UK SHORE support.²⁸

Of the 25 CMDC3 organisations across 12 projects that provided at least one of the statistics ((see Table 33):

- the majority (60%) reported cost reduction, 28% reported gains in profit and 40% reported positive turnover due to UK SHORE
- the median financial benefits range from £0.05 million to £0.23 million
- 10 reported zero cost saving, 18 reported zero profit gain and 15 reported zero turnover attributable to UK SHORE
- no organisation reported a loss in any of the 3 financial indicators.

Table 33 Financial benefits across organisations

	Number of organisations reporting financial benefit	Total benefit across reporting organisations (£m)	Median benefit per organisation experiencing benefit (£m)
Cost reduction	15	3.05	0.08
Profit gain	7	1.20	0.05
Turnover	10	6.82	0.23

Source: Frontier analysis of baseline and end-of-project monitoring data

Note: *n* = 25. 'As a result of this Innovate UK support, what is the value of any cost savings achieved by your business to date?', 'As a result of this Innovate UK support, estimate how much operating profit your business generated to date,,' 'As a result of this Innovate UK support, estimate how much turnover your business has generated to date.'

Of the 85 CMDC4 organisations across 30 projects that provided at least one of the statistics (Table 33):

- a smaller proportion than that of CMDC3 reported financial benefit – 15% reported cost saving, 12% reported profit gain and 34% reported turnover due to UK SHORE
- the median financial benefits range from £0.02 million to £0.09 million

²⁸ 'As a result of this Innovate UK support, what is the value of any cost savings achieved by your business to date'; 'As a result of this Innovate UK support, estimate how much operating profit your business generated to date'; 'As a result of this Innovate UK support, estimate how much turnover your business has generated to date?' Numeric answers. Innovate UK added: 'This question is not required for public sector organisations, academic institutes or individuals. Please select 'Not Applicable'. Nonetheless, some of these organisations provided a response to this question, while some private sector organisations did not. Ten CMDC3 and 29 CMDC4 organisations did not respond or selected 'Not Applicable'.

- 69 reported zero cost saving, 65 reported zero profit gain and 52 reported zero turnover attributable to UK SHORE
- 7 (8%) organisations reported a profit loss due to UK SHORE participation, totalling £1.05 million (or a median of £0.07 million). Five out of these were part of Strand 3, or feasibility studies/pre-deployment trials. This may indicate that these types of projects face higher financial risk than demonstration projects (Strands 1 and 2). It should be noted that profit gains would be expected to be a longer-term outcome. Innovation is inherently risky and so it is not necessarily a concern that organisations involved in innovation report that this reduced profit over the short term.

It is unclear whether, compared to CMDC3, the lower proportion of CMDC4 organisations which reported financial benefits reflects a genuinely lower financial impact of UK SHORE at the time of data collection or differences in how organisations assessed which financial outcomes are attributable to UK SHORE.

Table 34 Financial benefits for CMDC4 responding projects

	Number of organisations reporting financial benefit	Total benefit across reporting organisations (£m)	Median benefit per organisation (£m)
Cost reduction	13	1.27	0.05
Profit gain	10	0.44	0.02
Turnover	29	16.92	0.09

Source: Frontier analysis of baseline and end-of-project monitoring data

Note: n = 85. See previous table for question.

The survey gathered the following additional evidence on financial gains in the last 2 years resulting from UK SHORE participation:²⁹

- 5 out of 27 (19%) CMDC3 and CMDC4 survey respondents generated revenue from the technology related to their UK SHORE project
- 20 (74%) survey respondents had yet to generate revenue and 2 (7%) survey respondents reported 'Don't know'.
- the 5 respondents reported a total of £0.53 million revenue – this should not be considered additional to the revenue generation included above.

²⁹ 'Over the past two years, have you generated any revenue as a result of the technology developed during your project?'
Options included 'Yes', 'No', 'Don't know'.

End-of-project reports also provided examples of financial gain as a result of UK SHORE. For instance, one CMD4 project reported that one consortium organisation had “won a piece of work worth £130k as a direct result of this project”.

Some responding organisations had secured commercial contracts by the end of the project

In the end-of-project monitoring data:³⁰

- 80 total commercial contracts were reported by 16 organisations across 9 CMD3 projects, representing 46% of responding organisations
- 67 total commercial contracts were reported by 22 organisations across 17 CMD4 projects, representing 19% of responding organisations.
- the highest number of commercial contracts obtained by one organisation was 20.

The survey provides supporting evidence. Across the 27 CMD3 and CMD4 survey respondents:³¹

- 13 (48%) expected to generate revenue as a result of the technology developed during their projects – of these, 2 had signed contracts and 11 had identified customers but not yet signed contracts
- 11 (41%) felt it was too early to say whether they would generate revenue over the next 2 years, and one said ‘Not sure’
- 2 (7%) did not expect to generate any revenue
- among those who expected revenue generation, 11 survey respondents estimated a total expected value of £32.85 million in the next 2 years.³²

Many survey respondents expected to continue moving towards commercialisation

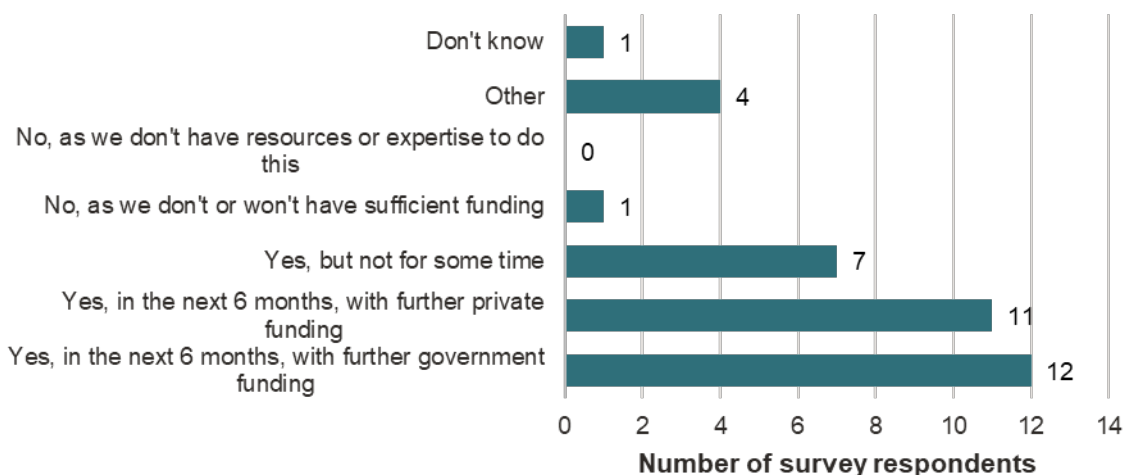
In the survey, respondents were asked about their plans to progress their technology towards commercialisation after project completion (Figure 27). The most frequently selected answers were ‘yes, in the next 6 months, with further private funding’ (11 respondents, 41%) and ‘yes, in the next 6 months, with further government funding’ (12 respondents, 44%).

³⁰ ‘As a result of this Innovate UK support, how many commercial contracts have you entered into?’ Numeric answer.

³¹ ‘Over the next two years, do you expect to generate any revenue as a result of the technology developed during your project?’. Options included ‘Yes – contract signed’, ‘Yes – customer identified but contracts not signed’, ‘No’, ‘Too early to say’, ‘Not sure’. Responses from the 2025 survey (CMD3 and CMD4 organisations only).

³² ‘Please state the expected value of revenue generated as a result of your project over the next 2 years.’ Numeric answer.

Figure 27 Number of survey respondents that expected to further progress technology towards commercialisation post project completion



Source: 2025 survey (CMDC3 and CMDC4 organisations only)

Note: n=27. 'At this stage, do you expect to take your technology further towards commercialisation at the end of the project? Please select all that apply'. Options as shown.

Projects believed UK SHORE participation paved the way for future commercial benefits

In the end-of-project reports, many projects reported that they had not yet generated revenues but were optimistic about future revenue gains. For instance, one CMDC3 project expected a realistic potential customer group of 7 port groups and work/rescue boat operators, which could be fully obtained by 2032. At the time of reporting, the project had already gained 2 customers, with discussions underway with 3 additional customers. A CMDC4 project noted in its report that connections built through participation in UK SHORE had also paved the way for future commercial opportunities.

"The relationships developed as part of this project have also opened discussions about future projects and consultancy work. Further, the knowledge gained and relationships developed have placed [us] in a good position to act in a consultancy role for stakeholders interested in offshore charging." – **CMDC4 end-of-project report**

Interviews with organisations echoed the sentiments. The CMDC4 organisation noted that it would take a couple of years to begin generating profit, as its technology would need to be developed further before launching for sale. However, it expected significant profit in the long run.

"It's going to be a couple of years down the line before we will start to see a profit on this, because we will have got to the stage of developing our product and then start to sell it at that point, if all goes well. We potentially see this as a long term significant profit, with tremendous export opportunities." – **CMDC4 organisation**

The interviewee elaborated that, through participation in UK SHORE, they were able to identify potential customers and get to a product with several routes to market and long-term viability, all of which “wouldn’t have happened without this project”.

Similarly, in the interview, the CMD3 organisation expressed that it had been able to build a product which consumers were interested in and were willing to utilise in the future. It had received a high level of commercial interest and use. Two hundred people had visited its operation site. It had also begun to sign small contracts for the future. It noted that intense competition from US firms was a potential barrier :

“Certainly on our side, massive, massive opportunity, and we’re talking a multi-billion dollar opportunity. One of the challenges is the UK is very slow moving and we’re seeing a lot of US competitors starting to enter the UK market for the first time. So we’ve got to move pretty damn quickly [...]. So I think it’ll be a 50/50 approach, but there is a very real commercial interest in this sector. There’ll be winners and there’ll be others that are less successful.” – CMD3 organisation

Some projects identified potential industry-wide and supply chain benefits

In the end-of-project reports, some projects noted the potential industry-wide cost saving if their technologies were to be adopted at scale.

“...a 30% reduction in pilot boat fuel costs equates to £626,000 annually across four boats. Scaling this to the identified applicable customers (SOM) could yield £8.5 million in annual fuel cost savings across the UK.” – CMD3 end-of-project report

“Substantial operational cost savings (OPEX) will be achieved for shipping operators through fuel efficiency gains.” – CMD4 end-of-project report

Of the end-of-project reports reviewed, at least 5 mentioned wider supply chain benefits for the UK. For instance, a CMD3 project reported that adoption at scale would support the maritime supply chain.

“Supply chain activities will be distributed across the UK, including advanced ceramics, injection systems, and power electronics. Overall, the commercialisation of our technology would support a pan-UK high value maritime supply chain.” – CMD3 end-of-project report

To what extent did CMDC facilitate Intellectual Property (IP) to be generated and retained in the UK for clean maritime technologies?

A few organisations had submitted and/or obtained IP protections and published papers

The end-of-project monitoring data asked about IP protection (including patents, designs, trademarks and copyrights) submitted or granted as a result of funding:³³

- 6 CMDC3 organisations across 6 projects reported that they had submitted or been granted IP protection, representing 17% of responding organisations
- 10 CMDC4 organisations across 9 projects reported that they had submitted or been granted IP protection, representing 9% of responding organisations
- a total of 23 IP protections were reported by 12 CMDC3 and CMDC4 organisations.³⁴

The monitoring data also asked about papers (including academic papers, industry reports, white papers, trade papers and conference papers) published as a result of UK SHORE support:³⁵

- 65 papers had been published by 16 CMDC3 organisations across 10 projects, representing 46% of responding organisations
- 90 papers had been published by 39 CMDC4 organisations across 21 projects, representing 34% of responding organisations.

Evidence from end-of-project reports also suggests that projects were working towards IP creation, even if not yet generated.

“An IP review was conducted toward the end of the project, and this will be explored further with a view to licensing and patent opportunities.” – CMDC3 end-of-project report

“The project has helped clarify the details of several pieces of technology which have potential for intellectual property to be generated.” – CMDC4 end-of-project report

4.4 Spillover benefits

EQ4 asks: To what extent is there evidence that CMDC has generated positive spillover benefits? There is limited evidence available to assess this EQ as it is not directly assessed

³³ ‘As a result of this Innovate UK support, have you or your organisation submitted or been granted any patents, designs, trademarks or copyrights to date?’ (Options included ‘Yes’, ‘No’) and ‘As a result of this Innovate UK support, how many patents, designs, trademarks or copyrights have you or your organisation been granted to date?’ (Numeric answers).

³⁴ The 12 organisations that reported number of IP protections came from 11 projects, so there may be a degree of double counting if 2 organisations within the same project submitted for the same IP.

³⁵ ‘As a result of this Innovate UK support, how many academic papers, industry reports, white papers, trade papers or conference papers have you or your organisation published to date?’ Numeric answers.

in quantitative monitoring data. However, survey data, end-of-project reports and interviews point to some examples.

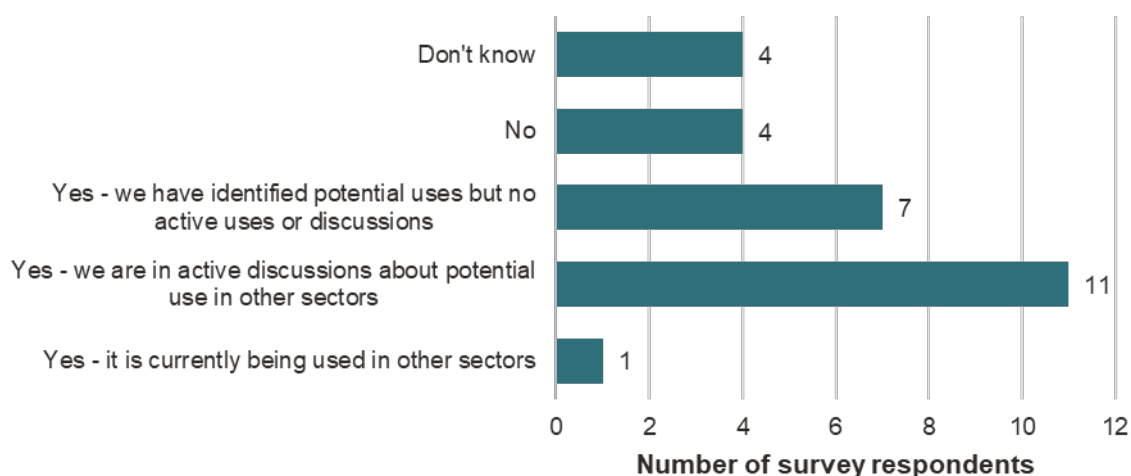
4.4.1 Evaluation evidence

What evidence is there for benefits to other maritime supply chain companies and companies outside of maritime who can use the technologies?

The majority of survey respondents had identified potential uses of their technologies outside of maritime

As shown in Figure 28, 70% (19 out of 27) of CMDC3 and CMDC4 survey respondents believed that the outputs or findings from their projects could be used in other sectors. Of these, 11 (41%) were in active discussions about potential uses and one already saw their technology being applied to other sectors.

Figure 28 Survey respondents who suggested that outputs or findings from the project could be used in other sectors



Source: 2025 survey (CMDC3 and CMDC4 organisations only)

Note: $n=27$. Respondents were asked the question 'Based on your current expectations, could the outputs or findings from your project be used in other sectors?'. Options as shown.

Specific CMDC end-of-project reports provide examples of spillovers into, and out of, maritime

The CMDC4 organisation interviewed mainly worked in the automotive sector, illustrating how technologies from other sectors are being drawn into maritime as a result of UK SHORE.

The CMDC3 organisation said that its technology was applicable in many sectors. It also felt that the learnings and upskilling developed due to its UK SHORE project would help with the development of technology elsewhere.

“A lot of our hydrogen learnings have got broad applicability outside of maritime [...] lots of the regulatory learnings are broad, not just in the maritime sector but beyond. I would say that the upskilling of the team is broader than that” – CMDC3 organisation

Of the 13 end-of-project reports reviewed, one project showed realised spillovers to other sectors.

“The project ... has enabled [organisation] to secure additional R&D funding (~£36k) applying some of the learnings developed within [project] to a new sector, specifically offshore renewables.” – CMDC4 end-of-project reports

4.5 Wider social benefits

This section presents findings on EQ5: To what extent has UK SHORE achieved wider social objectives? The relevant data and data sources for each sub-question under EQ5 are reported in Table 35.

Table 35 EQ5 data sources

Sub-question	Data	Data source
To what extent has UK SHORE contributed to sustaining or creating jobs in the UK in the clean maritime or related sectors?	Number of jobs created and retained	Monitoring data; stakeholder interviews
	Expectations of jobs created and retained	Monitoring data; end-of-project reports; survey data
	Impact on jobs in the broader sector	Survey data; stakeholder interviews
To what extent has UK SHORE contributed towards levelling up of coastal areas?	Number of projects in coastal areas	Survey data
	Regional split of UK SHORE funding	Monitoring data; survey data
	Other social benefits	Stakeholder interviews

Source: Frontier Economics

4.5.1 Evaluation evidence

To what extent has CMDC contributed to sustaining or creating jobs in the UK in the clean maritime or related sectors?

Reported job totals are likely to be underestimates due to non-response. Only 25 out of 93 CMDC3 and 88 out of 143 CMDC4 organisations responded to questions on job creation.³⁶

In addition, the figures suffer from potential double counting and inconsistencies. First, some organisations participated in multiple projects and may have attributed the same changes in full-time equivalent (FTE) employment to more than one project. Second, organisations were asked to report FTEs before their projects, FTEs after their projects and changes in FTEs separately. These figures do not always align.

For most organisations, the results were taken at face value and not adjusted. An adjustment was made for one organisation involved in both a CMDC3 and a CMDC4 project, as it had a large impact on results.³⁷ Consequently, a ‘main’ and a ‘conservative’ scenario are presented in the job totals.

Just over half of reporting CMDC3 and CMDC4 organisations created jobs as a result of UK SHORE participation

Figure 29 and Figure 30 show the distribution of realised and expected number of additional jobs at the end of project, based on end-of-project monitoring data. Job creation to date is reported in red in the chart (expected job creation is discussed further below).

Of the 25 CMDC3 organisations that provided a response (excluding ‘Not Applicable’):

- 44% (11) reported an increase in FTEs
- 48% (12) reported no change, showing that almost half of CMDC3 responding organisations had not created jobs due to the scheme
- among the 11 that reported creating jobs, median job creation was 3 – most (8) had created between one and 4 jobs

³⁶ Some of this non-response is because the questions on jobs started ‘This question is not required for public sector organisations, academic institutes or individuals. Please select “Not Applicable”’. Some of these organisations did respond to this question (and some private organisations did not). Ten CMDC3 and 26 CMDC4 organisations that responded to monitoring data did not answer this question or selected ‘Not Applicable’.

³⁷ One organisation which participated in both CMDC3 and CMDC4 reported 870 jobs created for both schemes. However, the organisation reported its total number of FTE employees to be 790 before the start of the project and 870 by the end of the project. This means that the organisation may have misunderstood the question prompt and overestimated the number of jobs created due to UK SHORE participation. While it is possible that the organisation may have shut down without UK SHORE, this is considered unlikely. As this is a large figure which substantially affects the comparison to job creation, a plausible adjustment has been made. In the main scenario, additional jobs for the organisation are set equal to the difference between jobs at the start and at the end of the schemes (80 jobs) and are split equally between CMDC3 and CMDC4 each (40 jobs). In the conservative scenario, additional jobs for this organisation are set to 0.

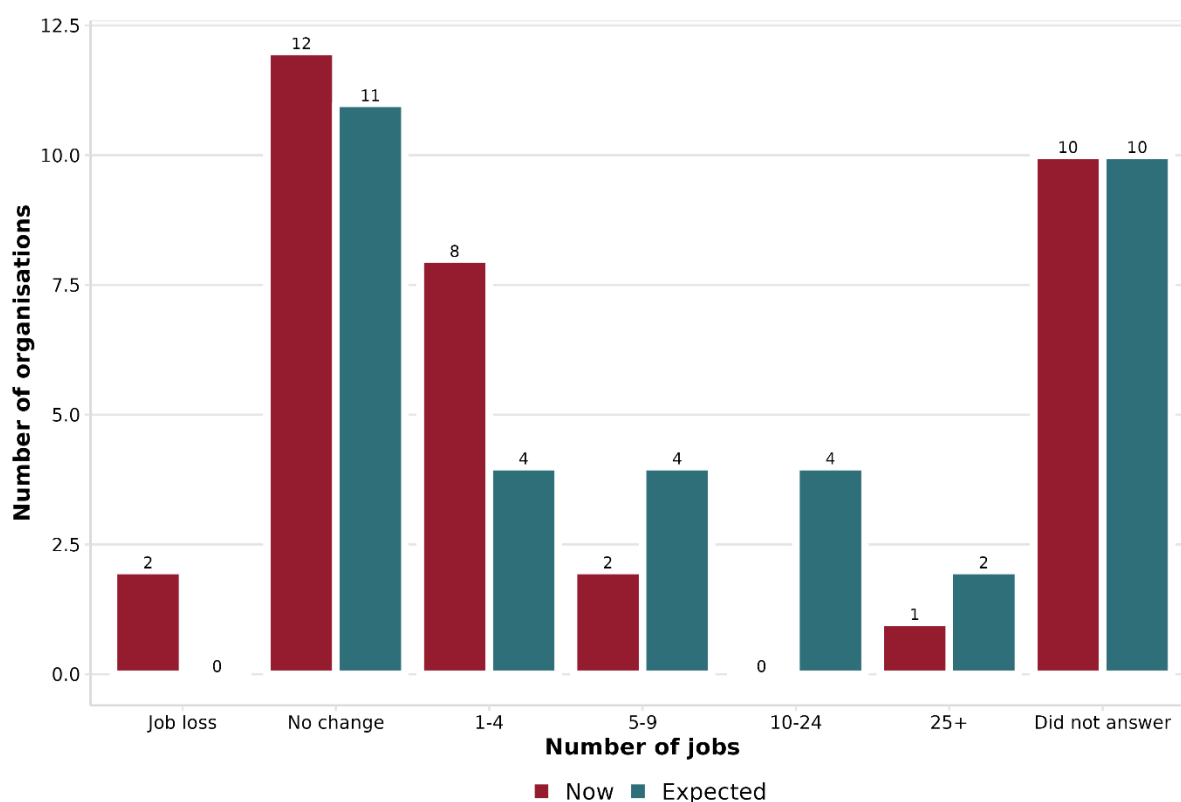
- one CMDC3 organisation reported losing 2 FTEs for 2 separate projects. However, the total number of job losses is unclear, as the organisation reported 5 total FTEs before the project and 8.5 FTEs after, suggesting inconsistency in the response.

Of the 88 CMDC4 organisations that provided a response (excluding 'Not Applicable'):

- 58% (51) reported an increase in FTEs – this is slightly higher than CMDC3 and shows that the majority had created jobs due to CMDC4
- 42% (37) of CMDC4 responding organisations reported no change in FTEs
- among the 51 organisations that reported job creations, median job creation was 2 – most (46) had created between one and 4 jobs.

For projects which did not create jobs, free text fields in the survey provide some insight.³⁸ Projects commonly noted that the increase of staff was dependent on the availability of additional funding, likely because many were still at the early stages of commercialisation. One project noted that the cost of full-time staff was too “onerous”. Another said that “as [we are a] feasibility study we were able to contain the workload within our existing headcount”.

Figure 29 Additional number of FTE employees created now and expected as a result of UK SHORE – CMDC3 organisations

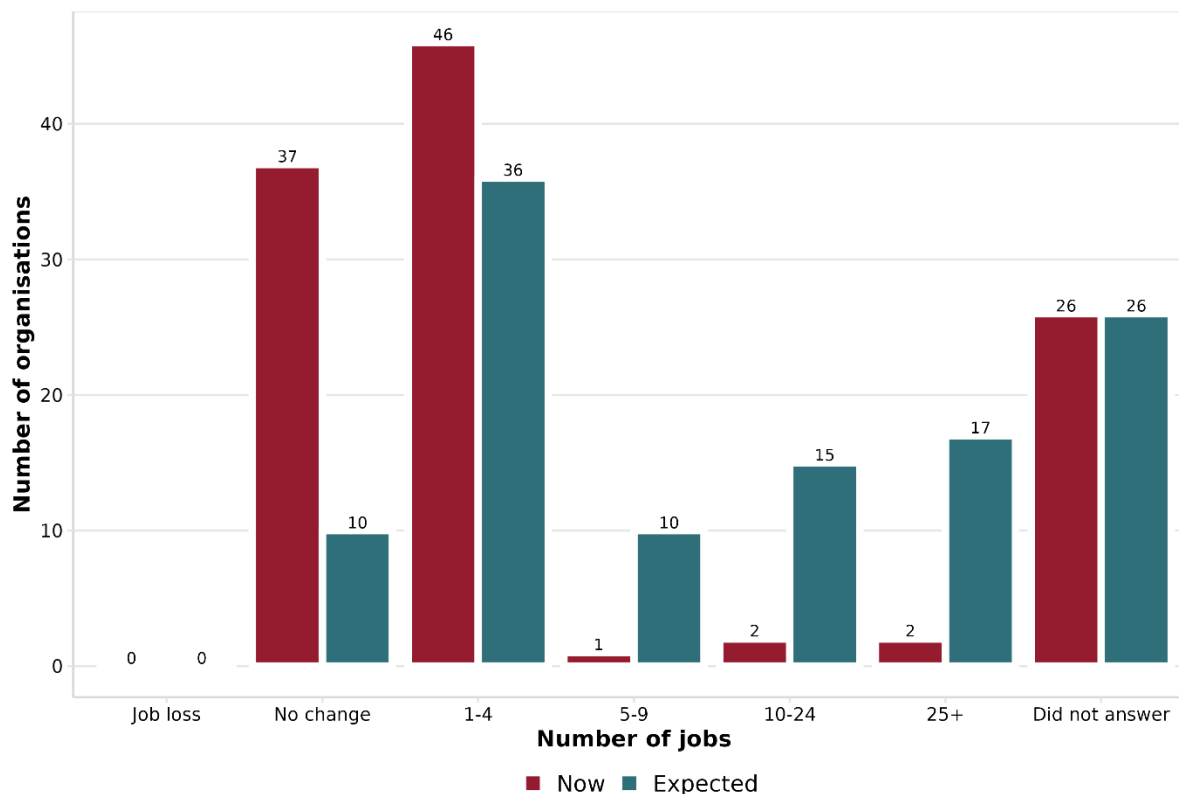


³⁸ 'Is there anything else you can tell us about the changes [and/or expected changes] in your number of FTEs?' Free text answers. Responses from 2025 CMDC3 and CMDC4 organisations only.

Source: Frontier analysis of end-of-project monitoring data

Note: Compared answers to the question 'As a result of this Innovate UK support, how many more or less Full Time Equivalent (FTE) employees are in your business today?' with '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?'

Figure 30 Additional number of FTE employees created now and expected as a result of UK SHORE – CMDC4 organisations



Source: Frontier analysis of end-of-project monitoring data

Note: Compared answers to the question 'As a result of this Innovate UK support, how many more or less Full Time Equivalent (FTE) employees are in your business today?' with '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?'

The majority of reporting organisations expected continued growth in FTEs

The blue bars in Figure 29 show that organisations' expected job creation 5 years after their CMDC project.

More projects expected future job creation than had already created jobs. For CMDC3, 14 (56%) expected job creation compared to 11 which had already created jobs. For CMDC4, 78 (89%) expected job creation compared to 51 who had already created jobs.

In addition, the level of job creation was expected to be higher:

- For CMDC3, organisations expected to create 8 jobs on average in the future compared to 3 jobs created to date.

- CMDC3 organisations had most commonly created 1-4 jobs to date. However, an equal number of organisations (4 organisations) reported expected to create 1-4, 5-9 and 10-24 jobs.
- For CMDC4, organisations expected to create 5 jobs on average compared to 2 jobs created to date.
- Creation of between 1 and 4 jobs was the most common response for current and future CMDC4 jobs. However, only 5 organisations reported creating more than 4 jobs to date, while 42 expect to create more than 4 jobs in the future.

No organisation expected job losses from CMDC3 and CMDC4.

The survey evidence is in line with findings from the monitoring data:³⁹

- The majority of survey respondents (19 out of 27, 70%) expected an increase in the number of FTE employees as a result of their projects over the next 2 years.
- One CMDC4 survey respondent explained that “CMDC4 has given us very good dissemination of our technology and a potential end user, this will increase our FTEs”. Another caveated that “we are chasing rapid growth, but this will be tempered by our ability to raise necessary capital”.
- One survey respondent expected a decrease in the number of FTEs, explaining “if we are unable to secure additional follow on funding we will need to make redundancies in Q4 2025”.

Similarly, end-of-project reports provide an indication of future job creation which depends on deployment.

“Potential for 30+ jobs if deployment of 10 vessels is achieved.” – CMDC3 end-of-project report

Based on reporting organisations alone, 159 to 239 jobs have been created due to CMDC3 and CMDC4, with a further 2,034 to 2,159 expected in the next 5 years

The figures in Table 36 show realised and expected job creation for CMDC3 and CMDC4, with the conservative scenario (outlined above) reported in brackets.

Table 36 Total realised and expected job creation by CMDC3 and CMDC4 reporting organisations, main and conservative scenarios

	CMDC3	CMDC4	Total
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³⁹ ‘Over, the next 2 years do you expect the number of FTE employees in your organisation to increase/decrease/remains the same as a result of your project?’ Options included ‘Increase’, ‘Decrease’, ‘No impact’, ‘Don’t know’.

Realised job creation	66 (26)	173 (133)	239 (159)
Expected job creation	218 (178)	1,941 (1901)	2,159 (2,034)

Source: End-of-project monitoring data

Note: Conservative scenario reported in brackets. 'As a result of this Innovate UK support, how many more or less Full Time Equivalent (FTE) employees are in your business today?' with '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?'

These totals fall below the business case expectations. For CMD3, job creation by the end of project was expected to be 1,637 jobs and by 5 years after project end it was expected to be 1,416. For CMD4, these figures were 378 and 8,681. However, this comparison is incomplete given the partial response rates to monitoring data. In addition, business case job creation was informed by CMD1 self-reporting, which may be a less useful metric for expectations for other schemes.

Some evidence suggests future creation of high skilled jobs by CMD3 and CMD4 participants

CMD1 and CMD2 monitoring data asked projects to quantify high-skilled job creation. This question was not asked in CMD3 and CMD4. Instead, some end-of-project reports from CMD3 and CMD4 participants suggest that projects look to recruit highly skilled employees. For instance, a CMD4 project reportedly expected to recruit positions such as senior software engineer, data engineer, lead development engineer, design engineer and fabrication engineer. A CMD3 project reported:

"The commercialisation of [our product] will safeguard 6 jobs and create up to five new highly skilled UK jobs" – CMD3 end-of-project report

To what extent has CMD contributed towards levelling up of coastal areas?

The monitoring data does not include information regarding coastal areas, the following section therefore explores distribution of funding by regions, supplemented by partial evidence regarding coastal areas from the survey data.

The South East, South West and Scotland received the most CMD3 and CMD4 funding

Table 37 below presents the distribution of UK SHORE funding across regions for CMD3 and CMD4. The percentages refer to the percentage of funding that went to each region out of all those where regional information was available:⁴⁰

⁴⁰ Data on region and grant is available for the majority of CMD3 and CMD4 organisations and so can be considered a reasonable representation of all funding (76 out of 92 and 141 out of 143 CMD4 organisations).

- Of the £43.18 million CMD3 funding, the South West and the South East received the highest proportion (around 26% each), followed by Scotland (21%).
- CMD4 funding, which totalled £32.55 million, was less concentrated in specific regions. Regions with the highest total UK SHORE funding were North West, South West and London (over £5 million each). This was followed by Northern Ireland, which received around £4.69 million UK SHORE funding.

Table 37 presents a potential benchmark for UK SHORE funding: public-funded spending on research and development by region in the financial year 2022, as reported by the [ONS](#). The top 3 regions for CMD3 and CMD4 funding (combined) were South East, South West and Scotland. The top 3 regions for wider government funding were South West, London and the East of England. Northern Ireland and Scotland both received a greater proportion of UK SHORE funding than they received of wider government funding. The funding profile for UK SHORE would be expected to be different to wider R&D spending, as it would be expected to go disproportionately to coastal regions and those with expertise in the specific technologies.

Table 37 Regional split of CMD3 and CMD4 funding (£m)

Region	CMD3	CMD4	CMD3 plus CMD4	2022 public R&D
South East	11.09 (26%)	5.56 (17%)	16.66 (22%)	21%
South West	11.14 (26%)	0.93 (3%)	12.07 (16%)	9%
Scotland	8.95 (21%)	2.78 (9%)	11.73 (15%)	8%
London	3.45 (8%)	5.39 (17%)	8.84 (12%)	20%
Northern Ireland	2.32 (5%)	4.69 (14%)	7.01 (9%)	1%
North West	1.09 (2%)	5.68 (18%)	6.78 (9%)	9%
North East	2.40 (6%)	2.68 (8%)	5.09 (7%)	3%
West Midlands	1.53 (3%)	1.77 (5%)	3.30 (4%)	6%
East of England	0.34 (1%)	1.92 (6%)	2.26 (3%)	10%
East Midlands	0.76 (2%)	0.67 (2%)	1.43 (2%)	5%
Wales	0 (0%)	0.38 (1%)	0.38 (1%)	3%
Yorkshire and The Humber	0.09 (0%)	0.10 (0%)	0.19 (0%)	6%

Source: Frontier analysis of monitoring data plus [ONS](#)

Survey respondents were most commonly located in inner city and coastal areas

In the survey, respondents reported the nature of the area where most of the project had been delivered.⁴¹ Among the 27 CMDC3 and CMDC4 survey respondents:

- 8 (30%) reported having been delivered in coastal areas – these projects received total UK SHORE funding of £15.30 million
- 8 reported inner city, 5 (19%) reported each of town/village and suburban city, and one respondent reported rural area (4%).

Qualitative evidence from end-of-project reports highlights key areas around the UK which their project would support. These include Liverpool City Region (CMDC3 project); Milford Haven, Port Talbot, Falmouth and Scottish ports (CMDC4 project); and the Scottish Highlands and Islands (CMDC3 project).

4.6 New CMDC1 and CMDC2 findings

There is limited data with which to update the CMDC1 and CMDC2 findings presented in the interim report. No additional monitoring data was collected. The only new data comes from the 2025 primary survey, which had a response rate of 6 organisations. This data provides the following insight:

- **EQ1:**⁴² Three projects were reported as being on hold. One project had moved towards further testing and validation (TRL 5), one had introduced its technology to the market and another had both moved to TRL 8 or above and had introduced its technology to market. Those organisations that reported further development said development had happened both overseas and in the UK.
- **EQ2:** No additional data.
- **EQ3:** Three projects reported that they had not generated a revenue as a result of their project over the last 3 years. The remaining 3 projects said they did not know.
- **EQ4:** All projects reported potential use of their technology in other sectors. Three projects had technology being used in other sectors and one project was in discussions with other sectors. The remaining 2 projects had identified potential uses but had no active discussions.
- **EQ5:** The projects had not created additional FTEs since their project had completed. One project reported a decrease and 2 reported that the number remained the same.

⁴¹ 'Which of the following best classifies the nature of the areas in which most of the project is being delivered?' Options included 'Inner city area', 'Suburban city area', 'Town/village', 'Rural', 'Coastal', 'Don't know'.

⁴² 'Since project completion, how has your project developed? Select all that apply.' Options were: 'No development – Project was not deemed viable', 'Moved to further testing and validation (e.g. up to TRL5)', 'Moved to prototype demonstrations or demonstrations in an operational environment (e.g. TRL 6-7)', 'Moved to qualified technology (e.g. TRL 8+)', 'Developed commercialisation, but technology not yet introduced to market', 'Technology introduced to market', 'Project on hold (e.g. awaiting additional funding or resources)'.

Looking forward, one project expected the number of FTEs to decrease and another 2 to remain the same.

4.7 Overall findings and future considerations

Responding CMDC4 project leads saw successful development of technologies through UK SHORE participation, with the majority of project leads reporting TRL progression by the end of project. Project leads most frequently started at mid TRL (TRL 4-6) and were between TRL 5 and TRL 9 by the end of the project. For CMDC3, 3 of 4 responding project leads saw TRL progression, but this sample size is not large enough for generalisable findings.

Survey evidence demonstrates that most of the respondents would not have progressed without UK SHORE funding, providing evidence of partial additionality. There is some evidence of deadweight, with the majority of survey respondents reporting diversion from other activities.

CMDC3 and CMDC4 responding organisations also reported that they had formed networks and collaborations as a result of UK SHORE participation, and this had contributed to new business opportunities and technological innovations. Given the difficulty in organically forming knowledge sharing networks in the sector, UK SHORE serves as an important platform to encourage such collaboration.

In addition, evidence suggests progress towards commercialisation for CMDC3 and CMDC4:

- Some organisations had received further funding beyond match funding during delivery and after project completion, most commonly from private sources. Most responding organisations attributed the further funding to UK SHORE participation. Around two-thirds of survey respondents also expected to obtain more funding in the next 2 years, especially from private sources both in the UK and overseas.
- The majority of responding CMDC4 project leads had seen CRL/MRL progression, most of these by more than one level. As with TRL, only 4 CMDC3 project leads responded so results cannot be generalised, but all reported an increase in CRL.
- Some organisations had already secured commercial contracts. Around half of survey respondents expected to generate commercial benefits in the future, including industry-wide and supply chain benefits as noted in interviews and reports.

A few CMDC3 and CMDC4 organisations provided qualitative evidence of spillovers into and out of the maritime sector. Some also identified potential use of their technologies outside of the maritime sector.

Around half of responding organisations reported that they had created jobs due to CMDC3 and CMDC4. Of those that reported, in total, 204 to 284 jobs had been created to date. More organisations expected job creation in the future as well as more jobs per firm. In the future, 2,034 to 2,114 jobs were expected. These figures fall below business case expectations, but such a comparison is limited due to high levels of non-response.

Lastly, although the updated reporting requirement for emissions savings led to standardised units of reporting, reports still varied in assumptions and timelines of estimation. Consequently, no aggregate analysis of emissions savings can be conducted for CMDC3 and CMDC4. However, the 4 projects analysed via case study analysis could achieve emissions savings from a single unit of the technology range between 337tCO₂e and 2,813tCO₂e per unit, while full-scale deployment could result in savings of 2,024tCO₂e to 173,699tCO₂e per project. These projects were selected using purposive sampling so are not representative of all CMDC3 and CMDC4 projects.

5 Impact evaluation findings – ZEVl

This section presents findings for ZEVl organised by evaluation question (EQ). Only the first round of ZEVl is included (as detailed in Section 1). It is still mid-way through completion at the point of writing.

Table 38 sets out the evidence sources used and the response rate across each (percentages refer to the percentage of all organisations or projects).

Table 38 Evidence sources used for the ZEVl evaluation

Data source	ZEVl response rates
Baseline monitoring data	48 organisations (98%) across 7 projects (88%)
Inflight monitoring data ⁴³	21 organisations (43%) across 7 projects (88%)
2025 online survey	4 organisations (50%) across 4 projects (50%)

Source: Frontier Economics

Note: Response rates are rounded to the nearest integer. See Section 2.2 for a more detailed discussion of evidence sources.

The same limitations apply to the ZEVl monitoring data as the CMDC monitoring data. These relate to the following:

- Response rates to the monitoring data and survey are less than 100%. As a result, findings are not representative of all projects and totals reported will underestimate the benefit across the entire scheme. For some questions in the monitoring data, there are materially higher levels of non-response and this is explicitly noted in the analysis.⁴⁴
- There may be instances of double counting, which is noted throughout the analysis where relevant.

5.1 Development of clean maritime technologies

This section presents findings on EQ1: To what extent, and through what mechanisms, did ZEVl help to accelerate and support the development of clean maritime technologies relative

⁴³ ZEVl is still ongoing. Unlike other schemes where end-of-project monitoring data was collected, inflight monitoring data was collected in April to June 2025, roughly at project mid-point.

⁴⁴ In some cases, some non-response is driven by the question wording where Innovate UK stated: 'This question is not required for public sector organisations, academic institutes or individuals. Please select "Not Applicable"'. This was relevant for the following topics: job creation, financial impacts (e.g. profit), and new or improved products, services or processes. This is indicated throughout in footnotes.

to what would have happened in the absence of ZEVI? The relevant data and data sources for each sub-question under EQ1 are reported in Table 39.

Table 39 **EQ1 data sources**

Sub-question	Data	Data source
To what extent did the projects funded through ZEVI schemes deliver the outputs as anticipated in the business cases (for example feasibility studies, pre-deployment trials, demonstrations, deployment trials in operational settings and market-readiness plans)?	Number of projects and outputs delivered	Monitoring data
	Stakeholder views on project success	Interviews
To what extent did ZEVI support technologies through the TRL scale?	Change in TRL	Monitoring data
What role did ZEVI play in facilitating parties to come together to advance the development of clean maritime technologies?	Number of new or maintained collaborations through ZEVI	Monitoring data
	Stakeholder views on new or maintained collaborations through ZEVI	Interviews

Source: *Frontier Economics*

Each sub-question is discussed in turn through the rest of this section. In addition, a further sub-question for this EQ on evidence relating to the ‘factors [that] played a role in enhancing the influence of ZEVI in meeting its aims for accelerating UK clean maritime’ is discussed throughout exploration of each of the other sub-questions.

5.1.1 Evaluation evidence

To what extent did the projects funded through ZEVI deliver the outputs as anticipated in the business cases?

Two of the 10 ZEVI projects dropped out. Seven (of the 8 remaining) projects provided either baseline or inflight monitoring data.

The discussion of demonstrations and innovations in the following 2 sections may suffer from double counting when totals are reported. This is because organisations from the same project

may have reported the same demonstrations or innovations separately, meaning these are counted in the total more than once. Therefore, the numbers of projects that reported demonstrations and innovations are also included.

A few organisations have completed real world demonstrations and/or deployments to date

According to DfT's business case, ZEVl expected projects to deploy and demonstrate their technologies at scale by March 2028. Inflight monitoring data provides information on whether responding projects have achieved these to date (noting that projects still have time within their project to do so):⁴⁵

- Three out of 21 responding organisations reported a total of 7 real-world deployments. These organisations were spread across two projects. Deployments may not be directly attributable to UK SHORE due to the wording of the question.
- One organisation reported real-world demonstration related to ZEVl support. Two organisations had not undertaken this, while the remaining 18 organisations answered that this metric was 'not applicable'. This may suggest that ZEVl organisations did not deem real-world demonstrations to be a relevant objective at this point of their projects.

Some reporting organisations have launched innovations, with more expected in the near future

Five organisations had reportedly launched a total of 17 new or improved products, services and/or processes due to UK SHORE participation.⁴⁶ Of these, one organisation accounted for 9 innovations launched. The 5 organisations were spread across 4 projects.

More organisations were optimistic about the future launch of new products, services or processes.⁴⁷ Ten organisations reported that they 'expected new products, services or processes as a result of ZEVl', 9 of which would be within 2 years, and one within 5 years. Two responded 'not applicable' and the remainder did not respond.

Evidence from the 2 ZEVl projects interviewed suggests delays in project progress

One organisation interviewee reported good progress despite delays. Their ZEVl project was subject to delays and they had required an extension to project deadlines. Prior to the

⁴⁵ The questions were 'How many technologies have been deployed in real world settings during this project?' (numeric response), and 'Real-world demonstration of products or services related to Innovate UK support post-project' ('yes' or 'no' response).

⁴⁶ The end-of-project monitoring data asked organisations to report the number of new or improved products, services and processes launched as a result of UK SHORE support separately. They are aggregated here into the number of innovations. Innovate UK stated 'This question is not required for public sector organisations, academic institutes or individuals. Please select "Not Applicable".'

⁴⁷ The data asked 'expected new products, services or processes as a result of this support'. Options included 'Yes within 2 years', 'Yes within 5 years', 'Yes within 10 years', and 'Not Applicable'. Innovate UK stated 'This question is not required for public sector organisations, academic institutes or individuals. Please select "Not Applicable".'

reassessment, the project had been delayed by more than a year due to financial and shipyard complications. They also argued that, from the onset, their bid had over-promised on deliverables. However, ZEVI had helped them to bring forward their company-wide objective to deliver a zero-emission vessel by 2030 and they now expected to deliver by mid-2027.

“It was probably us over-promising on delivery because we wanted the funding to do the project, and also part naivety on the Innovate side, that the project could be done in that timeline. ... [the project plan] from the very outset was unrealistic, we’d never deliver a ship on time.” – ZEVI organisation

The other organisation interviewee also stated that they were behind schedule and had received a deadline extension to April 2026. Causes of project delays included supply chain and compliance related challenges. The R&D nature of the project and the nascent state of the green maritime industry also meant more trials and errors than mature counterparts.

“That is the nature of R&D work as well, you know, we’re very early, we’re market leaders in this area. So, the processes and procedures haven’t been established and the industry wide lessons aren’t really filtered out there because everybody’s keeping all the information close to their chests.” – ZEVI organisation

Innovate UK also noted common delays for ZEVI in its interview, with around half of ZEVI projects on track to deliver by the original deadline. Echoing ZEVI interviewees, Innovate UK pointed to the tight timescales, supply-side shortages and compliance challenges as causes of project delays.

In in-depth interviews, the MCA commented that ZEVI projects had been more realistic because of the requirement for higher TRL and being ready to operate on a near-commercial basis. They also found that the ZEVI projects had been more realistic at the design stage in terms of what technology they could integrate, whereas CMDC projects had tended to try and tackle several points of innovation at once.

The process evaluation (Section 3.6.2) discusses barriers further and presents recommendations for dealing with these. At this stage, it is too early to say whether these delays will affect the impact ZEVI has on the development of technologies.

Some survey and interview evidence suggests UK SHORE funding was crucial to technological development for ZEVI projects

All 4 ZEVI survey respondents reported that their project would not have developed in the same way without UK SHORE.⁴⁸ Without ZEVI, organisations reported that their project: would

⁴⁸ ‘To what extent, if any, has your participation in this competition supported the development of your technology? Please select all that apply’ Options included ‘It wouldn’t have happened at all without the competition funding’, ‘It wouldn’t have happened in this country without the competition funding’, ‘It wouldn’t have happened with the same number of partners without the competition funding’, ‘It would have happened anyway, exactly the same way’, ‘it would have happened anyway but with a reduced scope’, ‘It would have happened anyway, but not at the same pace’, and ‘Not sure’. 2025 ZEVI respondents only.

not have happened at all (1); would not have happened in the UK or with the same number of partners (1); and would have happened at slower pace (2).

Similarly, the 2 ZEVI organisations interviewed stated that their projects would not have gone ahead without UK SHORE funding. One interviewee said that due to the technical risks of their innovations, they would not have been able to secure private funding.

“The scale of change that we’re hoping to deliver once this project is successfully up and running could not have happened without ZEVI. ... It really is because of the technical risk of the project, I know the ZEVI projects are high TRL ... but there is associated technical risk... That kind of level of innovation, it will never be privately funded. Once potential customers have ... seen it operational, they’re happy to enter into commercial discussions, but not until they’ve seen things operational.” – ZEVI organisation

The other interviewee noted that UK SHORE had helped them bridge the cost gap between decarbonised fleets and conventional fleets.

“We’re a fairly small company, and to build a vessel and deliver it to the market, which was 20% more expensive than our competitors, and still be competitive, wouldn’t have worked, so this funding allowed us to sort of bridge that gap and start off with this build. We’re delivering this first vessel and we’re still competitive with everyone else. Effectively, the funding has allowed us to bridge that gap [and continue to bridge it in future, self-funded] and start the whole process of building these zero emission vessels.” – ZEVI organisation

Additionally, the interviewee believed the ZEVI funding was more crucial to their project than previous CMDC funding they had received across multiple rounds, as CMDC project costs were typically smaller and could be covered by the firm internally, while ZEVI projects would not have been financially feasible without the UK SHORE funding.

To what extent did ZEVI support technologies through the TRL scale?

Analysis of TRL development uses responses by project leads, comparing baseline and inflight monitoring data.⁴⁹

Only 3 out of 8 project leads provided baseline and inflight TRL information. Of these, one project lead started at TRL 9 and therefore no TRL progression was possible. The 2 other project leads started at TRL 7 and reported no change in TRL. ZEVI projects are not yet complete and so future TRL progression may occur, particularly when demonstration gets further underway.

An additional 2 project leads provided baseline TRL information. These started at TRL 6 and TRL 9.

⁴⁹ Consistent with CMDC3 and CMDC4, this approach is used as organisations within the same ZEVI project often reported different levels of start and inflight TRL. Compared answers to the question ‘Start of project TRL of primary innovation associated with the project’ asked at the start of projects to the question ‘In relation to this Innovate support, what is the Technology Readiness Level (TRL) of the product or service to date?’ asked at the end of projects.

What role did ZEVl play in facilitating parties to come together to advance the development of clean maritime technologies?

The majority of responding organisations reported new collaborations facilitated by ZEVl

Among responding organisations to the inflight monitoring data, roughly two-thirds (14 out of 21) reported forming at least one new collaboration from ZEVl participation.⁵⁰ Half of these (7) had gained 2 to 5 new collaborations. One organisation reported gaining 50 new collaborations.

In the interviews, one organisation, which had also participated in CMDc, remarked that UK SHORE participation had fostered an organic growth of its network.

“We started off with a few people that that we knew and that we were establishing relationships with. But as we’ve gone through the UK SHORE process, we’ve got to meet other companies, and this is one of the things that I really like ...” – ZEVl organisation

The other organisation interviewee also noted gaining new collaboration opportunities through participation in various UK SHORE schemes. They expressed enthusiasm in attending knowledge sharing events, partly because they wished to give back to the community which had supported them.

“We’re finding that a lot of people are approaching us to say, ‘we’re looking at this opportunity, would you like to be involved?’. And we’ve had quite a lot of offers to be involved in different funded projects as either partners, project sponsors, or just supporters.” – ZEVl organisation

5.2 Environmental benefits

EQ2 asks: To what extent, and through what mechanisms, can environmental benefits be attributed to ZEVl?

There is not enough evidence for a full assessment of this evaluation question. However, the survey and interviews provide some initial evidence of expected carbon savings:

- One ZEVl interviewee predicted that their ship would lead to savings of 6,000 tonnes of CO₂ per year, based on a comparison with a brand new conventional vessel without batteries or methanol.
- All 4 ZEVl survey respondents expected sector-wide environmental benefits.⁵¹

⁵⁰ ‘As a result of this Innovate UK support, how many new collaborations have you made with external organisations to date?’ Numeric answer.

⁵¹ ‘Based on your current expectations, what do you think is going to be the scope of environmental benefit – in terms of Net Zero: reducing carbon and other GHG emissions – of your project?’ Options included ‘Whole energy system scope’,

5.3 Commercial opportunities

This section presents findings on EQ3: To what extent, and through what mechanisms, did UK SHORE improve the commercial prospects and opportunities for clean maritime in the UK? The relevant data and data sources for each sub-question under EQ3 are reported in Table 40.

Table 40 EQ3 data sources

Sub-question	Data	Data source
To what extent was additional private investment crowded in for developing clean maritime technologies?	Follow-on funding received	Monitoring data
How far have commercial benefits for UK businesses been realised or are expected to be realised in the future, for clean maritime technologies?	Changes in MRL	Monitoring data
	Financial benefits realised	Monitoring data
	Number of commercial contracts	Monitoring data
	Plans to take the projects further towards commercialisation	Survey data
To what extent did ZEVI facilitate intellectual property (IP) to be generated and retained in the UK for clean maritime technologies?	Number of organisations reporting intellectual property rights	Monitoring data

Source: Frontier Economics

'Sector/regional scope', 'Sub-sector/sub-regional scope', 'Niche-sector/district scope', and 'Organisation specific'. 2025 ZEVI respondents only.

5.3.1 Evaluation evidence

To what extent was additional private investment crowded in for developing clean maritime technologies?

A few organisations have already secured further funding

Of the 20 organisations that responded to inflight monitoring data, 4 reported having secured further funding at the time of data collection.⁵² Two of these had received funding from private sources and 2 from public sources.

Funding reported in this data totalled £19 million. Given incomplete response rates to monitoring data, this figure should be taken as the lower bound of funding generated by ZEVI projects to date. It can be contextualised against total UK SHORE funding for the scheme (£79 million) and matched funding generated at project start (£32 million).

As only a few organisations had received funding, it is not informative to consider the split of funding across regions or size of the organisation.

The survey provides some further evidence of additional funding secured.⁵³ Of the 4 ZEVI organisations responding to the survey, one had secured funding from private investors in the UK and abroad and another had secured funding from private investors overseas. However, it is unclear whether the funding mentioned was in addition to that reported in the inflight monitoring data.

Survey and interview evidence suggests potential for ZEVI projects to secure additional funding in the future

Of the 4 ZEVI survey respondents, one expected to secure UK public sector funding, and one expected to secure private sector funding both within the UK and overseas.

Interviews also provide qualitative evidence on potential funding opportunities due to UK SHORE participation. One ZEVI organisation noted that its participation in the UK SHORE programme had increased its visibility and had encouraged investment.

“We’ve gone from a company that’s quite small in the market to being now forefront in the market. Everybody’s seeing what we’re doing and everybody’s seeing that we’re trying to change the industry. We’ve got a lot of press about that and, along from that, we’re now

⁵² ‘As a result of this Innovate UK support, estimate the total value of any follow-on private funding you have received to date. You should only include funding that would not have been received without this Innovate UK support’ and ‘As a result of this Innovate UK support, estimate the total value of any further public sector funding you have received to date’. Numeric responses

⁵³ ‘Have you secured, or do you expect to secure within the next two years, any follow-on funding to further develop the technology after the delivery phase of this project? Select all that apply for each column.’ Options included ‘UK public sector’, ‘Public sector overseas’, ‘Private investors in the UK’, ‘Private investors overseas’, and ‘None secured’. 2025 ZEVI survey respondents only.

looking at the next generation of vessels and we're looking at investment. It wouldn't have been possible a year or two ago, to go to get investment ... without having this story behind us and without having built this vessel." – ZEVI organisation

The other organisation interviewed felt that there was good industry appetite to uptake UK SHORE technologies based on its conversations with potential customers.

How far have commercial benefits for UK businesses been realised or are expected to be realised in the future, for clean maritime technologies?

The small sample size limits the ability to draw conclusions on MRL development

Analysis of MRL development uses responses by project leads, comparing baseline and inflight monitoring data.⁵⁴

Five project leads provided MRL at baseline, all of which were either MRL 9 (4) or MRL 10 (1); ZEVI projects were therefore starting from a high base of market readiness with little to no room for MRL to progress. Three project leads provided MRL at baseline and inflight, all of which remained at the same MRL.

A few organisations had already secured commercial agreements

The inflight monitoring data asked organisations to report the number of commercial contracts signed as a result of ZEVI support. Of the 19 responding organisations, a total of 9 contracts had been signed across 4 organisations.

Responding organisations provided mixed evidence on financial performance

The inflight monitoring data asked organisations to report the amount of cost saved and turnover and operating profit generated as a result of ZEVI support.⁵⁵

Fourteen (out of 57) organisations across 7 projects responded to at least one of the 3 indicators.⁵⁶ Four of these organisations (across 4 projects) reported non-zero values:

- One organisation reported £200,000 in turnover and £40,000 in operating profit
- Another organisation reported £300,000 in turnover.
- Two organisations reported operating loss of £150,000 and £1.1 million, respectively.

⁵⁴ Consistent with CMDC3 and CMDC4, organisations within the same ZEVI project often reported different levels of start and inflight TRL. Compared answers to the question 'market readiness level related to this support' asked at the start and the end of project.

⁵⁵ 'As a result of this Innovate UK support, what is the value of any cost savings achieved by your business to date?'; 'As a result of this Innovate UK support, estimate how much operating profit your business generated to date'; 'As a result of this Innovate UK support, estimate how much turnover your business has generated to date?' Numeric answers.

⁵⁶ Some of the non-response was driven by question wording as Innovate UK added 'This question is not required for public sector organisations, academic institutes or individuals. Please select "Not Applicable"'.

In the 2025 survey, one of the 2 organisations which reported suffering a loss in monitoring data noted that “one partner went into liquidation 4 months before the end of the financed period”, which may be an explanation for the loss. The extent to which this can be attributed specifically to ZEVIs is unclear.

As discussed in the CMDIC evaluation, it is not necessarily a concern to see profit loss attributed to innovation. Profit gains would be expected to be a longer-term benefit, with short-term losses not unlikely due to the inherently risky nature of R&D.

Most survey respondents expect to generate revenue in the next 2 to 5 years

Respondents were asked whether they expected to generate revenue in the next 2 years from the technology developed during their projects.⁵⁷ Of the 4 survey respondents, 3 expected to generate revenue which totalled £72.5 million. One survey respondent had already signed contracts, and 2 had identified customers but were yet to sign contracts.

The inflight monitoring data asked organisations to estimate the expected turnover generated in the next 5 years as a result of UK SHORE support.⁵⁸

- Nine of the 10 organisations that responded to this question expected to generate turnover in the next 5 years.
- Expected turnover ranged between £0.5 million and £200 million, with a median of £5.4 million.

There is likely overlap between revenues reported in the survey and monitoring data.

Interviews provide qualitative evidence of industry-wide benefits

In the interviews, one organisation reflected observing more common usage of new technologies (such as alternative fuels, offshore charging) to reduce emissions, and that the marine industry appears to have been vitalised by opportunities that have come through UK SHORE.

“In a general sense, everyone is kind of moving in a positive way towards decarbonisation and reducing emissions and improving efficiencies, and that for me feels like a goal that everybody shares...It feels like there’s quite a positive atmosphere in the marine industry in terms of these funded projects.” – ZEVIs organisation

⁵⁷ ‘Over the next two years, do you expect to generate any revenue as a result of the technology developed during your project’ (Options included ‘Yes – contracts signed’, ‘Yes – customer identified but contracts not signed’, ‘No’, ‘Too early to say’, and ‘Not sure’); and ‘Please state the expected value of revenue generated as a result of your project over the next 2 years.’ Numeric answers. 2025 ZEVIs respondents only.

⁵⁸ ‘As a result of this Innovate UK support, how much more (or less) turnover do you anticipate generating over the next five years?’. Numeric response.

To what extent did UK SHORE facilitate intellectual property (IP) to be generated and retained in the UK for clean maritime technologies?

A few organisations reported IP protection secured and/or papers published

The inflight monitoring data collected information on the number of IP protections (including new patents, designs, trademarks and copyrights) secured as a result of ZEVl support, as well as a 'number of papers as a result of this support'. Of the 21 responding organisations, 2 reported a total of 3 new IP protections secured. One organisation reported having published one paper.

5.4 Spillover benefits

EQ4 asks: To what extent is there evidence that ZEVl has generated positive spillover benefits?

There is limited evidence available to assess this EQ at this stage. However, qualitative insights from survey data and interviews point to some examples.

5.4.1 Evaluation evidence

What evidence is there for benefits to other maritime supply chain companies and companies outside of maritime who can use the technologies?

Some survey respondents and interviewees identified potential uses for their technologies outside of the maritime sector

In the survey, 3 out of 4 ZEVl respondents reported that they expected the outputs from their projects to be used in other sectors.⁵⁹ Of these, 2 reported that they were in active discussions about potential use in other sectors, and one identified potential uses but no active uses or discussions. However, 2 of the survey respondents interpreted 'other sector' as sub-sectors within the marine industry (for example inland shipping). One respondent reported that they were potentially adapting their technology for "overnight electric bus charging at the port".

In the interviews, a ZEVl organisation said it saw the potential for batteries and chargers to be applied to other transport modes. It had also developed its own collision avoidance system, which could be applied to other industries.

⁵⁹ 'Based on your current expectations, could the outputs or findings from your project be used in other sectors' d include 'Yes – it is currently being used in other sectors', 'Yes – we are in active discussions about potential use in other sectors', 'Yes – we have identified potential uses but no active uses or discussions', 'No', and 'Don't know'. 2025 ZEVl respondents only.

5.5 Wider social benefits

This section presents findings on EQ5: To what extent has ZEVI achieved wider social objectives? The relevant data and data sources for each sub-question under EQ5 are reported in Table 41.

Table 41 EQ5 data sources

Sub-question	Data	Data source
To what extent has ZEVI contributed to sustaining or creating jobs in the UK in the clean maritime or related sectors?	Number of jobs created and retained	Monitoring data, interviews
	Expectations of jobs created and retained	Monitoring data, survey data
	Impact on jobs in the broader sector	Interviews
To what extent has UK SHORE contributed towards levelling up of coastal areas?	Expectations of green or high-skilled jobs	Survey data, interviews
	Number of projects in coastal areas	Survey data
	Regional split of UK SHORE funding	Monitoring data; survey data
	Other social benefits	Stakeholder interviews

Source: Frontier Economics

5.5.1 Evaluation evidence

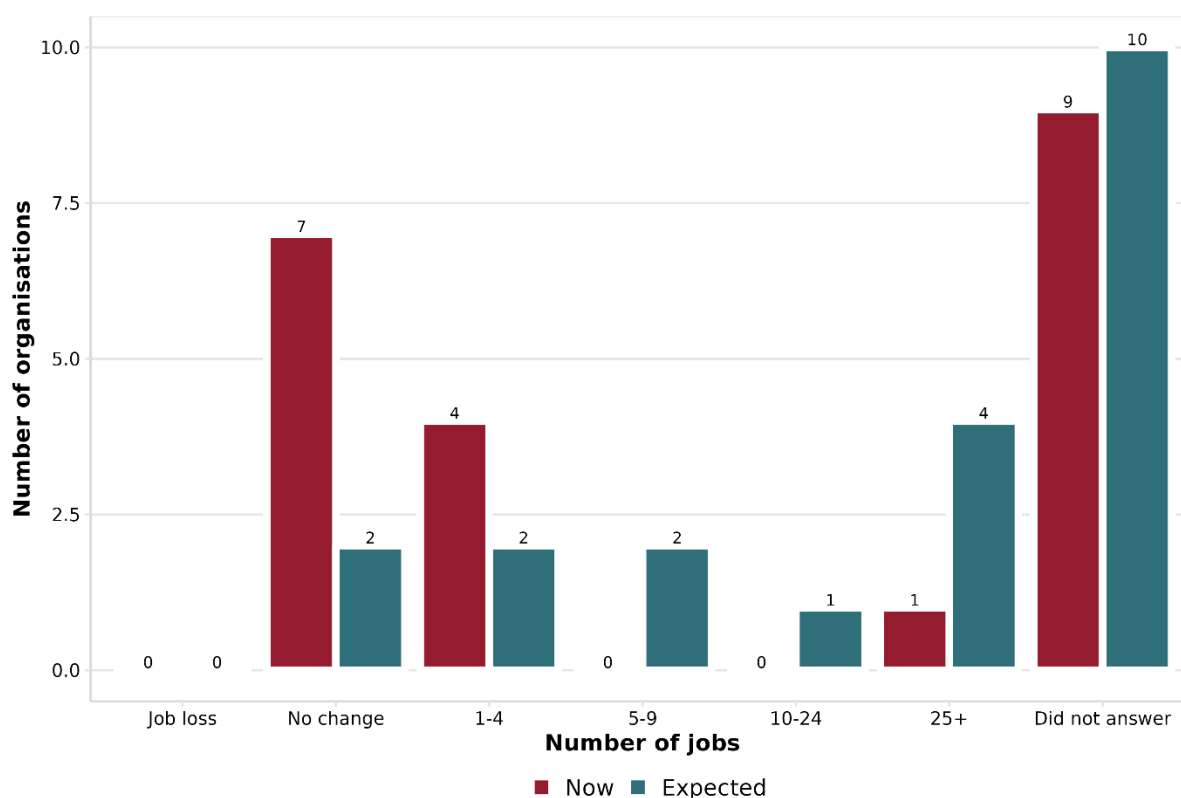
To what extent has UK SHORE contributed to sustaining or creating jobs in the UK in the clean maritime or related sectors?

Total job creation reported below is likely an underestimate due to non-reporting. Out of 57 ZEVI organisations, 12 organisations reported realised job creation and 11 reported expected job creation.⁶⁰

A few reporting organisations have added FTE employees, with more expecting staff increase in the future

Figure 31 shows the expected and realised job creation of reporting ZEVI organisations.

Figure 31 Realised and expected future number of FTE employees as a result of UK SHORE



Source: Frontier analysis of inflight monitoring data

Note: n=21. Compares responses to 'number of FTE employees as a result of this support' and 'expected number of FTE employees as a result of this support'. Numeric answers.

⁶⁰ Some of the non-response was driven by question wording, as InnovateUK added 'This question is not required for public sector organisations, academic institutes or individuals. Please select "Not Applicable"'.

At the time of data collection, 5 out of 12 reporting organisations had created jobs. Four of these reported job creation of between one and 4 jobs.

Most reporting organisations expected a future increase in FTE employees over the next 5 years (9 out of 11). They were also more ambitious in the size of expansion, with organisations most frequently reporting an expected increase of 25 or more FTEs. This may be due to the high TRL and MRL nature of the projects, where organisations expect to see commercialisation and rapid business growth in the near future.

Survey data provides additional evidence on the expected changes in FTE employees. All 4 survey respondents expected the number of FTE employees to increase in the next 2 years (this data likely overlaps with the monitoring data respondents). Survey respondents noted that additional staff were needed to deliver their UK SHORE projects, and operational staff would be needed after successful project delivery.

“There was an increase in the number of employees required to deliver the build phase of our ZEVI project. Following completion of the vessel, we will also need to recruit a new crew to operate the ship, along with additional management staff to support operations from the office.” – ZEVI survey response

There is indicative evidence of high-skilled job creation from the survey. One survey respondent explained that they looked to hire High Voltage Qualified Electrical Engineers, as the project would require their expertise to plug in the ships.

Sixty-eight jobs were reported to have been created due to ZEVI to date, with 682 expected to be created in 5 years’ time

In the inflight monitoring data, 12 organisations reported 68 total jobs created as a result of ZEVI. A total of 682 additional jobs were expected in 5 years’ time.

These figures are below business case expectations of 2,468 for 2025 and 23,432 in 2030. However, this comparison is not insightful given the incomplete response rates to monitoring data. In addition, business case job creation was informed by CMDC1 self-reporting, which may be a less useful metric for expectations for other schemes.

Qualitative evidence suggests potential positive influence on jobs in the broader maritime sector

In interviews, one ZEVI organisation noted that it had expanded its staff to support the delivery of the project. Successful project delivery would create 30 permanent crew roles in the UK to operate the ship. With commercialisation at scale, the organisation reported that it would create more crew roles both in the UK and overseas, as well as jobs down the shipbuilding supply chain.

“When it comes to delivering the vessel, we’ll have up to 30 crew for the ship, which will be UK flag, so they’ll be predominantly UK workforce. ... Then wider from that, there’s going to be effects down the supply chain of delivering a ship like this, and it’s going to be

managed out of the UK...If we manage to build more vessels and change the way the industry is going, then that could obviously massively increase.” – ZEVl organisation

To what extent has UK SHORE contributed towards levelling up of coastal areas?

As with CMD3 and CMD4, the monitoring data does not include information regarding coastal areas. The following section therefore explores distribution of funding by regions, supplemented by partial evidence regarding coastal areas from the survey data.

The South East region received the most funding

Table 42 below splits ZEVl funding by the location of the organisations (reporting in descending order of funding size). As shown, the South East region received around 40% of total ZEVl funding, followed by North West (25%) and Scotland (18%). Some regions (East Midlands, Wales and West Midlands) received no funding. The fact that not every region received funding is not unexpected given the fact that there were only 8 ZEVl projects.

The regional distribution of public R&D spending for the 2022 financial year is included as a benchmark.⁶¹ The South East, North West and Scotland received a higher proportion of total ZEVl funding than of total public R&D spending. London, the South West and regions with no ZEVl funding received a lower proportion of total ZEVl funding than of total government R&D spending (see Table 42).

Table 42 Regional split of ZEVl funding (£m)

Region	ZEVl	Public R&D spending (2022)
South East	31.59 (40%)	21%
North West	19.61 (25%)	9%
Scotland	14.45 (18%)	8%
East of England	5.93 (8%)	10%
Northern Ireland	4.10 (5%)	1%
London	1.57 (2%)	20%
South West	0.55 (1%)	9%
North East	0.36 (0%)	3%
Yorkshire and The Humber	0.20 (0%)	6%
East Midlands	NA	5%
Wales	NA	3%

⁶¹ [ONS](#) (2024). UK public-funded gross regional capital and non-capital expenditure on research and development.

West Midlands	NA	6%
Unknown	0.19 (0%)	

Source: Frontier analysis of baseline monitoring data plus ONS data on UK public R&D expenditure by region

Note: n=48.

Of the 4 ZEVIs respondents to the survey, one reported that they had delivered most of their projects in coastal areas. This project had received £16 million of ZEVIs grant funding.⁶² One respondent had delivered mostly in a rural area and 2 in inner city areas.

5.6 Overall findings and future considerations

As ZEVIs is still ongoing and the evidence base is reasonably small, limited conclusions can be drawn about ZEVIs outcomes. This section summarises findings to date, which are subject to change as projects continue to progress. A future technical evaluation of ZEVIs will be aided by in-depth data collection and evaluation, separate to this evaluation.

In line with the business case expectation, most reporting project leads reported high TRL and MRL of their projects at baseline. Little change has been observed in either metric so far. Due to the ambitious nature of the projects and the potentially more difficult push as projects near commercialisation, both organisations interviewed had experienced delays as they navigated both internal (for example liquidation of a project partner) and external challenges (for example supply-side shortage, compliance issues). One of the ZEVIs interviewees commented on positive project progress despite these delays.

At the time of data collection, 2 projects had dropped out. However, one project has generated learnings, including the approval pathway for hydrogen-powered uncrewed surface vessels, site selection criteria and training requirements. Following the termination of the other project, one partner completed the development of the technology they had started as part of the project.

A few organisations have generated additional funding, in line with findings from other schemes. At this stage, reporting organisations had mixed financial performance, with a few suffering losses, although it was unclear if this related to ZEVIs specifically. However, many were optimistic about the potential commercial benefits from their technologies given conversations with perspective customers and industry sentiments.

Interview evidence suggests that, because many ZEVIs organisations have gone through other UK SHORE schemes, they have benefitted from the networks and collaborations developed through UK SHORE. One organisation interviewed also remarked that the size of ZEVIs

⁶² 'Which of the following best classifies the nature of the areas in which most of the project is being delivered' Options included 'Inner city area', 'Suburban city area', 'Town/village', 'Rural', 'Coastal', 'Don't know'. 2025 ZEVIs respondents only.

projects, in terms of funding provided, made the funding particularly important. These projects would not have been financially feasible otherwise.

Overall, current findings from ZEVl point to the higher risks of larger R&D projects and the importance of UK SHORE in supporting the development of such projects through funding, network building and de-risking.

6 Impact evaluation findings – TRIG

This section presents evidence against each impact evaluation question for the 2023 and 2024 scheme rounds of the Transport Research Innovation Grant (TRIG).

The following evidence sources inform this assessment:

- **Baseline and end-of-project monitoring data:** Due to small sample sizes, analysis is reported for TRIG23 and TRIG24 combined. Only the project lead was asked to complete monitoring data:
 - All 16 projects responded to the end-of-project monitoring data.
 - Seven out of 8 TRIG23 and 6 out of 8 TRIG24 projects responded to the baseline monitoring data (13 projects in total).
- **End-of-project reports:** All projects submitted end-of-project reports. This evaluation relies on information from a sample of 2 out of 8 reports for each of TRIG23 and TRIG24.

Comparison between baseline and end-of-project monitoring data is only possible for 12 projects. Only 13 projects completed the baseline data. Of these, one organisation was involved in 2 TRIG projects but responded to the baseline questionnaire only once and so it is not possible to determine which project this response refers to.

While response rates to monitoring data are high, the sample size is still small (16 respondents) meaning that averages should not be over-interpreted.

6.1 Development of clean maritime technologies

This section presents initial findings for the TRIG programme on EQ1: To what extent, and through what mechanisms, did TRIG help to accelerate and support the development of clean maritime technologies relative to what would have happened in the absence of TRIG? The relevant data and data sources for each sub-question under EQ1 are reported in Table 43.

Table 43 EQ1 data sources

Sub-question	Data	Data source
To what extent did the projects funded through TRIG deliver the outputs as anticipated in the business cases (for example feasibility studies, pre-deployment trials, demonstrations, deployment	Number of projects and outputs delivered	End-of-project reports

trials in operational settings and market-readiness plans)?		
	Number of projects reporting success and impact from programme	Monitoring data
	Reported success indicators and achieved success	Monitoring data
To what extent did TRIG support technologies through the TRL scale?	Reported TRL progress for TRIG23 and TRIG24	Monitoring data
	Reported TRL start and end levels for TRIG23 and TRIG24	Monitoring data
What role did TRIG play in facilitating parties to come together to advance the development of clean maritime technologies?	Number and type of collaborators per project	Monitoring data
	Connections gained from TRIG	

Source: *Frontier Economics*

Each sub-question is discussed in turn through the rest of this section. In addition, a further sub-question for this EQ on evidence relating to the ‘factors [that] played a role in enhancing the influence of TRIG in meeting its aims for accelerating UK clean maritime’ is discussed throughout exploration of each of the other sub-questions.

6.1.1 Evaluation evidence

To what extent did the projects funded through TRIG deliver the outputs as anticipated in the business cases?

TRIG aims to support early stage, small-scale research projects and prototyping innovative ideas. In particular, the TRIG23 programme aimed to fill gaps and support technologies which were not supported by other UK SHORE schemes. These were: deep-sea shipping technologies; smart and autonomous technologies that indirectly support maritime decarbonisation; and decarbonisation plans of small ports and harbours.

Specific measures of success for TRIG are identified in the business case. Measures relevant for EQ1 relate to the successful delivery of projects with some successful innovations,

recognising that not all projects would be expected to deliver successful innovations given the uncertain nature of early stage R&D investment. Other aims include increasing project TRL and generating investment, which are considered in assessing relevant sub-EQs.

All TRIG projects reported positive outcomes

Almost all projects had succeeded in proving their initial concept, either with (7 projects) or without challenges (8 projects), in end-of-project monitoring data. One project had successfully proved a concept that was different from its initial project plan. Responses are shown in Table 44.

Table 44 Number of TRIG23/24 projects that reported each outcome

	Number of projects
We set out to prove a concept worked and were successful without challenges	8
We set out to prove a concept and succeeded despite some unexpected challenges	7
We ended up proving something else worked	1

Source: End-of-project monitoring data

Note: 'What was the outcome of your TRIG [2023/24] project?' (n = 16).

TRIG projects typically reported that they had achieved indicators for success

TRIG projects were asked at baseline which outcomes would indicate success. At the end of their project, they were asked which outcomes they had achieved. Figure 32 compares responses at baseline and end of project.

At baseline, the key expected measures of success reported by the 13 responding projects were:

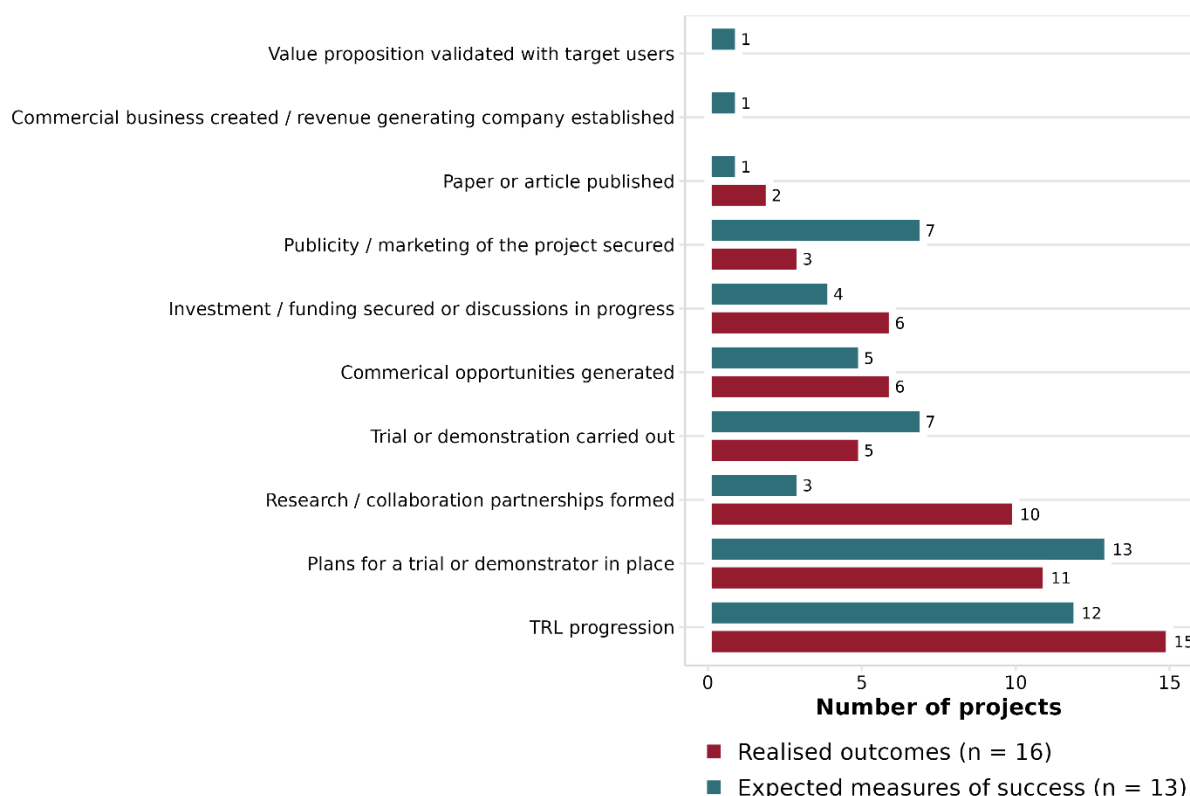
- measures related to technology, including plans for a trial and demonstrator (all 13 responding projects), TRL progression (12) and trial or demonstration carried out (7)
- publicity/marketing of the project (7 projects)
- commercial measures of success such as securing or progressing with funding (4) and generating commercial opportunities (5).

By the end of project, of the 16 TRIG projects:

- many reported having achieved technology measures, including 15 projects having seen TRL progress, 11 having put in place plans for a trial or demonstrator and 5 having carried out a trial or demonstrator

- fewer projects had achieved publicity/marketing of their project (only 3 compared to 7 which had expected to)
- more projects had achieved commercial measures of success than expected, such as generating commercial opportunities or progressing/securing funding (6 each)
- more projects had formed research or collaboration partnerships (11 compared to 3 at baseline).

Figure 32 Number of TRIG23/24 projects that reported each measure of success at baseline and end of project



Source: Baseline and end-of-project monitoring data

Note: 'Thinking of where your project will be at the end of the TRIG [2023/24] programme, which of the following will signal to you that your project has been successful?' and 'As a result of the TRIG [2023/24] programme, do you think that your project has been successful in any of the following ways?'

Indicators for success reported at the end of project did not always align with indicators reported at the start of project, suggesting that project goals can be fluid and change throughout projects or are not always easy to anticipate

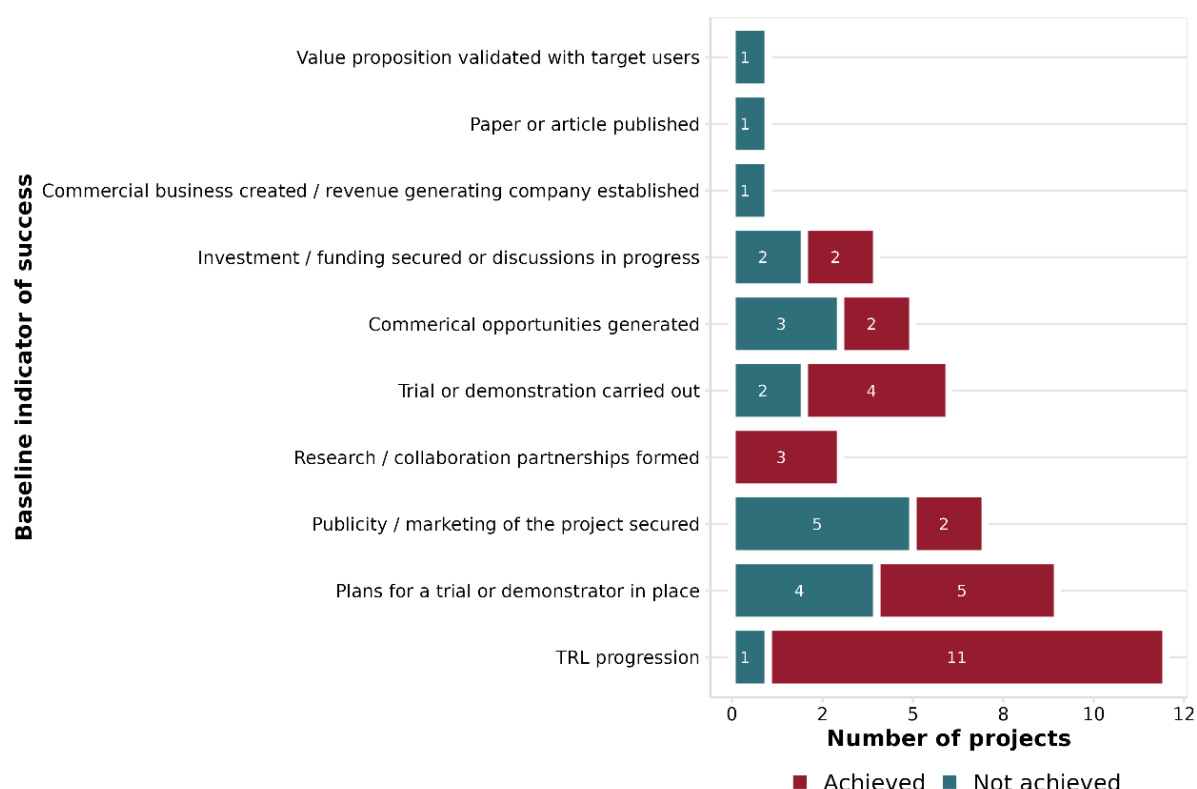
Comparing project-level reported measures of success with those expected at baseline adds rich insights into whether projects delivered against expectations.

For the 12 projects where comparison is possible, Figure 33 shows the number of projects which reported each measure as an indicator of success in baseline data, and the split of those projects into those which achieved and did not achieve.

Eleven projects which reported TRL progression as an indicator of success achieved this. Only one project reported it as an indicator of success but did not achieve this.

For other indicators, patterns of success were more mixed, with often less than half of projects having achieved indicators expected at baseline. For example, of the 9 projects that had hoped to put in place plans for a trial or demonstrator, only 4 achieved this.

Figure 33 Number of projects that reported achieving each measure of success set out at baseline



Source: Baseline and end-of-project monitoring data (n = 13)

Note: 'Thinking of where your project will be at the end of the TRIG [2023/24] programme, which of the following will signal to you that your project has been successful?' and 'As a result of the TRIG [2023/24] programme, do you think that your project has been successful in any of the following ways?'

Instead, projects often achieved indicators of success not reported as indicators for success at baseline. For example, 5 projects said that 'Research / collaboration partnerships formed' was a measure of success achieved in end-of-project monitoring despite not marking this as a measure of success in baseline data. Securing or being in investment discussions (4 projects), generating commercial opportunities (3) or putting in place plans for a trial/demonstrator (3) were also commonly achieved indicators of success by projects which did not report these as expected indicators at baseline.

The discrepancy between measures of success expected at baseline and reported at follow-up suggests that project goals can be fluid and change throughout projects.

There is some evidence of progress towards demonstration

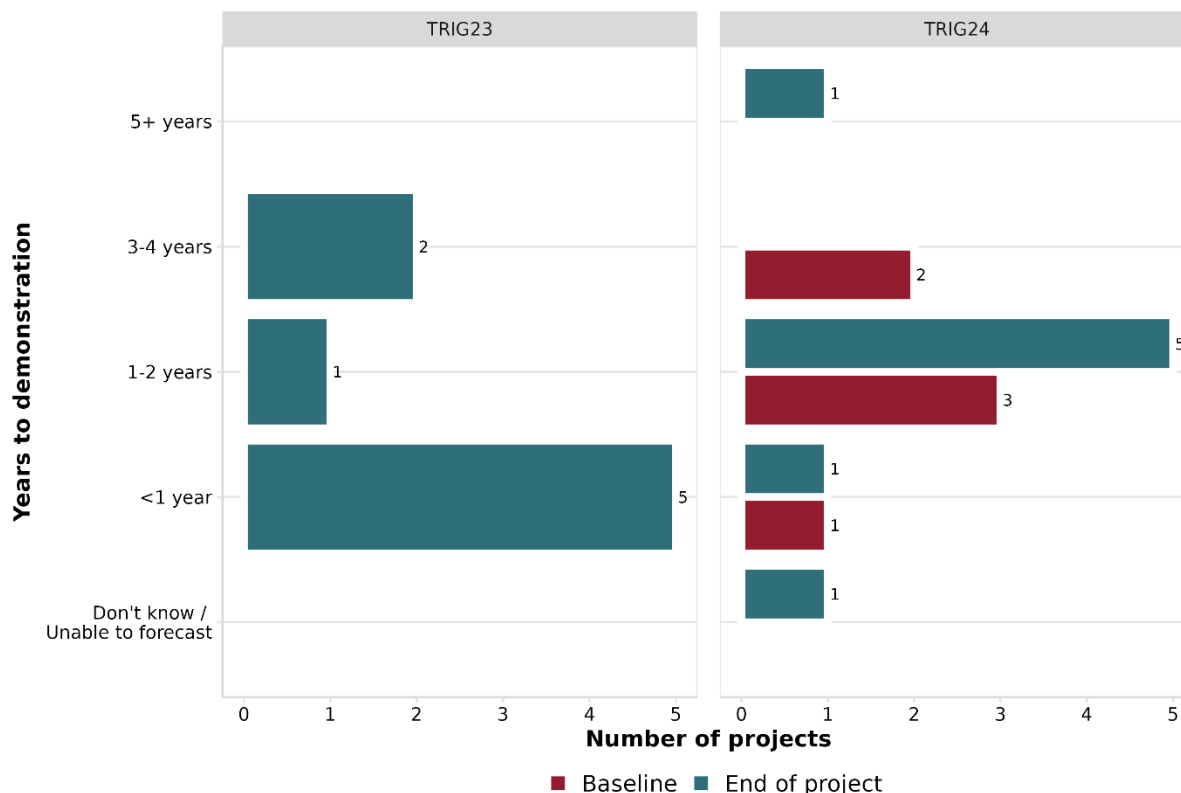
Twelve out of 16 projects reported that they had either conducted a trial or demonstration or that plans for one had been put in place, according to monitoring data. Of these, 5 had actually conducted the trial or demonstration. However, this did not always align with project goals:

- Two projects which said that carrying out a trial or demonstration had been a goal did not achieve this. Both these projects did put in place plans to do so.
- Four projects which said that putting in place plans for a trial or demonstration had been a goal did not do so (see Figure 33 above).
- On the other hand, 3 projects had put plans in place for a trial or demonstration despite not having had this as an indicator of success.

Additionally, projects were asked how many years away they were from demonstrating their technology at the end of the project (Figure 34). Six out of the 16 TRIG projects reported being less than one year from demonstration and another 5 reported being one to 2 years from demonstration.

In TRIG24, projects were also asked this question at baseline. Comparing baseline and end-of-project responses helps assess whether projects got closer to demonstration during TRIG. This comparison can be made for 5 projects. Of these, 2 projects reported a fall in the number of years from demonstration, 2 reported the same years from demonstration and one reported an increase (that is, moving away from demonstration).

Figure 34 Projects that reported the number of years to demonstration at baseline and end of project



Source: Baseline and end-of-project data

Note: 'How many years away from demonstrating the solution in the real world do you believe your idea/technology is?'. End of project TRIG23 and TRIG24, n = 8 each. Baseline TRIG24 n = 6.

Self-reported evidence suggests that TRIG is generating at least some degree of additionality in terms of technology development

In the end-of-project monitoring data, all projects 'agreed' or 'strongly agreed' with the statement that: 'The TRIG [2023/24] programme has helped your project progress towards or make it to proof of concept/feasibility'.

There were only 2 survey respondents from TRIG23/24. The results can therefore only provide a suggestive indication of additionality. One respondent said that their project would not have happened without UK SHORE funding and one said it would have happened at a slower pace.⁶³ Both projects reported that participation in TRIG had accelerated technology

⁶³ 'To what extent, if any, has your participation in this competition supported the development of your technology? Please select all that apply.' Options included: 'It wouldn't have happened at all without the competition funding', 'It wouldn't have happened in this country without the competition funding', 'It wouldn't have happened with the same number of partners without the competition funding', 'It would have happened anyway, exactly the same way', 'It would have happened anyway but with a reduced scope', 'It would have happened anyway, but not at the same pace', 'Not sure'.

development by one to 6 months.⁶⁴ One respondent said that they had diverted resources from other projects, with this funding coming from other R&D projects, suggesting a degree of displacement.⁶⁵ The other respondent reported no diversion of resources.

End-of-project reports are another source of evidence on additionality. Some projects felt that they would not have gone ahead without funding, for example due to lack of finance and commercial risk.

“Without this funding, exploration around this sector would have had to be deprioritised and is unlikely to have gone ahead, due to difficulties in raising venture capital funding for maritime hardware startups in the current funding environment.” – TRIG23 end-of-project report

To what extent did TRIG support technologies through the TRL scale?

Almost all projects reported TRL progression – but there is a discrepancy between different methods of TRL reporting

TRL progression can be understood from the monitoring data in 2 ways:

- By considering end-of-project data only: projects were asked whether they had achieved TRL progression (as part of ‘measures of success’ discussed above) and by how many levels
- By comparing baseline and end-of-project data: projects reported TRL in the baseline and end-of-project monitoring data.

As observed in previous analysis of TRIG21 and 22 (Section 7.1 of the interim report provides further detail), findings differ across these methodologies. Table 45 sets out the findings across methodologies.

Table 45 TRL progression across different measures

Reporting methodology	Proportion of projects progressing	Level of progression (for projects that progressed)
End-of-project data only (all 16 projects)	Fifteen out of 16 projects reported progression	Development was on average 1.8 TRLs.

⁶⁴ ‘To what extent, if any, has your participation in this competition reduced the time required to develop your technology? Select one.’ Options included: ‘By 1–6 months’, ‘By 7–12 months’, ‘By 1–2 years’, ‘By more than 2 years’, ‘Not at all’, ‘Too soon to say’, ‘Don’t know’.

⁶⁵ ‘Have you diverted internal resources away from other activities in order to complete the funded project?’ Options included ‘Yes’, ‘No’, ‘Don’t know’; ‘Which type of activities have you diverted internal resources from? Tick all that apply’ Options included ‘Other R&D activities’ and ‘Non-R&D activities’.

		Six projects progressed by each of 1 and 2 TRLs. Three projects progressed by 3 TRLs.
Comparing baseline and end-of-project data (12 projects)	Seven projects progressed, 3 stayed the same and 2 projects regressed	Development was on average 2.1. Five projects progressed by 2 TRLs, one project by 1 TRL and one by 4 TRLs.

Source: Frontier Economics

Note: First row presents answers to: 'Over the course of the TRIG programme, how many level(s) has your idea/technology progressed on the TRL (Technology Readiness Level) scale, if at all?' and number of projects that selected TRL development as a measure of success. Second row compares answers to: 'At what level is your idea/technology on the TRL (Technology Readiness Level) scale at present, i.e. at the beginning of the TRIG programme?' and 'At what level is your idea/technology on the TRL (Technology Readiness Level) scale at present, i.e. at the beginning of the TRIG 2023 programme?'.

Considering progression levels between the 3 methods of reporting, only 3 projects progressed by the same number of TRLs when comparing their baseline and end-of-project reported TRL to their reported number of levels progressed in end-of-project data. Three projects progressed by more than their reported number of levels progressed, while 6 progressed by less.

TRL levels reported by the 12 projects where their baseline and end-of-project data can be compared shows that:

- the majority of projects (10) were at TRL 2 and 3 at baseline, and one project was at TRL 4 and 5 respectively
- at end of project, many more projects were at TRL 4 (6 projects), fewer projects (4) were at TRL 2 and 3 and one project was at TRL 5 and 6, respectively.

Neither of the methods are given precedence in the evaluation. Taken together, they show that the majority of projects saw TRL progression but there is mixed evidence on the scale of progression.

There is evidence that further technology development can be expected from TRIG projects

Different sources of evidence suggest that TRIG projects have planned next steps related to further technology development:

- In the end-of-the project monitoring data, of the 9 responding projects, 3 reported plans to publish in a peer-reviewed journal, 4 planned to apply for an accelerator or further grant programme and a further 4 planned to go for further trials.⁶⁶

⁶⁶ 'Now that you are at the end of the TRIG 2024 programme, what are your planned next steps for the project? Please select all that apply.'

- In the online survey, one of the 2 TRIG respondents reported demonstration as a key next step.⁶⁷

In addition, there is self-reported evidence that TRIG is equipping researchers with skills that can support future development of clean maritime technology. In end-of-project monitoring data, projects reported gaining research (11 projects) and technical (14) skills as a result of TRIG. Both TRIG23 and TRIG24 were asked about the skills they had gained from TRIG. In free text fields, some projects said the skills had allowed them to gain a further understanding of the technology being developed or the specific field of research.

What role did TRIG play in facilitating parties to come together to advance the development of clean maritime technologies?

As shown in Figure 32 above, at the end-of-project stage, 10 out of 16 projects said they had formed collaborations or partnerships due to TRIG. However, only 3 projects had identified this as a measure of success at the start of the project, suggesting it was not a key goal for many TRIG projects but had been more of an incidental or unexpected benefit.

TRIG projects typically involved a number of collaborators

Seven out of 8 TRIG24 project leads collaborated with 1 to 3 partners.⁶⁸ For TRIG23, there was a mix of responses across 1 to 3, 4 to 6, and 7 to 10 collaborators. Looking at all 16 TRIG23 and TRIG24 projects, collaborations were predominantly with other SMEs (11 out of 16). They also included collaborations with government department/agencies and universities. A minority of projects (4 out of 16) said they would form a formal partnership with their collaborators after the project.⁶⁹

Monitoring data was not collected to assess whether organisations would have collaborated in this way without TRIG funding.

All projects gained connections as a result of TRIG

All projects reported that through TRIG they had gained connections with other stakeholder groups. Table 46 shows the number of projects that reported improved collaboration with each group.

⁶⁷ 'Please can you briefly outline the next steps for your project after the funded delivery phase, e.g. moving on to commercialisation, or further development/testing?' Open text response. 2025 TRIG23 and TRIG24 respondents only.

⁶⁸ 'As part of your project delivery, how many individuals or organisations have you collaborated with on your TRIG 24 project?' Options included: 1-3, 4-6, 7-10, plus other unknown options.

⁶⁹ 'Are you planning to form a consortium or formal partnership with the organisation(s) you have collaborated with?' Options included: 'Yes', 'No'

Table 46 Projects that reported improved connections as a result of TRIG

	Number of projects
Connections with other innovators	13
Connections with CPC	11
Connections with the private sector	11
Connections with DfT	8
Connections with academics	6

Source: End-of-project monitoring data

Note: 'Which of the following did you gain through participating in the TRIG [23/24] programme?' (n = 16).

In end-of-project reports, some projects praised the networking opportunities provided by TRIG.

“TRIG support is about so much more than just funding – the opportunity to regularly talk, share ideas and knowledge with likeminded people who are all facing similar problems and obstacles has been amazing.” – TRIG23 end-of-project report

6.2 Environmental benefits

EQ2 asks: To what extent, and through what mechanisms, can environmental benefits be attributed to TRIG? There is not enough evidence for a full assessment of this evaluation question. Given the low TRL of TRIG projects, demonstrable environmental benefits would not be expected at this stage. In addition, projects typically do not always report quantitative benefits in end-of-project reports.

Nonetheless, TRIG end-of-project reports set out potential environmental benefits from their technologies. Some examples are:

“By enabling on-site LH2 production and bunkering, our technology eliminates the need for transporting hydrogen, significantly reducing supply-chain emissions, promoting carbon-free maritime.” – TRIG24 end-of-project reports

“The installation [technology] represents a total NOx reduction of 65.98% when compared [to counterfactual technology].” – TRIG23 end-of-project reports

6.3 Commercial opportunities

This section presents initial findings on EQ3: To what extent, and through what mechanisms, did TRIG improve the commercial prospects and opportunities for clean maritime in the UK? The relevant data and data sources for each sub-question are reported in Table 47.

Table 47 **EQ3 data sources**

Sub-question	Data	Data source
To what extent was additional private investment crowded in for developing clean maritime technologies?	Additional investment received during programme	Monitoring data
How far have commercial benefits for UK business been realised or are expected to be realised in future for clean maritime technologies?	Business skills developed	Monitoring data
	Private sector connections generated	Monitoring data and end-of-project reports
	Revenue and cost saving benefits from TRIG	End-of-project reports
	Planned next steps	Monitoring data, end-of-project reports

Source: *Frontier Economics*

The following section discusses each sub-EQ in turn. In addition, the following sub-EQs are relevant to TRIG:

- To what extent did UK SHORE facilitate IP to be generated and retained in the UK for clean maritime technologies?
- To what extent has TRIG played a role in convening parties from industry to drive forward clean maritime concepts that offer commercial potential? What remaining barriers are there for the development of concepts?

Evidence for these sub-EQs are discussed as part of the sub-EQ on realised and future commercial benefits. Not enough evidence is available to assess them for other sub-EQs. Collaboration (relevant for the sub-EQ on convening parties) is also discussed in EQ1 above.

6.3.1 Evaluation evidence

To what extent was additional private investment crowded in for developing clean maritime technologies?

The following analysis of the monitoring data is based on 15 project leads across the 16 TRIG projects (7 projects for TRIG23 and 8 for TRIG24; as a reminder, project leads responded to TRIG monitoring data). This is because one organisation led 2 TRIG23 projects. It responded to the end-of-project data separately for both projects but both responses provided the same answers on funding generated. Therefore, this organisation is only considered once in the further funding analysis below, assuming that the data is duplicated in the responses. The term 'organisation' rather than 'project' is therefore used when discussing this data.

It is not possible to calculate total funding generated as some organisations reported receiving funding but did not disclose the funding amount and because ranges (e.g. £250,000 to £500,000) were used in reporting.

A minority of organisations had secured further funding opportunities, but more were in discussions with potential investors

Six out of 15 organisations that led TRIG projects had secured further funding, whether from the public or private sector, at the time of completion of the end-of-project questionnaire.⁷⁰ A further 8 organisations were either in discussions with equity investors (2) or were developing bids for grant funding (6). One organisation (an SME) noted that it would fund further research itself.

In the survey, one of the 2 TRIG respondents expected to secure funding from the UK public sector. Neither survey respondent had secured or expected to secure private funding or overseas public funding.

Five organisations had secured equity funding

Of the 6 organisations that reported having secured further funding, 5 had secured equity funding. Funding amounts differed across these organisations: some organisations had secured below £50,000, while one had secured in excess of £750,000.

In the end-of-project monitoring data, organisations were asked whether they had received this funding as a result of TRIG (with a binary 'Yes' or 'No' response option). Of the 5 which had secured equity funding, only one organisation felt that it had secured the further funding due to TRIG involvement. In addition, one organisation with funding in progress said that this

⁷⁰ 'What is the value of any grant funding (in GBP) you or your organisation received while participating in the TRIG 2024 programme, excluding the TRIG grant itself?'; 'What is the value of any equity investments you have received while participating in the TRIG 2024 programme (in GBP)?'; 'Did your organisation receive any debt funding (for example, loans) while participating in the TRIG 2024 programme? If so, how much (in GBP)?' Possible responses were 'None' and numerical categories e.g. £1-£50,000.

had occurred as a result of TRIG investment. More granular options reflecting the possibility of partial attribution may have helped gather more nuanced perspectives of additionality, but such data was not available.

Five organisations had secured public funding

Evidence of organisations applying for other public funding competitions was an indicator for success identified in the TRIG business case. Of these 6 organisations that reported having secured further funding, 5 had secured further grant funding. Funding typically came from Innovate UK (all 5 organisations) and was between £200,000 and £500,000 (3 out of 5 organisations). There was stronger evidence on additionality of additional grant funding: 3 out of 5 of those which had secured further grant funding felt this was because of their involvement in TRIG.

No TRIG24 organisations had secured debt funding, with no evidence for TRIG23

No TRIG24 organisations reported having received debt funding during the TRIG programme, based on end-of-project monitoring data. This data is not available for TRIG23.

How far have commercial benefits for UK business been realised or are expected to be realised in future for clean maritime technologies?

TRIG has improved projects' private sector connections and business skills

As shown in Table 46 (EQ1), 11 out of 16 projects reported improved private sector connections as a result of TRIG. Additionally, many projects reported improved business connections and collaborations as a result of TRIG in end-of-project reports. For example, one project noted collaboration with port operators and an improvement in their relationship with energy infrastructure specialists.

"The programme connected us with DfT, industry experts, and fellow innovators, helping refine our approach and align our technology with maritime decarbonisation goals." –
TRIG24 end-of-project report

Moreover, when asked which skills they had developed as a result of TRIG, 7 out of 16 projects reported 'Business and enterprise skills' and 11 reported 'Networking skills'.⁷¹ Discussions with the delivery partner for TRIG (CPC) suggest that mentoring and training provided by CPC are key aspects of the TRIG programme. These may be a mechanism for skills development. In open text fields in the end-of-project monitoring data, projects demonstrated how these skills had helped their project. They often noted the usefulness of networking sessions and opportunities to connect with investors.

⁷¹ 'Which of the following skills have you and your team gained or improved through participation in the TRIG 24 programme? Please select all that apply.'

“The project allowed us a multitude of networking opportunities which have proven highly valuable.” – TRIG23 end-of-project monitoring data

“We have improved the way we pitch our solution to private investors. We have engaged with additional stakeholders as result of the activity in TRIG to grow our network.” – TRIG23 end-of-project monitoring data

CPC stakeholders identified that the maritime cohort of TRIG projects were particularly engaged in the skills sessions provided by CPC. Skills sessions included marketing, design thinking, engaging with academics and finance.

Given that many organisations that participated in TRIG were working on low TRL projects and were SMEs, the development of such skills and connections is likely to be particularly important.

For many projects, next steps include commercialisation

Five out of 8 TRIG24 projects reported a next step related to commercialisation. In particular, 2 projects reported plans to launch their technology, 5 planned to apply for IP and 5 planned to exploit the IP within their company, university or spin-off.

In the online survey, both TRIG respondents said they were looking to take their project forward to commercialisation with further government and/or private support. However, one survey respondent noted the difficulties with getting further funding.

“The classic Valley of Death makes funding for pre-revenue hardware companies very challenging. Investors want traction and traction requires advanced development and advanced development requires time and money.” – TRIG24 survey response

Additionally, many projects discussed commercialisation in end-of-project reports. For example, one TRIG24 project aimed to “pursue spin-out formation and commercialisation by 2026” while another hoped to achieve a “commercially viable solution” by the end of the year. Other projects did not provide timeframes, with many first needing to further develop their technology before moving to commercialisation. Many projects felt that a key value add from TRIG was in helping move projects towards commercialisation, and that it had provided a foundation which they could build upon.

“Overall, TRIG funding was a catalyst for advancing this technology, providing both technical and commercial momentum for its future deployment.” – TRIG24 end-of-project report

“Through TRIG, [the organisation] has gained a strategic edge in [technology type], ensuring that its innovations are well-positioned for commercial success and further research advancements.” – TRIG24 end-of-project report

Revenue and cost-saving benefits may result from some projects

Projects were not asked about revenue and cost-saving benefits in monitoring data.

In end-of-project reports, projects noted that their technology would generate cost savings in the future. This may be due to efficiency improvements or changes in fuel used.

“With rising costs of marine diesel, it is expected that green hydrogen will in future be cheaper to produce – this will have financial benefits to both logistics companies but also potentially customers and consumers.” – TRIG23 end-of-project report

In the online survey, one of the 2 respondents reported generating revenue as a result of the technology developed during TRIG over the past 2 years. This respondent had also signed contracts to generate revenue over the next 2 years. Additionally, in the end-of-project reports, some projects noted that they had signed contracts or had had discussions about future potential contracts.

6.4 Spillover benefits

EQ4 asks: To what extent is there evidence that UK SHORE has generated positive spillover benefits?

There is limited evidence available to assess this EQ at this stage. However, some examples of spillovers can be found in the survey and end-of-project reports. These include off-grid energy solutions, military and defence applications, and road transport. Both survey respondents said their technology was currently being used in other sectors or they were in active discussions about the potential use in other sectors.

“Being successful in our grant application to TRIG has opened both conversations and doors not only in the marine industry where our project has been focussed, but in Road Transport and Plant as well.” – TRIG23 end-of-project report

6.5 Wider social objectives

This section presents initial findings for EQ5: To what extent has TRIG achieved wider social objectives? The relevant data and data sources for each sub-question under EQ5 are reported in Table 48.

Table 48 EQ5 data sources

Sub-question	Data	Data source
To what extent has TRIG contributed to sustaining or creating jobs in the UK in	Number of jobs created by TRIG22 projects and number of employees	Monitoring data

the clean maritime or related sectors?

	Project views on potential job creation impact, for TRIG21 and TRIG22	End-of-project reports
	Job creation expectations for TRIG projects	Business case
To what extent has TRIG generated evidence that supports potential employment and learning opportunities in UK maritime decarbonisation technologies?	Project views on potential job creation impact, for TRIG21 and TRIG22	End-of-project reports

Source: *Frontier Economics*

The following section presents evidence for both of these sub-EQs together due to the nature of available evidence. It should be noted that the low TRL nature of TRIG projects means the scheme is not yet expected to have delivered significant social benefits.

In addition, as data is not available, it is not possible to address the sub-EQ: 'To what extent has TRIG contributed towards levelling up of coastal areas?'

6.5.1 Evaluation evidence

Considering current job creation:⁷²

- 9 out of 16 projects added FTEs to their TRIG projects during the project
- the number of FTEs added ranged from 0.5 to 5. This equates to an average of 2.3 FTEs added to the project, for those which did add FTEs.

As highlighted in the interim report with regard to TRIG21/22, job creation would not be expected at this stage due to the low TRL nature of TRIG.

Instead of creating current jobs, TRIG projects may generate evidence which in turn could create jobs in the future. Projects typically include future job creation as a benefit in end-of-project reports. For example:

⁷² Note that 'jobs added' to the TRIG project may mean that employees were moved from other parts of the business into the TRIG project and so does not necessarily refer to job creation. 'How many full-time equivalent (FTE) employees have you added to your TRIG project during the course of the TRIG 2024 programme?' Numerical response.

“Supports future commercial pilot projects and creation of high-skilled technical and engineering jobs in Plymouth, Aberdeen and Islands by 2026.” – TRIG23 end-of-project report

Like with TRIG21/22, end-of-project reports list other additional social benefits such as increased safety due to the use of autonomous vehicles.

“Autonomous technologies help to move people from high-risk offshore jobs and into safer onshore technical and operational roles supporting remote vessel operations.” – TRIG23 end-of-project report

6.6 Overall findings and future considerations

Technology development is the primary aim of TRIG, as set out in the business case. Project self-reporting suggests that this goal was achieved as a result of TRIG funding. Most projects saw TRL progress, regardless of the approach used to measure this (15 out of 16 projects reported TRL development while 7 out of 12 projects reported higher TRL at end of project compared to baseline). All projects felt that they had successfully proven a concept as part of TRIG and that TRIG had helped them progress towards, or to, proof of concept/feasibility.

While technology development is the short-term goal, TRIG aims to develop projects which will ultimately be commercialised. Many projects reported moving towards commercialisation as a next step, although the timeframes for this were not always clear and other steps may be needed beforehand. There is evidence that TRIG is creating conditions, such as skills development and collaboration and connections, which will support future commercialisation. This includes both research and technical skills and broader commercial skills, such as networking and ‘business and enterprise skills’. However, there is not yet evidence of significant commercial benefits.

Based on end-of-project reports and the 2025 survey, at least some projects are unlikely to have gone ahead without TRIG. Others would have gone ahead but at a different scale or scope. Multiple projects noted in their end-of-project report that TRIG had helped them to set projects up for commercialisation.

However, while there is evidence that TRIG is generating technology and commercial benefits, engagement with CPC identified that the same organisations often apply and win projects multiple times (discussed within the process evaluation – see Section 3.4.6). This suggests that the technology solutions brought forward may be less diverse than they could be with a wider pool of applicants, reducing technology benefits. It also suggests that project-specific commercial benefits (such as revenue generation as a result of TRIG technologies) may be concentrated in certain organisations.

In addition, only a minority of TRIG projects generated additional funding during their project, a further measure of success identified in the business case. Evidence was stronger on further public funding than private funding. Other benefits (environmental, social and spillover) are not yet expected to have materialised due to the low TRL of TRIG projects.

The interim report made 3 data collection recommendations, all of which remain relevant for TRIG23/24. These relate to the discrepancies in TRL measurement (between the self-reported number of TRLs improved reported in the end-of-project report, and in comparing the baseline and end-of-project data) and the need to collect data after projects have finished to better capture funding generated (both short-term and long-term) and environmental, spillover and social benefits. For example, a minority of TRIG projects had generated further funding during the project – but it would be important to capture whether or not additional funding was generated shortly after project completion. Finally, while TRIG21/22 have now been completed for 3 to 4 years, it has not been possible to assess their longer-term benefits due to the lack of follow-on data.

7 Impact evaluation findings – The Clean Maritime Research Hub

This section presents findings for The Clean Maritime Research Hub, ordered by EQ. The following evidence sources are used:

- **Mid-term report (April 2025) and independent review (May 2025):** In the mid-term report, The Hub summarises its research in each of its 5 research areas and its performance against KPIs. The mid-term review was conducted by an independent board of assessors in May 2025.
- **Mid-term monitoring data (April 2025):** 12 out of 13 consortium members responded to the mid-term monitoring data. Comparisons are additionally made to baseline and end-of-year-one (April 2024) data, which had complete response rates (all 13 consortium members).
- **Stakeholder interviews:** Two interviews with The Hub lead in summer 2024 and summer 2025. One interview with a focus group of consortium members, including members from each of The Hub's research strands.

7.1 Development of clean maritime technologies

This section presents initial findings on EQ1: To what extent, and through what mechanisms, did The Clean Maritime Hub help to accelerate and support the development of clean maritime technologies relative to what would have happened in the absence of The Clean Maritime Hub? The relevant data and data sources for each sub-question under EQ1 are reported in Table 49.

Table 49 EQ1 data sources

Sub-question	Data	Data source
To what extent did the Clean Maritime Hub support technologies through the TRL scale?	Change in TRL for The Hub projects	Mid-term monitoring data
To what extent did the Clean Maritime Hub generate evidence to help inform market players as they develop maritime decarbonisation technologies?	Number of academic papers published	Mid-term report
	Hub self-assessment of research aims	Mid-term report

	Number of policy papers published	Mid-term report
	Research projects supported	Mid-term report
	KPIs relating to academic papers, policy papers and research projects	Mid-term report
What role did The Clean Maritime Hub play in facilitating parties to come together to advance the development of clean maritime technologies?	Views of The Hub on policy engagement	Mid-term report and stakeholder interviews
	Improvements in collaboration skills	Mid-term data
	Hub contact list	Mid-term report
	KPIs relating to The Hub contact list and number of presentations	Mid-term report
	Views of The Hub on collaboration	Mid-term report and stakeholder interviews
What factors or investments played a role in enhancing the influence of The Clean Maritime Hub in meeting its aims for accelerating UK clean maritime?	Skills developed as a result of The Hub	Mid-term data
What role did The Clean Maritime Hub play in facilitating international engagement in relation to the development of clean maritime technologies?	Engagement at an international level	Mid-term report

Source: Frontier Economics

Each sub-question is discussed in turn through the rest of this section. In addition, a further sub-question for this EQ on evidence relating to the ‘factors [that] played a role in enhancing the influence of The Hub in meeting its aims for accelerating UK clean maritime’ is discussed throughout exploration of each of the other sub-questions.

7.1.1 Evaluation evidence

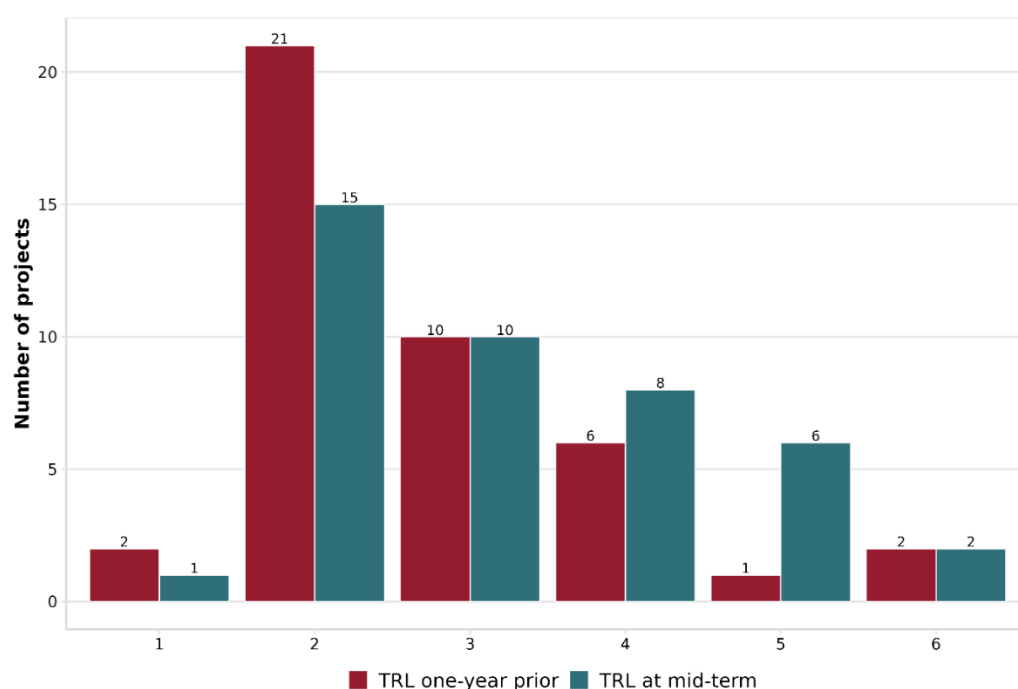
To what extent did The Clean Maritime Hub support technologies through the TRL scale?

One-third of research projects had progressed in TRL over the last year

The Hub lead was asked to report the TRL of each of their research projects at mid-term and the change compared to one year prior (which was around the one-year mark of The Hub). They reported that The Hub had worked on 44 research projects over the past year, although they only provided TRL data for 42.

Figure 35 shows TRL distribution at mid-term and one year prior (at end of year one).

Figure 35 Distribution of project TRL at mid-term and one year prior



Source: Frontier analysis of mid-term monitoring data

Note: 'Please state the technologies being researched, their current technical proximity to the market in terms of technical readiness (TRL) and commercial readiness (CRL) and how this compares to last year.' (n = 44, 2 missing responses).

Across the projects, over the year prior to the mid-term review:⁷³

- around a third (15) saw progress in TRL and the remainder saw no change

⁷³ It is not possible to compare back to TRL at baseline because of discrepancies in TRL reporting. A fuller discussion of TRL in the baseline and end-of year-one data can be found in the interim report.

- most had progressed by one level (11 projects) and the remainder (4) had progressed by 2 or 3 levels
- average TRLs had progressed from 2.73 to 3.22.

To what extent did The Clean Maritime Research Hub generate evidence to help inform market players as they develop maritime decarbonisation technologies?

A key goal of The Hub is to provide the evidence needed to support both policy makers and industry in the progression towards a clean maritime sector.

The Hub is performing well compared to its research targets

The Hub is organised across research themes. These themes are: supporting decision-making and safety for marine fuel scale-up and safety; developing cleaner power and propulsion systems; supporting decarbonisation of vessels in port and port infrastructure; enhancing vessel design and efficiency for GHG reduction; and researching digitisation, marine operations and finance.

According to its mid-term report, The Hub self-reported to be ‘on track’ for the planned schedule across all 5 research themes. Leads of each research theme similarly rated themselves on track in a focus group for The Hub.⁷⁴ For 2 research themes, there were delays in sub-workstreams (for example due to recruitment delays – see Section 3.6.2). However, these were not expected to impact overall delivery of the research themes. This marks a development compared to the interim report, where The Hub self-reported as delayed in 2 of the 5 research themes (‘marine fuel scale up and safety’ and ‘power and propulsion systems’).

Across these research areas, The Hub mid-term report sets out that it has published over 30 journal articles with more than 80 citations in total. It is achieving its KPI to publish 2 papers per research theme.

Additionally, in interviews, The Hub reported going further than its own initial bid, with one Hub member noting that it had brought in additional aspects and strands of research. The breadth of research has increased compared to the first year of The Hub: they are now researching 45 technologies, compared to 10 at the end of year one.

“The research The Hub is conducting is clearly progressing well and of high quality at this point.” – The Hub mid-term review

However, The Hub is performing less well in supporting additional research projects. Its KPI from EPSRC and DfT is to fund 30 projects via its Flexible Fund programme. These flexible funds are important in allowing The Hub to respond to emerging research challenges which fall outside of its core research. However, only 9 had been funded by the mid-term report (with a tenth being scoped).

⁷⁴ All research themes except the vessel design and efficiency strand were represented in the focus group.

It is likely that The Hub has generated research beyond what may have been generated without The Hub

At the interim report stage, the additionality of The Hub on research outputs was unclear. It is still true that some of The Hub's published research will have been started before The Hub was established. For example, in interviews, it was noted that much of the work for research strand 5 (digitalisation, marine operations and finance) had begun before The Hub was started and was partly funded outside of The Hub.

However, interviews with The Hub identified that The Hub has drawn people into the clean maritime field. This has therefore expanded the amount of research that can take place. Additionally, consortium members of The Hub felt that the benefits discussed below (such as collaboration and insight from industry) has resulted in additional or higher quality/more effective research.

Policy engagement has increased in the past year, but remains behind schedule

The Hub has a Clean Maritime Policy Unit (CMPU). This unit, as well as other researchers in The Hub, engages with policy makers and produces policy outputs. To date, some key engagements have been:

- regular scheduled meetings with the Chief Scientific Advisers at both DfT and the Department for Energy Security and Net Zero (DESNZ)
- a meeting with the Minister for Aviation, Maritime and Security
- co-presenting a session at DfT Academic Engagement event
- engagement with the Bank of England to examine the macroeconomic effects of the transition to net zero in the maritime industry as part of the 'digitalisation, marine operations and finance' research strand.

In addition, The Hub has produced a number of policy outputs:

- 4 policy bulletins (as of July 2025), including topics such as eco-ship investment and price differentials and safety hydrogen storage⁷⁵ – these aim to inform policy makers about academic issues
- one white paper, in collaboration with a maritime insurance company, on the risks in maritime decarbonisation⁷⁶
- an energy efficiency report for DfT to support negotiations at the International Maritime Organisation (IMO) – this is a notable example of international influence

⁷⁵ <https://www.clean-maritime-research-hub.org/resources/>

⁷⁶ Atrium Underwriters (2024). Emerging Risks in Marine Decarbonisation: Time to Set Sail. (https://www.atrium-uw.com/media/vz0nfiku/5647_27-atrium-marine-decarbonisation-whitepaper-v4a.pdf)

- 3 calls for evidence across 3 government departments: the Invest 2035 green paper on industrial strategy (DBT), the UK ETS expansion for maritime (DESNZ) and the Integrated National Transport Strategy (DfT)
- a maritime research infrastructure survey for EPSRC.

In interviews, The Hub lead noted that it was difficult to track the impact of its policy influence as it was primarily indirect. For many of the outputs listed above, there is no evidence on the impact of engagement and outputs. However, The Hub lead highlighted a key example being the energy efficiency report, which was used to influence International Maritime Organisation negotiations via an evidence-backed approach. This evaluation did not include engagement with key policy makers to understand the impact The Hub has had.

Looking ahead, The Hub plans to continue engaging with policy makers in several ways. This includes continued ‘informing’ via policy bulletins and a seminar series. Meetings with the Chief Scientific Advisers for DfT and DESNZ will continue, as will further support for the IMO negotiations. It will also hold a roundtable to help DfT enhance its emission models.

However, in line with findings at the interim stage, The Hub is behind on its policy KPIs due to a 10-month recruitment delay for the Policy Lead. Its target is to achieve 10 policy documents per year but only 10 have been produced across the roughly 20 months of The Hub. The Hub is aware of this delay. In the focus group, the Policy Lead also acknowledged that the objectives of the policy strand were behind objectives and attributed this to the recruitment delay.

The Hub is providing training to create policy-ready researchers

In the mid-term report and in interviews, The Hub reported that it was training early career researchers and experienced academics to translate their research to a policy audience. It noted that the aim of this work was to create a community which can translate its research in a form that is understandable to a ‘lay’ audience.

Consortium members of The Hub reported that this training had been effective. In monitoring data, 9 out of 12 of The Hub’s universities that responded to monitoring data reported that ‘policy engagement’ was one of the top 3 skills they had developed because of The Hub (see Figure 37 below). In addition, in interviews, consortium members commented on the support provided by this training.

“We have been helped in how to make policy presentations rather than the academic presentations we make normally. We are more comfortable with the sort of organisation of powerpoints or slides in that way, but clearly try to use language or use the style of policy.”

– Consortium member of The Hub

In the mid-term review, it was noted that individuals at the Hub lead university were skilled at engaging with key stakeholders, but this was less true at other consortium members of The Hub. Therefore, this training is important to ensure that all consortium members of The Hub

can be ‘ambassadors’ for their work. Training will help academics engage not only with policy makers but also with industry (helping to achieve commercial outcomes, discussed in 8.3).

The opportunity to feed into government policy is a key value add of The Hub

In interviews, consortium members noted that The Hub provided a great opportunity for them to disseminate knowledge to government. Policy engagement was also a key success story noted by universities in monitoring data.

“The involvement with The Hub has enhanced policy engagement through presentations of findings to and dialogue with the UK Department for Transport and the Department for Business and Trade.” – The Hub mid-term monitoring data

The complexity of the maritime sector means that research is crucial to develop policy successfully. Delivery partners noted that policy makers need access to academic expertise and the cutting-edge of knowledge.

“Another good reason for setting this up, is about accessing the academic expertise. It's about that excellence, it's about cutting-edge knowledge. It's about the DfT having the policy idea and having evidence ... and expert individuals that can help to challenge that, develop it or improve it.” – Delivery partner

What role did the Clean Maritime Hub play in facilitating parties to come together to advance the development of clean maritime technologies?

The Hub’s research has been made possible by drawing in people, skills and technologies from outside the maritime sector

In interviews, The Hub emphasised that a key benefit of its work had been to bring together researchers who had previously worked outside of the maritime sector. These researchers had expertise in specific technologies, such as combustion technology, propulsion technology or certain fuels. Others worked in fields not directly connected to the technology and were instead ‘environmentalists’ and ‘social scientists’.

“The majority of researchers that are working within the hub had no previous work in relation to the maritime sector [...] So actually bringing together all the right expertise but with a complete focus on maritime.” – The Hub lead

When asked in monitoring data about the key success stories and skills developed as a result of The Hub, some university members commented on the fact that their researchers had no previous experience in clean maritime. The clean maritime field can now draw on this vast and eclectic skillset to advance research.

“One of the straplines we use a lot is about being a fresh approach to maritime decarbonisation. That is very much about harnessing new skillsets that have not previously been tapped into.” – The Hub lead

In addition, The Hub had brought in technologies from other sectors. One example was researching into the use of ultrasonic sensor technology, initially developed outside the maritime sector, to overcome the challenges of storing ammonia within maritime. This idea was developed as part of the Co-Innovation cycle (discussed further below).

“I think that’s probably a really good example of showcasing how existing technologies and expertise has been translated into a clean maritime setting [...] we’ve put a new spin on it to actually give a new perspective on what that technology can do if we are moving to cleaner fuels, autonomous shipping.” – The Hub lead

Moreover, in the mid-term report, The Hub reported that strand 1 of the research (marine fuel scale-up and safety) had involved working closely with the UK Hub for Hydrogen Research Challenges (UK-HyRes). They had been able to draw on expertise from UK-HyRes and apply learnings to clean maritime.

The Hub has contributed to the creation of a clean maritime community

The Hub is made up of 13 universities with support from 72 project partners.⁷⁷ The Flexible Fund programme encompasses an additional 6 universities and 16 project partners. Based on The Hub’s mid-term review, 79 people work in The Hub. This includes 26 core academics, 19 post-doctoral research associates, 7 PhD students and 21 researchers in the Flexible Fund programme.

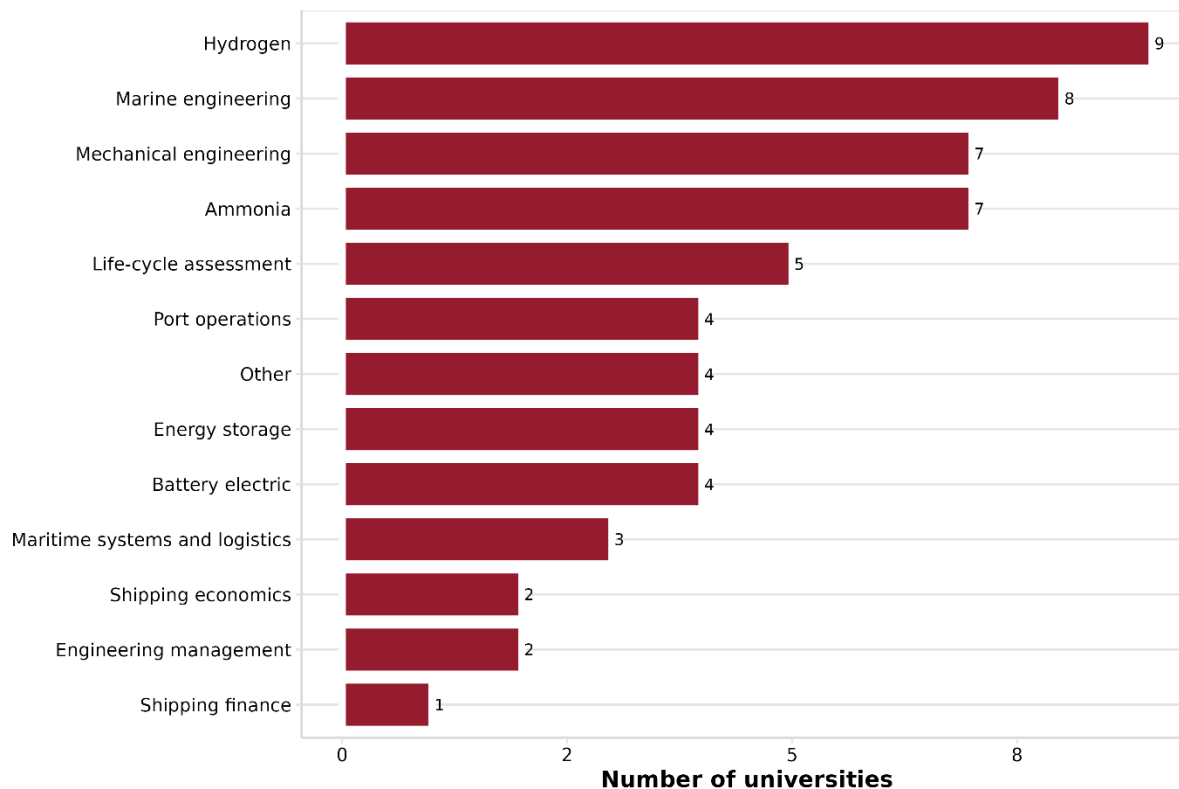
As noted above, The Hub reported that many of these researchers were new to the clean maritime field, but this has not been independently verified.

According to the monitoring data, a significant proportion of this workforce have subject matter expertise.⁷⁸ This expertise is wide ranging. Figure 36 presents the number of consortium members that reported staff with subject matter expertise in each field. It includes specific technologies (such as hydrogen and ammonia), specific types of analysis and skills (such as life cycle assessment and engineering) and broader understanding of the sector (such as shipping finance and economics). Hydrogen, marine and mechanical engineering and ammonia were the subject matter expertise reported by the most universities.

⁷⁷ The remainder of this section refers to 12 universities as only 12 responded to the mid-term monitoring data. One university did not respond.

⁷⁸ Summing results across universities results in a total of 73.5 people with subject matter expertise working at The Hub. This is unintuitive as the question asked about ‘people’ but some universities appear to have understood this question to mean ‘FTEs’, reporting half a person. This question cannot be compared to previous monitoring data, which asked about subject matter experts across the university and not just those at The Hub.

Figure 36 Number of the consortium members had staff with subject matter expertise in each area



Source: Mid-term monitoring data (n = 12)

Note: 'Please select the primary areas of expertise held by the staff members referenced in the previous question' where the previous question asked 'How many people associated with The Hub are considered to have maritime related subject-matter expertise?'. Chart reports the total number of staff with expertise in each area.

Consortium members felt that The Hub had had a positive impact on engagement, with 8 out of 12 universities reporting that 'collaborating and partnering is one of the top 3 skills they have developed because of The Hub' (Figure 37, see below).

In particular, The Hub has created a network for early stage researchers. The network helps equip researchers to work in the clean maritime sector. As an example, it organised a visit to a port to give the researchers more insight into the practical implications of their work. It also supports connections between this group.

"The Hub has organised a very good platform for young people to share their news and interact with each other. I do believe this benefits the research as a whole." – **Member of The Hub**

The Hub is driving knowledge sharing across the clean maritime sector

In line with findings presented in the interim report, The Hub is performing well on KPIs related to engagement according to evidence from the mid-term report.

It has presented 28 conference papers, compared to a target of 12 per year (which would equate to around 19 conference papers in the roughly 19 months that The Hub had existed at mid-term). Membership of the email mailing list exceeds 2000, including multiple areas of the maritime community. This is above the target of 300 active members by the end of the first year, with further increases over time. The figure has grown from 150 at baseline and 1,500 at end of the first year.

The Hub reported that engagement at its events had been strong and in line with targets. For example, it reported that attendance was in line with targets of a minimum 30 delegates at small-scale events. In addition, it reported that it had achieved goals for positive feedback from 75% of all delegates.

On 25 to 26 June, The Hub held its [Clean Maritime Assembly 2025](#). The session brought together researchers from The Hub with industry experts. It covered a breadth of The Hub's research through presentations and included networking opportunities. In the mid-term report, it forecasted that attendance at the Clean Maritime Assembly would be a 40% increase from 2024, at roughly 200 attendees. The Hub was also involved in London International Shipping Week in September 2025.

Evidence above suggests that collaboration is a key driver of the success of The Hub

Across interviews, stakeholders, organisations and delivery partners consistently highlighted the value-add provided by The Hub.

*“To build that critical mass and capability, you need a significant slug of funding and you also need to basically bring the right people together and so there are several universities involved in this hub. ... I think the nature of the investment in itself has helped, because it is about creating a hub, as opposed to 10 more individual research projects.” – **Delivery partner***

Consortium members noted that partnerships allowed more impactful work. For example, joint responses to consultations allowed collating evidence from different partners across the consortium. Learnings from different disciplines could be brought together to support the development of clean maritime research.

*“I think The Hub provides a very good opportunity for many universities in the industry to work together to achieve net zero [...]. It gives us a good environment to employ all this latest technology into maritime research.” – **Consortium member***

In particular, they noted that the Co-Innovation Sprints were a key element of collaboration. Over a two-day event, clean maritime stakeholders discussed research undertaken by The Hub to date and identified opportunities for further research. The event involved structured,

round-table discussions which included individuals with diverse perspectives in the clean maritime field. The discussions had informed The Hub's research and innovation roadmap and would be a yearly event over the next 3 years. As noted above, these sprints generated new ideas such as the use of ultrasonic sensor technologies from outside maritime.

In interviews, consortium members highlighted the benefits of such events and face-to-face collaborations.

"It really helps because even though we're in themes, in actual fact the themes need to work across each other [...]. I can't just sit in my own little theme box and work it out. Those in person meetings are hugely important in terms of understanding what everyone else is doing and coming up with new ideas about how you might take it." – Consortium members

However, at the mid-term, the panel noted that:

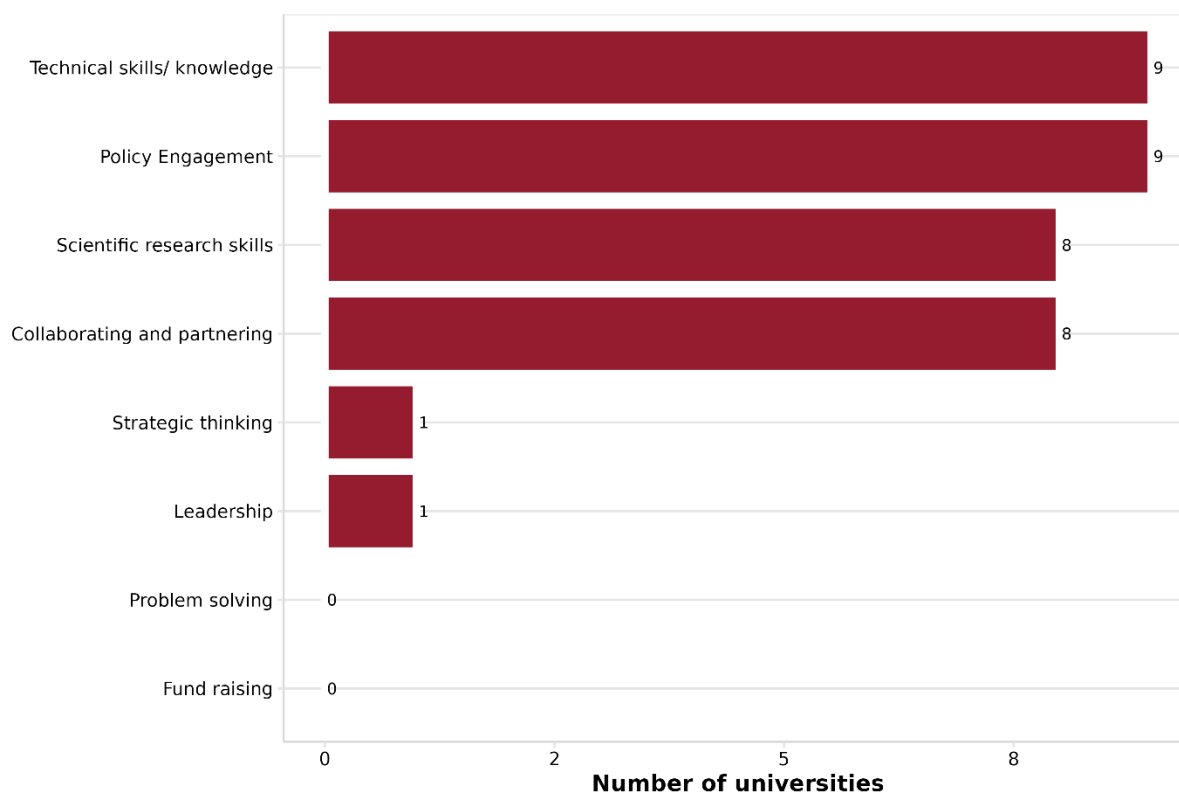
"There was some concern that the consortium needed to do more work together to ensure it is greater than the sum of its parts. The hub must address how the many projects, research streams, collaborations and researchers were moving forward the maritime sector as a whole, integration issues should be worked through." – The Hub mid-term review

This suggests that the full benefits of collaboration have not yet been realised and more could be done to foster collaboration in the future.

What factors or investments played a role in enhancing the influence of UK SHORE in meeting its aims for accelerating UK clean maritime?

Universities involved in The Hub have developed skills related to research, policy engagement and collaboration

All universities involved in The Hub were asked to select the top 3 skills that their workforce had developed due to participating in The Hub. Figure 37 presents the responses. Responses clustered around 4 key skills, with 8 or 9 (out of 12 universities) selecting each of these responses. These relate to technical and scientific research skills, collaboration and policy engagement – which are key aims for The Hub.

Figure 37 Skills developed as a result of The Hub

Source: Mid-term monitoring data (n = 12)

Note: 'Has participation in the Clean Maritime Research Hub resulted in the development of any of the skills listed below for the work force associated with The Hub in the previous year (since April 2024)? Please select the top 3 that apply'.

Some skills were very rarely selected or not selected at all (strategic thinking, leadership, problem solving, fund raising). This does not mean The Hub did not contribute to these skills, as organisations only selected the top 3 skills.

7.2 Environmental benefits

EQ2 asks: To what extent, and through what mechanisms, can environmental benefits be attributed to the Clean Maritime Hub? There is not enough evidence for a full assessment of this evaluation question (in line with findings for the interim report). Given the low TRL of their research, it is not expected that The Hub will have delivered demonstrable environmental benefits at this stage. Nonetheless, there are examples of how The Hub can support emission reductions in the future. For example:

- In the focus group, The Hub members highlighted that their research provided evidence to allow correct decisions to be made about the path to decarbonisation.

- The Hub's 'port-centric approach'⁷⁹ means it is developing specific routes for emission reductions for those ports it is engaging with. Working directly with the port increases the likelihood that technologies will be introduced in the real world.

7.3 Commercial opportunities

This section presents the initial findings on EQ3: To what extent, and through what mechanisms, did the Clean Maritime Hub improve the commercial prospects and opportunities for clean maritime in the UK? The relevant data and data sources for each sub-question under EQ3 are reported in Table 50.

Table 50 EQ3 data sources

Sub-question	Data	Data source
To what extent was additional private investment crowded in for developing clean maritime technologies?	Match funding generated	Mid-term report
How far have commercial benefits for UK business been realised or are expected to be realised in future for clean maritime technologies?	Collaboration with industry	Monitoring data Mid-term report Stakeholder interviews
	Change in CRL	Monitoring data
	Examples of commercialisation	Stakeholder interviews

Source: Frontier Economics

7.3.1 Evaluation evidence

To what extent was additional private investment crowded in for developing clean maritime technologies?

The Hub has had mixed success in generating additional funding

Based on the mid-term report, The Hub has engaged with an additional 16 project partners to generate £842,900 of match funding. The Hub is also drawing down on the match funding it

⁷⁹ Through the Co-Innovation approach, The Hub works directly with ports in Dover, Teesside, Belfast, Liverpool and Felixstowe. These ports were chosen for the variety of services they focus on.

generated as part of the bid. In total, The Hub should generate at least £10 million of match funding.

However, the mid-term report also identifies that The Hub has not yet been able to generate funding to sustain itself after the initial 43-month period (i.e. from April 2027). This is compared to a KPI to secure funding for months 43 to 60. In the mid-term report, The Hub noted the difficulties with securing funding so far in advance of the end date.

In addition, in monitoring data, no universities reported generating additional funding. One university reported receiving funding in kind to host an event. In Figure 37 above, no universities reported 'fund raising' as one of the top 3 skills they had developed due to The Hub.

How far have commercial benefits for UK business been realised or are expected to be realised in future for clean maritime technologies?

The Hub has increased collaboration with industry

Eleven out of 12 universities said they agreed or strongly agreed with the statement that 'Our connections with industry have improved as a result of participation in this Hub'. The remaining university responded that it neither agreed nor disagreed. This aligns with findings in the interim report, when 11 out of 13 universities agreed or strongly agreed with the statement (see Figure 78 in the interim report).

The Hub reported directly collaborating with industry partners on projects. In monitoring data, 16 out of 26 projects were recorded as having industry partners. For example, one member of The Hub reported working with a new industry partner via a relationship that had developed due to involvement with The Hub. In another project, one university was working with 3 regional Gas Network Operators to model safety concerns related to hydrogen-natural gas blends.

Industry collaboration is a key element of The Hub's 'port-centric and co-innovation methodology'. It works directly with 5 ports across the UK to tackle specific issues faced by each port.

"The panel praised the design of the work with the five port scenarios which has been integrated well into the hub's work, noting that they feel the hub has the potential to meaningfully tackle subjects such as operational inefficiencies at ports. They were pleased to hear the hub are continuing to engage with other ports and harbours outside the initial 5 cases." – The Hub mid-term review

Consortium members felt that collaboration with the community outside of The Hub was possible because of The Hub. Such collaboration allowed The Hub to focus on research that would make a real difference to the maritime sector.

"The Hub's done a really good job of putting together the meetings that bring together the academics with people in the ports and in industry. [These] have been incredibly useful to

highlight what they see as barriers and then us to be able to take that into our work to do the analysis.” – Consortium member

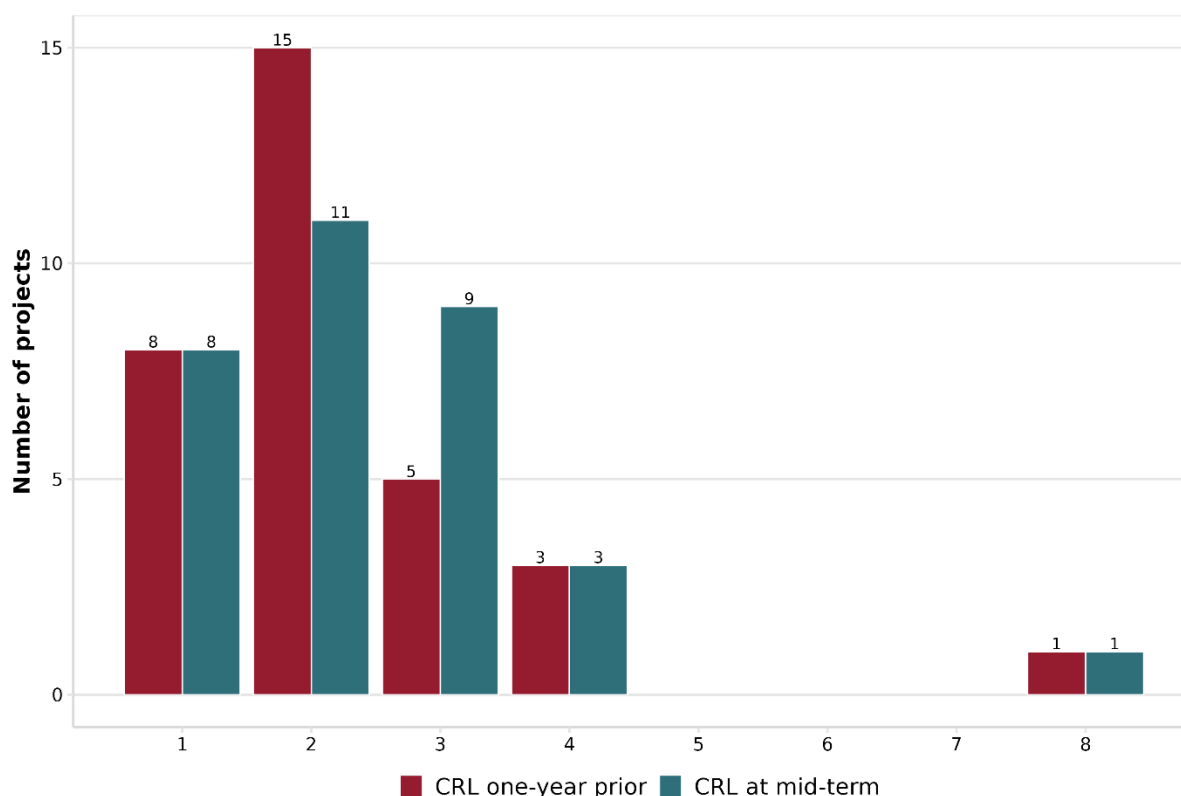
In line with conclusions in the interim report, it is too early to say whether follow-on commercial benefits will arise from the collaboration.

CRL progression has been limited to date

Like TRL, The Hub lead was asked to report CRL for each of their 44 research projects at mid-term and one year prior. They provided data for 31 out of 44 projects. Of these, only 4 projects saw CRL progressed. Such projects moved from CRL 2 to CRL 3. Projects span CRL 1 to 4, with one CRL 8 project.

Figure 38 shows the distribution of projects across the CRL scale at mid-term and one year prior. The graph illustrates that there were 4 fewer projects at CRL 2 and 4 more at CRL 3.

Figure 38 Distribution of CRL at mid-term and one-year prior



Source: Frontier analysis of monitoring data

Note: 'Please state the technologies being researched, their current technical proximity to the market in terms of technical readiness (TRL) and commercial readiness (CRL) and how this compares to last year.' (n = 44, 12 non-responses).

As with TRL, it is not possible to compare back to CRL at baseline because of discrepancies in CRL reporting (more detail can be found in Section 8 of the interim report).

There are some early examples of commercialisation from The Hub's work

In interviews, The Hub reported that 2 spin-out companies had been formed as a result of its work. One company focused on shore power and distributed energy within ports. The Hub had provided the stimulus for the project by the work that had been undertaken and from discussions with ports. As a result, the project had applied for a CMDC4 project, which gave private investors the confidence to provide additional funding. The Hub lead felt that The Hub had been crucial for this development, particularly at the pace it had occurred.

"That probably wouldn't have happened, definitely not at that pace and that business opportunity." – The Hub lead

Looking forward, The Hub aims to provide 'practical solutions' which can be commercialised. One example of a potential future commercialisation relates to technology that increases the safety of hydrogen storage tanks. The technology was developed via collaboration between The Hub and Ulster University's Hydrogen Safety Engineering and Research Centre (HySAFER).

"The unprecedented performance of this storage technology is underpinned by extensive numerical studies and successful experimental validations and has wider benefits for The Hub's other research into alternative maritime fuels. There is a commercialisation potential for this technology." – The Hub mid-term report

7.4 Spillover benefits

EQ4 asks: To what extent is there evidence that UK SHORE has generated positive spillover benefits? Limited evidence is available to assess this EQ at this stage.

As noted in EQ1, The Hub has drawn on other sectors for researchers, skills and technology to a large extent. It has supported large spillovers from other sectors into the clean maritime sector.

It is also possible that findings from The Hub research may spill over into other sectors, particularly because of its collaboration with bodies such as UK-HyRes. For example, in the mid-term report, The Hub highlighted that it was "contributing to emerging sectors, such as hydrogen and ammonia supply chains". However, there is not enough evidence available to assess the extent to which these spillovers have been achieved.

"It's actually how we bring in learning from other sectors to help to sort of accelerate maritime, but also some of the issues around hydrogen combustion etc., ... the aviation people are going to be just as interested. Some of the things that [The Hub are] working on has the potential for many transport solutions and not just in the maritime space."
– **Delivery partner**

7.5 Wider social benefits

This section presents initial findings on EQ5: To what extent has the Clean Maritime Hub achieved wider social objectives? The relevant data and data sources for each sub-question under EQ5 are reported in Table 51.

Table 51 EQ5 data sources

Sub-question	Data	Data source
To what extent has UK SHORE contributed towards levelling up of coastal areas?	Regional distribution of Hub organisations and collaborators	Interim report
To what extent has UK SHORE contributed to sustaining or creating jobs in the UK in the clean maritime or related sectors?	Number and change in FTEs	Mid-term data
	PhD researchers	Qualitative data

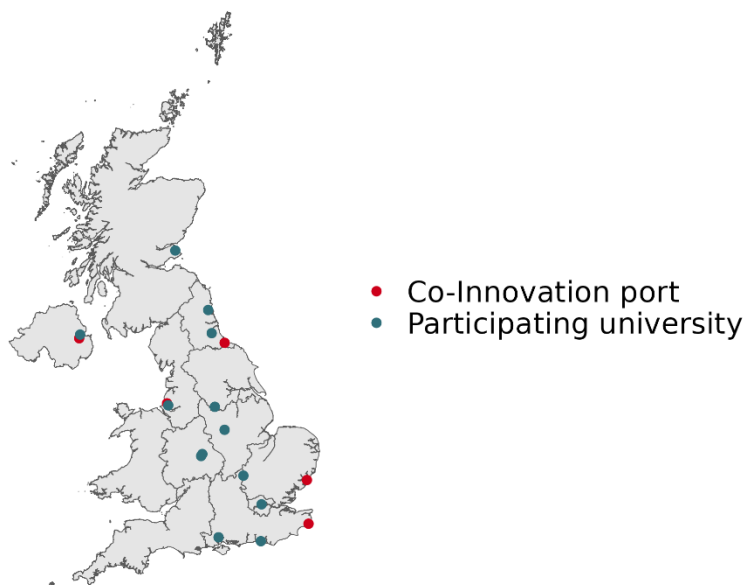
Source: Frontier Economics

7.5.1 Evaluation evidence

To what extent has the Clean Maritime Hub contributed towards levelling up of coastal areas?

The Hub's consortium and collaborators are well distributed across the UK (see Figure 39). This means that, to the extent that commercial and job creation benefits arise, these are likely to occur across the UK. Of the Co-Innovation ports, 2 are located in cities (Liverpool and Belfast) but the remainder are not (Felixstowe, Teesport and Dover).

Figure 39 Locations of the organisations involved in The Hub



Source: Frontier Economics

To what extent has the Clean Maritime Hub contributed to sustaining or creating jobs in the UK in the clean maritime or related sectors?

According to monitoring data, 36 FTEs participated in The Hub between April 2024 and 2025.⁸⁰ Of these, 20 were jobs created specifically due to UK SHORE funding for The Hub.⁸¹ This marks an increase compared to the end-of-year data where 28 FTEs had participated in The Hub, of which 10 were jobs created specifically due to The Hub funding. This aligns with the fact that 9 out of the 12 universities reported an increase in the number of FTEs relative to when they last answered the monitoring data in April 2024.⁸²

Qualitative engagement with The Hub identified that many of the jobs created because of The Hub were research assistant roles. The Hub has also created many PhDs, but these are not classed as 'jobs'. For The Hub, 'job' creation is a relatively less important outcome. Instead, it aims to create a skilled research community that can advance clean maritime research. Creating PhD roles in the field is therefore a key output for The Hub.

⁸⁰ 'How many Full-Time Equivalent (FTE) jobs from within your organisation participated in this Hub over the past year (e.g. 6.5 FTE would be 6 full time jobs and one part time job working 50% of a full time job)?' Numeric answer.

⁸¹ 'Of the above jobs, how many of them (or proportion of them) were new jobs created specifically due to UK SHORE funding for the Clean Maritime Research Hub?' Numeric answer.

⁸² 'How has the number of FTE jobs changed since you answered the last annual survey in April 2024?' Options included: 'Decreased', 'Increased', 'No change'.

7.6 Overall findings and future considerations

In its recent mid-term review (May 2025, conducted by external experts), The Hub received a score of 'B' meaning that the majority of the assessment criteria had been met with some suggested amendments. Additional funding of £2 million has been provided by DfT to support The Hub for an additional year, indicating that DfT and EPSRC are happy with The Hub's outputs to date.

In addition, The Hub is meeting the majority of its KPIs. It has been progressing research across key themes and engaging with policy makers and industry. It is working on more technologies than at the end of the first year and one-third of projects have seen TRL progression. In line with findings at the interim report, evidence from TRL and CRL progression suggests it has had a greater impact on technology than on commercial development. This is as expected given the focus on earlier-stage research.

According to consortium members, some key elements of The Hub have been crucial in generating its success:

- The Hub has drawn researchers into maritime and has created a 'clean maritime research community'. This also points to additionality of The Hub, as these researchers would not have been advancing research in this field without The Hub.
- The Hub's scale and cross-disciplinary approach enables it to understand the entire sector. This understanding puts it in a better position to deliver benefits for industry and policy makers beyond those that could be delivered by researchers working independently. The Co-Innovation methodology is a key element of this. This aligns with findings from the interim evaluation, where collaboration was identified as the key additionality of The Hub.

However, there have been challenges which have limited the ability of The Hub to deliver impact. Policy engagement is behind expectation due to recruitment delays. This was acknowledged by consortium members and by the reviewers at mid-term. Nonetheless, policy engagement has been increasing as has training on policy engagement, which was seen as a key benefit by members. Consortium members felt that The Hub had enabled them to engage with policy on a greater scale than they otherwise would have. It is difficult to measure whether there have been tangible impacts on policy development.

In addition, the mid-term review highlighted some concerns about how The Hub will deliver real-world impact:

[The Hub needs to] "be able to demonstrate a clear pathway for how they are going to convert outputs into outcomes, to deliver real-world impact from The Hub's activities."

– The Hub mid-term review

In interviews, The Hub itself acknowledged the difference between different funders' expectations on outputs/real-world impact compared to research. According to EPSRC, the

goal of The Hub is to build up a “research critical mass” working on “exciting, novel, world class research”. It felt this should be achieved while working with industry and policy makers to ensure that ideas are integrated into the wider sector. EPSRC did not expect the outcomes of The Hub to be tangible at this stage, as it was only 20 months into delivery of a 48-month programme (at the time of interview). Whether or not The Hub is able to generate significant emissions reductions and benefits for UK businesses can only be assessed over the longer term.

8 Impact evaluation findings – Portfolio-wide

This section draws on the scheme-level assessments (Sections 4 to 7) to provide a summative assessment of the UK SHORE portfolio. As detailed in Section 1, the 'UK SHORE portfolio' refers to a subset of schemes in the first phase of UK SHORE: CMD1-4, ZEVI1, TRIG21-TRIG24 and the Clean Maritime Research Hub.

The findings include evidence from CMD1 and ZEVI based on monitoring data with high levels of non-response. Across CMD1 and ZEVI, 430 out of 614 (70%) organisations across 103 out of 146 (71%) projects responded to end-of-project monitoring data.⁸³ The findings are therefore not representative of all projects and the totals reported (such as for job creation) will understate impacts across the schemes. This issue is more significant for some scheme rounds (such as CMD3) than others, due to varying response rates across schemes. Details on response rates for each scheme and scheme round can be found in Sections 4 and 5.

8.1 Development of clean maritime technologies

This section presents initial findings on EQ1: To what extent, and through what mechanisms, did UK SHORE help to accelerate and support the development of clean maritime technologies relative to what would have happened in the absence of UK SHORE? This includes the following sub-EQs:

- To what extent did the projects funded through UK SHORE schemes deliver the outputs as anticipated in the business cases?
- To what extent did the overall portfolio support technologies through the TRL scale?
- What role did UK SHORE play in facilitating parties to come together to advance the development of clean maritime technologies?
- What factors or investments played a role in enhancing the influence of UK SHORE in meeting its aims for accelerating UK clean maritime?

Not enough evidence was available to assess the following sub-EQs:

- To what extent did the overall portfolio generate evidence to help inform market players as they develop maritime decarbonisation technologies? The evaluation evidence gathered enabled an assessment of knowledge sharing and information benefits within schemes, but no specific additional evidence was gathered at the portfolio level or with players outside of the UK SHORE portfolio.
- What role did UK SHORE play in facilitating international engagement in relation to the development of clean maritime technologies? No monitoring data was available to assess this question in a substantive way. Primary data prioritised other aspects of UK SHORE.

⁸³ Sample size for individual questions may be lower as organisations did not always respond to all questions. For TRL and CRL/MRL development, only project lead responses were used. Only private organisations were asked some questions in the CMD1 and CMD2 monitoring data.

Given that CMD5 has more focus on international collaboration, this EQ may need to be revisited in future evaluations.

8.1.1 Evaluation evidence

To what extent did the projects funded through UK SHORE schemes deliver the outputs as anticipated in the business cases?

The number of projects funded is roughly in line with business case expectations. Some deviations have occurred, including project delays, withdrawals and terminations. In addition, The Hub is behind schedule on the funding of the Flexible Fund programmes.

Despite experiencing delays, individual projects have typically achieved their goals

Across all schemes, organisations were typically positive about the outcomes of their projects. For example:

- 85% (96 out of 113) of TRIG and early CMD5 (CMD1 and CMD2) project leads self-reported success.⁸⁴
- Later CMD5 (CMD3 and CMD4) and ZEV1 projects were not asked these questions in monitoring data. However, in interviews, many commented on delays or aspects of their project that they did not complete, but they still felt they had been ‘successful’ to date.
- The Hub members self-reported themselves as being ‘on track’ against their 5 key research themes and were meeting the majority of their KPIs.

Delivery partners were also typically positive about the success of projects across the portfolio.

“Most projects have achieved most of their objectives that they set out to do. We’re seeing lots of demonstrators come online, so vessels being on the water, infrastructure bits and pieces going live, and working with the vessels they’re meant to work with. I think that, as a result, the businesses and organisations that have been involved in the projects are realising their exploitation aims a little bit.” – Delivery partner

A fuller discussion of the types of barriers faced by projects is set out in the process evaluation (Sections 3.6.2 and 3.6.7).

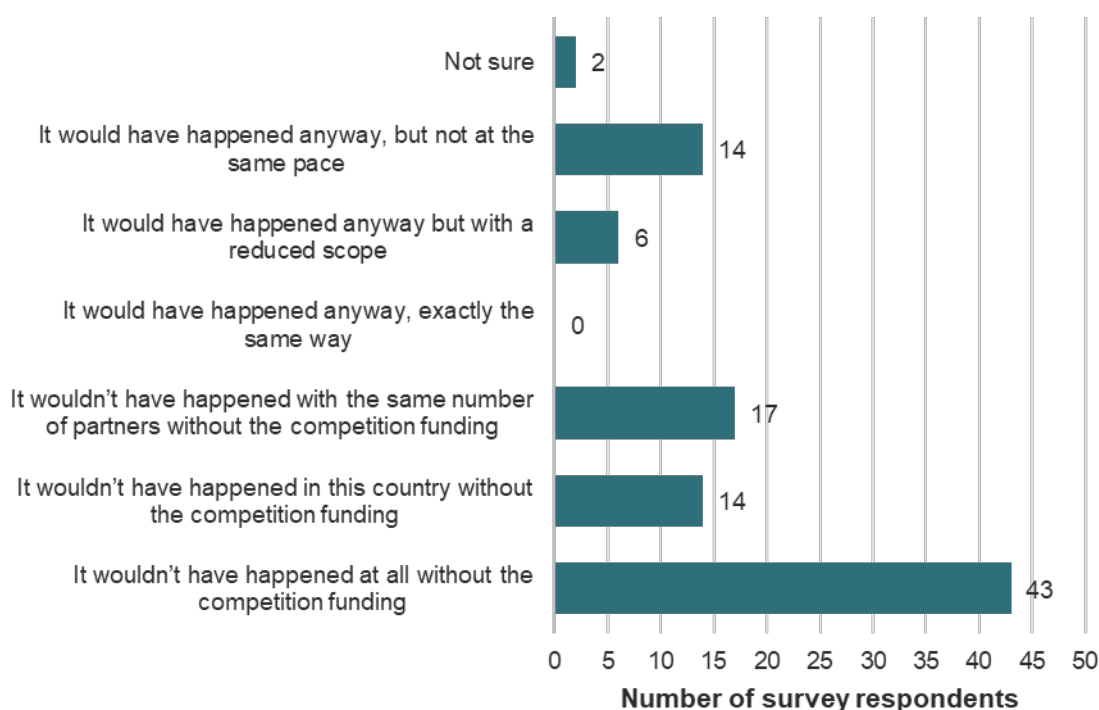
Multiple evidence sources suggest that UK SHORE generated additionality in terms of technology development

Figure 40 presents survey responses on how UK SHORE affected the development of technology, across both the 2023 and 2025 survey:

⁸⁴ The exact question asked and therefore definition of ‘success’ varies across schemes. TRIG projects were asked about the outcome of their project with this evaluation defining success as those who were able to prove a concept. CMD1 and CMD2 projects were asked ‘Has the intended project result been successfully achieved?’. See Section 4.2.3 for more details on the cleaning procedure for CMD1 and CMD2.

- The majority (43 out of 70, 61%) of respondents said that their project would not have gone ahead without UK SHORE funding.
- No respondent said their project would have happened in exactly the same way as it would have without UK SHORE funding.
- Other ways in which technologies may have developed differently in absence of UK SHORE include: the pace (14 respondents, 20%) and scope (6 respondents, 9%) of the project, the number of project partners (17 respondents, 24%) and whether the project took place in the UK (14 respondents, 20%).

Figure 40 Views on how technology would have developed in absence of UK SHORE funding (Number of survey respondents)

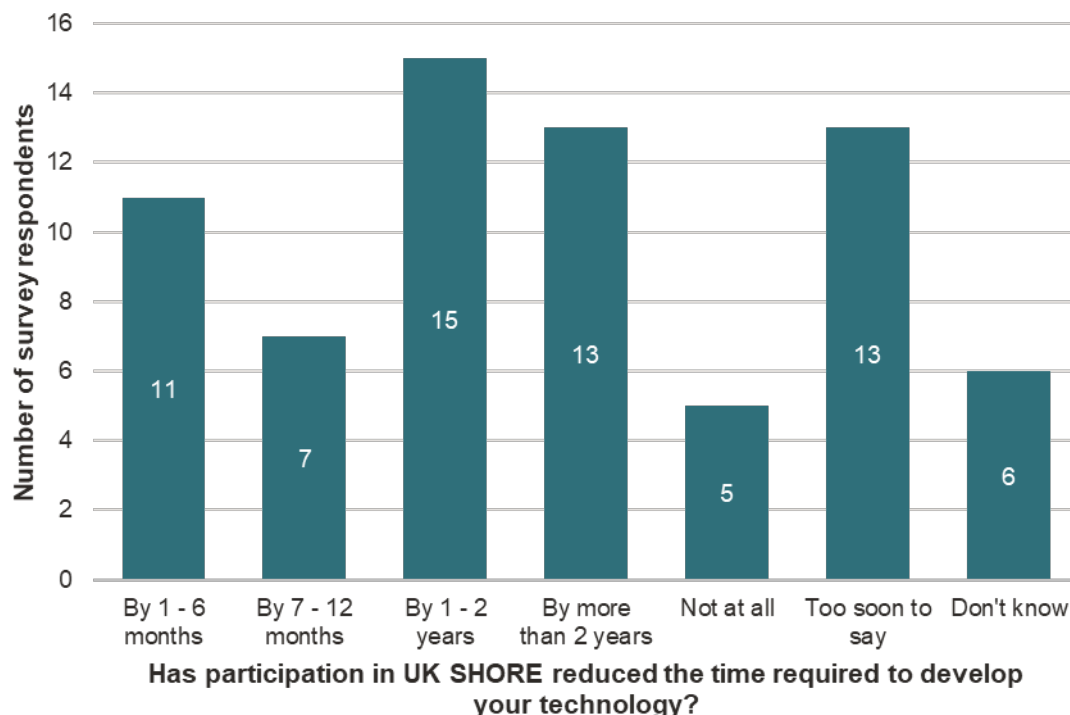


Source: Survey, $n = 70$. Combined results from 2023 survey (TRIG21/22 and CMDC1 and CMDC2) and 2025 survey (all other schemes)

Note: 'To what extent, if any, has your participation in this [scheme] supported the development of your technology? Please select all that apply.'

Figure 41 presents the responses on the impact of UK SHORE on the development of technology. Across 70 respondents to the 2023 and 2025 survey, 46 reported that UK SHORE had sped up the development of their technology (66%). Of these, 28 (40%) said it had sped up development by more than one year. Only a small proportion (5 respondents, 7%) said it had not affected the speed at all.

Figure 41 The impact of UK SHORE on the pace of technology (Number of survey respondents)



Source: Survey, n = 70. Combined results from 2023 survey (TRIG21/22 and CMDC1 and CMDC2) and 2025 survey (all other schemes)

Note: 'To what extent, if any, has your participation in this [scheme] reduced the time required to develop your technology? Select one.' Includes respondents who said their project would not have gone ahead.

In interviews, one delivery partner felt that many CMDC and ZEVI projects would have gone ahead anyway but that they had occurred at a faster pace as a result of funding. Commercial risk was a key barrier to the private funding of projects and UK SHORE funding helped to overcome this risk in the short term.

"These are commercially viable projects for them [the applicants] in the long, strategic, run, so they want to do them. But the technical risks get in the way of putting loads of money into it for them. There may be one or two that wouldn't have done it without the funding, but ultimately these businesses are driven towards doing this work, so they will try and do it one way or another, just at a much slower pace." – **Delivery partner**

One CMDC4 organisation also commented on commercial risk as a barrier to investment, which UK SHORE had helped to overcome.

"[Before UK SHORE] the concept of spending a lot of money developing a new product really wasn't there, because of the uncertainty over the return on that investment." – **CMDC4 organisation**

Moreover, evidence presented for each scheme supports the conclusion that each scheme has generated additionality (see individual schemes for more detail):

- For CMDC1 and CMDC2, more than two-thirds of organisations that responded to end-of-project monitoring data (177 organisations) felt that their project would not have gone ahead without UK SHORE.
- CMDC3, CMDC4 and ZEVI projects were not asked about additionality in monitoring data. However, in interviews, organisations felt that their project would not have gone ahead, or would have been different, without UK SHORE.
- All TRIG projects that responded to monitoring data ‘agreed’ or ‘strongly agreed’ that TRIG had helped them progress towards, or to, proof of concept or feasibility. End-of-project reports supported this and provided specific examples of TRIG’s impact.
- Members of The Hub felt that the scale of The Hub and the partnerships between organisations had enhanced research and allowed for greater industry and policy impacts.

Additionality may vary across schemes. One organisation involved in both CMDC and ZEVI commented in interviews that the ZEVI funding had been more crucial for the project to go ahead due to the large scale of funding. It felt that it might have funded the CMDC project itself otherwise, but not the ZEVI project. Small sample sizes for survey responses mean it is not possible to test this hypothesis with other data.

There is some evidence of diversion of resources from other activities due to UK SHORE

In the 2025 survey, 21 out of 33 survey respondents said they had diverted resources from other activities.⁸⁵ Of these, 15 had diverted from other R&D activities and 15 had diverted from non-R&D activities.⁸⁶ This is consistent with some displacement from UK SHORE.

Survey respondents were asked about the level of diversion as a proportion of their project costs. However, it is unclear whether project costs were interpreted as just the matched co-funding or the total project cost.⁸⁷ Therefore, figures are only indicative of the potential level of displacement:

- On average, reported diversion was 37% of the total project costs.
- Only 5 survey respondents reported diverting more than 50% of their project costs, with 6 reporting 10% or less.

⁸⁵ ‘Have you diverted internal resources away from other activities in order to complete the funded project?’ Options: ‘Yes’, ‘No’, ‘Don’t know’.

⁸⁶ ‘Which type of activities have you diverted internal resources from? Tick all that apply.’ Options: ‘Other R&D activities’, ‘Non R&D activities’.

⁸⁷ ‘Approximately what proportion of the project’s total costs would you say were diverted from other activities? Please state a % amount from 1% to 100%.’ Numeric response.

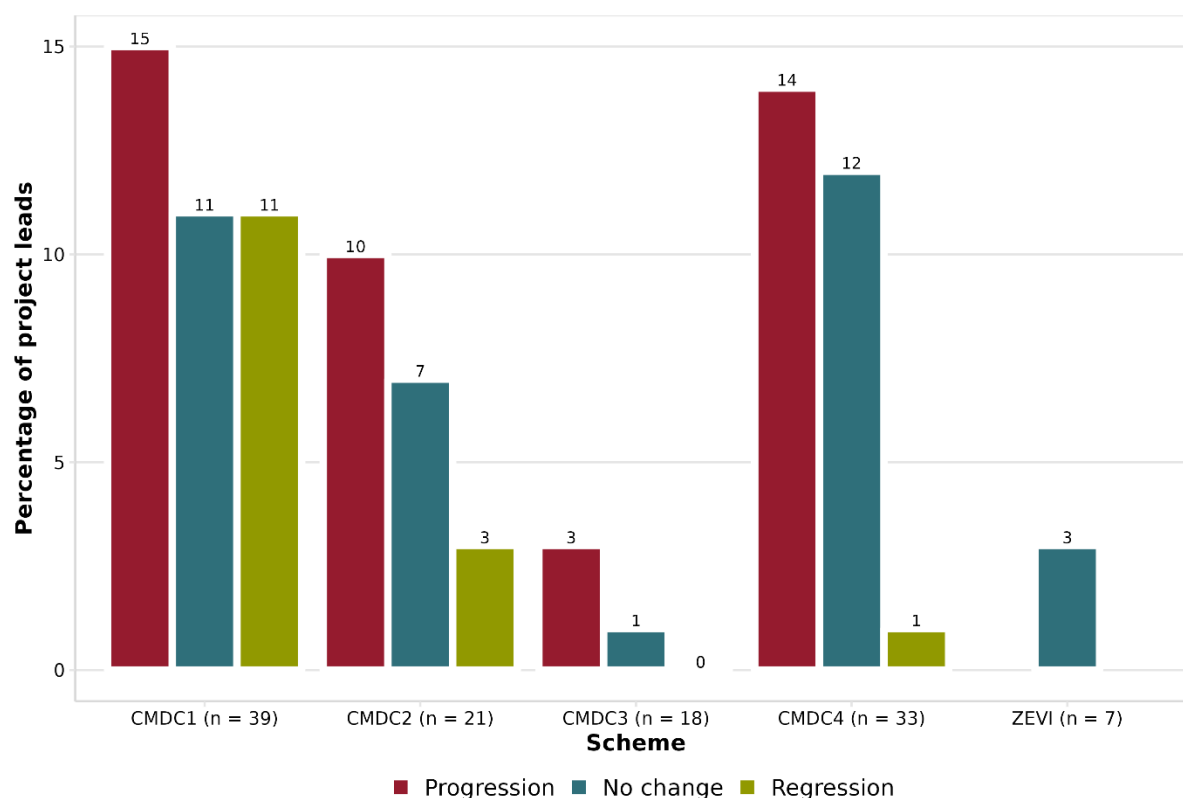
To what extent did the overall portfolio support technologies through the TRL scale?

A key goal of UK SHORE was to boost the TRLs of clean maritime technologies, providing support for technologies across the TRL level. The interim report found that UK SHORE had successfully supported technologies across this range. This report further assesses whether TRL development has been achieved.

It remains difficult to capture the impact of funding on technology development

Figure 42 reports the number of project leads who reported TRL progression, no change and stagnation for each scheme round across CMDC and ZEVI.⁸⁸

Figure 42 Percentage of projects that reported TRL development across schemes



Source: CMDC1-4 and ZEVI monitoring data (comparing baseline and end-of-project/inflight data)

Note: Bars do not sum to the total base size due to non-response in the monitoring data (not included in the graph). Compared answers to the question 'Now thinking about the primary innovation associated with the project, which of the following best describes the technical proximity of it to the market in terms of its technology readiness (TRL)?', asked at the start and end of projects. For CMDC1 and CMDC2, some organisations responded multiple times to the monitoring so responses were weighted such that weights summed to 1 for each unique organisation and projection combination. See Section 4.3.2 of the interim report for more details. The cleaning procedures for CMDC3 and CMDC4 and ZEVI are set out Sections 4.1 and 5.1.

⁸⁸ TRIG and The Hub are not included in the comparison. CMDC and ZEVI used similar data collection techniques and targeted roughly similar TRLs. This is not true of The Hub or TRIG.

Of the 118 responding CMDC and ZEVI project leads (out of a total 146 projects):⁸⁹

- 43 (36%) reported TRL progression by end of project (CMDC) or mid-point (ZEVI)
- 36 (roughly 30%) reported no change
- 15 projects reported TRL regression.

CMDC4 saw the highest ratio of projects which reported progression compared to regression. The relatively high level of TRL regression for the other schemes (in particular CMDC1) is surprising. It is unclear whether such regression is a result of genuine TRL regression or if there was some change in the way that projects measured and understood TRL progression. More details can be found in Section 6.1 and Section 10 of the interim report.

Almost all TRIG projects (39 out of 40 that responded to monitoring data) reported TRL progression. However, as with other schemes, there are limitations with this data (see Section 6.1 for a fuller discussion). TRIG focuses on lower TRL projects and so progression may be easier for lower TRL schemes.

For The Hub, there is evidence that technology development is being achieved:

- The Hub is working on more technologies than initially planned in its bid.
- One-third of The Hub's 44 research projects progressed in TRL between April 2024 and April 2025.
- Each research strand is progressing on track with its goals.

Stakeholder organisations commented that UK SHORE had supported technological developments in the UK.

"[UK SHORE] now means the UK has got loads of interesting technological developments [...] all the kind of interesting technology developments that have gone on, most of them have had at least a bit of funding through CMDC 1,2,3 & 4." – Stakeholder organisation

There were some mixed views about the split of technology supported across the portfolio

Stakeholder organisations felt that the balance of different technological sectors had so far been about right, despite the difficulties in predicting future fuels and technologies.

"There are lots of different fuel opportunities and lots of different use cases for each one, and I think ultimately it's going to be a multifuel future. So no, I think it's a good spread, I don't feel like anyone had got any particular focus." – Stakeholder organisation

However, they also felt that there had been a limited impact on the construction of larger vessels with, instead, a focus on the supply chain, retrofitting, maintenance and technology. One suggestion was to focus future ZEVI schemes on larger vessels such as service operation

⁸⁹ Figures based on responses by project leads. See Sections 4.1 and 5.1 for further details on the analysis.

vessels for offshore wind and ferries. Focusing on ferries may also benefit the UK because of the large number of ferries operating in the country.

In addition, one CMDC3 organisation felt that there had been too much focus on feasibility studies and not enough on higher TRL programmes within the overall UK SHORE portfolio. This comment was in line with those from other stakeholders which suggested that UK SHORE could have had a greater impact on environmental and commercial benefits by adjusting the scope of projects supported (discussed further below).

“Far too much money has gone to feasibility studies, not enough money has gone to more programmes like this, so my hope is that if there’s a CMDC7 programme, it will be another two to three-year programme ... I think far more focus going forward needs to be on multi-year programmes to actually build that real value. It isn’t just coming up with lots of theoretical stuff, it’s in the actual build.” – CMDC3 organisation

These views should be caveated as the key aim of UK SHORE at this stage has been to progress technologies through the TRL scale, rather than necessarily resulting in significant environmental or commercial benefits being realised. It may therefore be that industry stakeholders are not clear about the goals of UK SHORE to date.

What role did UK SHORE play in facilitating parties to come together to advance the development of clean maritime technologies?

Projects have benefitted from increased collaboration opportunities within their project and scheme round

Across all schemes, projects highlighted increased collaboration opportunities as a result of UK SHORE.

Collaboration opportunities may be particularly strong for those who work in many UK SHORE scheme rounds. Both ZEVI organisations interviewed for this evaluation had been heavily involved in UK SHORE (one had been involved in 3 previous CMDC scheme rounds and the other in all previous CMDC scheme rounds). They felt that this had resulted in many opportunities for them to collaborate.

“We’re finding that a lot of people are approaching us to say, ‘we’re looking at this opportunity, would you like to be involved?’. And we’ve had quite a lot of offers to be involved in different funded projects as either partners, project sponsors, or just supporters. ... We feel that we’re being pulled into other stuff as people recognise our involvement in the industry, that feels quite a positive thing.” – ZEVI organisation

However, the portfolio evaluation found limited opportunities for collaboration across schemes or scheme rounds. This is discussed further in Section 8.6.

UK SHORE has also led to greater collaboration in the industry, bringing the industry together to work on decarbonisation

In in-depth interviews, stakeholders, organisations and delivery partners commented that the UK SHORE portfolio had brought the industry together to work on decarbonisation, and that this would not have happened without UK SHORE.

“In a general sense, everyone is kind of moving in a positive way towards decarbonisation and reducing emissions and improving efficiencies, and that for me feels like a goal that everybody shares.... It feels like there's quite a positive atmosphere in the marine industry in terms of these funded projects.” – ZEVI organisation [also involved in CMDC]

“I don't think it [the industry] would have pulled together as much as it has done without the support from DfT. Even just the events that DfT run, that kind of act as a central point for the sector coming together to look at decarbonisation, that's valuable even without the money. [Without UK SHORE] the odd port would be looking at how to decarbonise, but with no real direction for doing so, and no government policy aims for doing so. And UK SHORE has created that policy. It's definitely pulled the sector together as a unit.” – Delivery partner

In addition, they commented that UK SHORE had given organisations within the industry an opportunity to develop their ideas and expand their knowledge.

“If UK SHORE wasn't there, they may not have had access to the same ecosystem to help them develop those new ideas. ... I don't know if it's introducing any new ideas to the sector, but expanding the knowledge of those ideas within the sector.” – Delivery partner

Moreover, The Hub members commented that UK SHORE had contributed to increased willingness to collaborate between universities including data and knowledge sharing, such as workshops and seminars.

What factors or investments played a role in enhancing the influence of UK SHORE in meeting its aims for accelerating UK clean maritime?

Regulatory changes will be needed to prevent delays in further technology development

As noted throughout this evaluation (see in particular Sections 3.6.7, 4.1 and 5.1), regulation has been a key barrier to the delivery of many projects.

Many CMDC projects also cited regulatory uncertainty as a barrier to further rollout. For example, CMDC1 and CMDC2 organisations listed the following as barriers to further development: UK government regulation (40% of 260 organisations), lack of or inappropriate industry standards (38%), and EU regulation (18%). In addition, 11 out of 13 CMDC3 and CMDC4 sampled end-of-project reports listed regulation as a barrier. Factors identified include uncertainty about how regulation will develop and the fact that current frameworks limit the development of their technology.

Stakeholder organisations commented that UK SHORE could focus more on funding projects which consider regulation.

“I think the one area that needs to be talked about in the future is that regulatory piece. I don’t quite know how the funding would look for that, but I think it needs to be considered.”

– **Stakeholder organisation**

Information from DfT suggests that the MCA’s new Innovation Unit may contribute to overcoming regulation issues going forward.

Other enablers for success of the technologies developed are discussed further throughout this section. These include economic incentives for adoption of technologies, rollout of infrastructure and follow-on funding to ensure commercialisation.

8.2 Environmental benefits

This section assesses the EQ: To what extent, and through what mechanisms, can environmental benefits be attributed to UK SHORE? The relevant sub-EQs included are:

- To what extent has UK SHORE facilitated GHG emissions or air pollutants to be reduced from UK maritime?
- What factors enabled or hindered the ability of UK SHORE to contribute towards changes in GHG emissions or air pollutants from UK maritime?

Issues with quantitative reporting of emissions means it is not possible to assess the following sub-EQ: ‘Did changes in GHG emissions facilitated by UK SHORE vary by sub-sector or technology type?’.

In addition, evidence is not presented here but is done so as part of EQ3 (Section 8.3) for the following sub-questions: ‘To what extent has UK SHORE contributed towards efficiency saving maritime solutions being adopted at scale?’ and ‘To what extent has UK SHORE contributed towards low carbon maritime solutions being adopted at scale?’.

Other environmental benefits, such as noise and air pollution, water quality and other natural capital outcomes, are not considered within this evaluation.

8.2.1 Evaluation evidence

To what extent has UK SHORE facilitated GHG emissions or air pollutants to be reduced from UK maritime?

Some emissions reduction has been achieved to date as a result of UK SHORE, with further reduction expected in the future

A lack of standardised data means it is not possible to aggregate total emissions reduction potential from UK SHORE. A fuller discussion of this can be found in Section 4.2.

There are examples of emissions reductions already achieved. For example, one CMD4 estimated the emissions savings achieved by replacing the diesel power generator with shore power at a shipyard to be 43,362tCO₂e.

However, UK SHORE is primarily expected to support emissions savings in the future (rather than achieving these to date). Project reporting indicates that projects are expecting to generate emissions savings in the future, assuming their technology is adopted by the maritime industry. For CMD4, the size of such emissions savings can also be found in Section 4.2.

“[UK SHORE]’s about proving the technology it’s opening a doorway or creating a pathway to future emission reduction, rather than actually making a significant difference now.” – Stakeholder organisation

To the extent that projects would not have gone ahead or proceeded at the same pace or scale without UK SHORE (as discussed in Section 8.1), this suggests a degree of additionality for any carbon abatement resulting from UK SHORE funded projects.

What factors enabled or hindered the ability of UK SHORE to contribute towards changes in GHG emissions or air pollutants from UK maritime?

Stakeholders felt a zero-emission mandate or other incentives to uptake clean technologies would be required for emissions savings

In interviews, stakeholders emphasised that legislation and other incentives were needed to encourage uptake of the technologies developed by UK SHORE. One commented that the purpose of UK SHORE was to develop technology so that it was ready for a future policy or regulatory mandate.

“The purpose of ZEV and CMD4 is to show these technologies work so that ... we have technologies available for when we apply the regulatory pressure through the IMO and through UK domestic law, to require the sector to decarbonise. ... What’s important [as an outcome of ZEV and the CMD4s] is that technology is demonstrated to work in the marine environment.” – Stakeholder organisation

This was also noted by organisations interviewed. A CMD4 organisation also felt that zero carbon legislation was needed to really push technology uptake forward, although details of what this might entail were not provided. Similarly, in their end-of-project report, one CMD3 project lead commented that there were few commercial benefits to adopting solutions at this point in time. Eleven out of 13 sampled CMD3 and CMD4 end-of-project reports listed the lack of economic incentive to take up clean maritime technologies as a barrier.

“Currently there is little commercial benefit (cost improvements) to adopting sustainable solutions while fossil fuelled alternatives are still viable for most applications.” – CMD3 end-of-project report

Other barriers will need to be overcome to generate emissions savings

The need for further funding was another barrier identified. This was commented on by stakeholders in in-depth interviews.

“I think that impact could potentially be wasted [...] if we don’t make that link between all that interesting technology at TRL level 8 and 9, and that link to the opportunity which is now out there. Then I think that money won’t be as effective or that big chunk of money that’s already been spent won’t have been as effective. So I think we need to focus on commercialisation and enabling industry and those small tech companies to actually access those bigger opportunities.” – Stakeholder organisation

In monitoring data, some CMDC1 and CMDC2 projects listed the availability of finance (50% of 260 organisations) and cost of finance (24%) as a barrier to further development. Issues with obtaining finance were also noted in interviews by a CMDC3 organisation and by delivery partners (see Section 4.3). Three out of 13 sampled CMDC3 and CMDC4 end-of-project reports listed difficulty gaining private investment as a future barrier.

In addition, stakeholders felt that the lack of shoreside and other infrastructure was a limitation. This was noted in 7 out of 13 CMDC3 and CMDC4 end-of-project reports. It was also highlighted by stakeholders who noted that some infrastructure, such as wider grid reinforcement, did not fall within the UK SHORE remit.

“... I’m not convinced that the supporting infrastructure is moving ahead at the same pace that the end technology is. I rather hope [that UK SHORE is addressing the supporting infrastructure], but I haven’t seen anything. ... At some point, UK SHORE will sort of run out of remit. Our remit only extends to the dockside and its environs, someone else is responsible for the national energy strategy.” – Stakeholder organisation

Some stakeholders expressed concerns about the direct emissions reduction impact of UK SHORE in the short term

One unsuccessful applicant organisation felt that UK SHORE focused on technologies which would make a difference in the future, rather than impacting emissions now.

“CMDC is far too focused on far future, silver bullet solutions like changing to hydrogen fuel for shipping, which is never going to happen.” – CMDC4 unsuccessful applicant organisation

This comment is similar to a comment from a CMDC4 organisation, discussed in EQ1 (Section 8.1), which was concerned about the focus on feasibility studies which will only create emissions savings in the longer term. In addition, EQ3 (Section 8.3) presents views from one stakeholder that UK SHORE does not focus enough on technologies moving towards market but on “innovation for its own sake”. Without technologies moving towards market, emissions savings cannot be realised. Moreover, one unsuccessful applicant organisation criticised UK SHORE’s focus on future fuels as the only mechanism for achieving net zero. They felt their technology would deliver emissions savings.

Again, these views should be set against a key aim of UK SHORE out to 2025, which is to support technology development rather than realising emissions savings immediately. However, if projects are too far away from achieving emissions savings, this will limit UK SHORE's ability to deliver such savings from 2030 onwards.

It should also be noted that evidence from CMDC (particularly CMDC3 and CMDC4) and ZEVI suggests that some projects are reaching late-stage TRLs. It is therefore likely that emissions reductions are feasible by 2030, although an in-depth analysis of project technologies and emissions savings potential has not been undertaken.

8.3 Commercial opportunities

This section considers findings on EQ3: To what extent, and through what mechanisms, did UK SHORE improve the commercial prospects and opportunities for clean maritime in the UK? The following sub-EQs are included:

- To what extent was additional private investment crowded in for developing clean maritime technologies?
- How far have commercial benefits for UK businesses been realised, or are expected to be realised in the future, for clean maritime technologies?
- To what extent has UK SHORE contributed to a change in take-up of clean maritime technologies in operational settings?
- To what extent did UK SHORE facilitate intellectual property (IP) to be generated and retained in the UK for clean maritime technologies?

Not enough evidence is available to assess the question: 'What impacts were realised or are expected for the wider clean maritime supply chain in the UK?'.

8.3.1 Evaluation evidence

To what extent was additional private investment crowded in for developing clean maritime technologies?

Providing certainty to investors, and therefore generating investment from the private sector, is a key goal of UK SHORE. As of December 2023, match funding of £120 million had been raised across all schemes (in line with expectations). For CMDC, ZEVI and The Hub, generating match funding from industry was a requirement for investment. This final report considers the extent to which UK SHORE projects generated investment beyond their match funding. Data is not available to assess whether additional investment was generated across the sector, outside of those involved in UK SHORE projects.

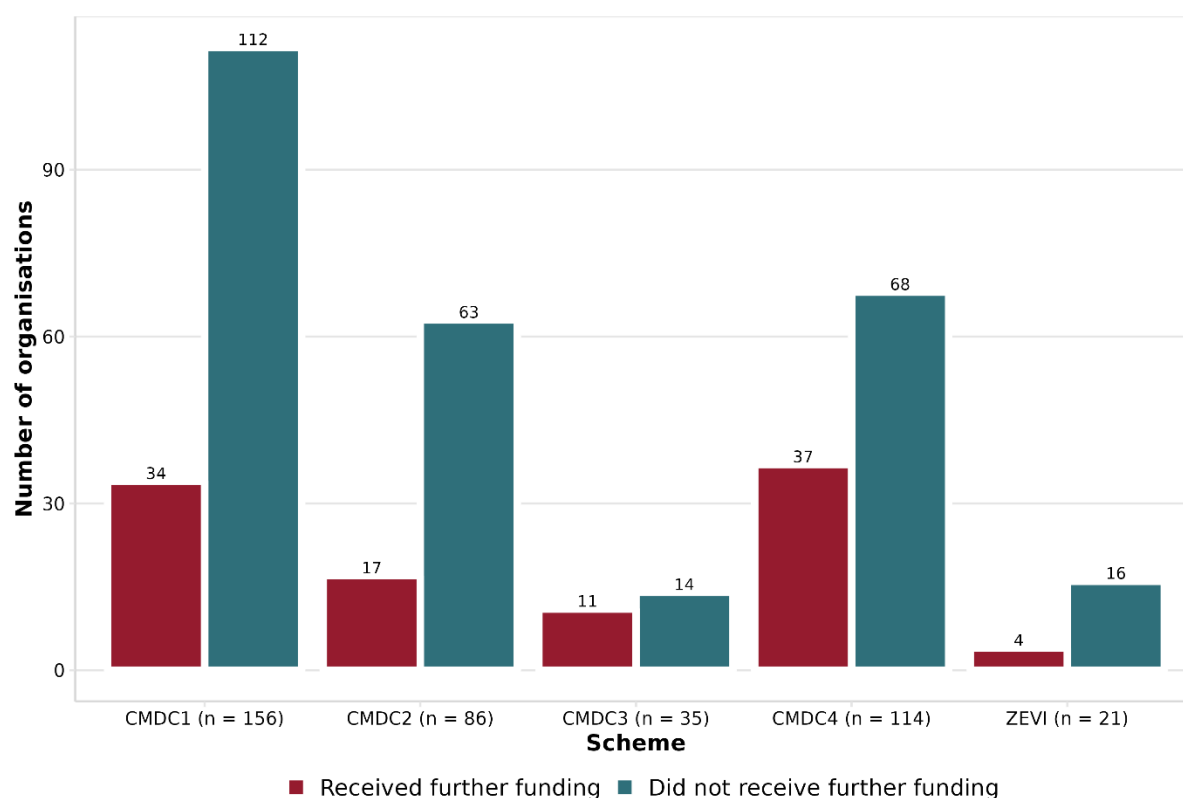
UK SHORE projects had generated some additional investment by the end of their project (or, for ZEVI, inflight data collection)

Across CMDC and ZEVI, of the 412 organisations that responded to end-of-project monitoring data (out of 614 organisations involved in the schemes):

- a quarter (103) had generated additional funding during their project, either private or public sector funding
- roughly two-thirds (273) reported not generating additional funding during their project
- the remainder (36) did not respond to this question in the monitoring data.

Figure 43 shows the scheme-level breakdown.

Figure 43 Number of organisations that generated additional investment across schemes



Source: CMDC1-4 and ZEVI monitoring data (comparing baseline and end-of-project/inflight data)

Note: Bars do not sum to total due to non-response. For CMDC3, CMDC4 and ZEVI, projects were asked 'As a result of this Innovate UK support, estimate the total value of any follow-on private funding you have received to date. You should only include funding that would not have been received without this Innovate UK support' and 'As a result of this Innovate UK support, estimate the total value of any further public sector funding you have received to date'. For CMDC1 and CMDC2, private organisations were asked 'As a result of your participation in this project, has your organisation been able to raise further funds, in addition to the match funding?'. Some CMDC1 and CMDC2 organisations responded multiple times to the survey, so responses were weighted so that weights summed to 1 for each unique organisation and projection combination. See Section 4.2.3 in the interim report for more details. Rounded numbers are reported.

As leveraging private investment is a key aim of UK SHORE, evidencing whether this investment came from private investors is of particular interest:

- A substantial proportion of the investment generated by **CMDC3, CMDC4 and ZEVI** organisations came from the private sector. Of the 52 CMDC3, CMDC4 and ZEVI organisations that reported generating investment, 37 reported generating private sector investment. This totalled £31.5 million of private sector investment (out of a total of £40 million investment generated).
- For **CMDC1 and CMDC2**, it is not possible to easily split out private and public sector funding. However, the vast majority of organisations which reported receiving funding listed sources such as 'existing investors', 'business angel' and 'venture capital'. 'Internal funds' was also a common source.

Considering the other UK SHORE schemes:

- No members of The Hub reported generating additional funding in monitoring data. The Hub is expected to generate funding to sustain it after the initial 43-month period, but it has not yet been able to gain this funding.
- Based on end-of-project monitoring data, one-third of TRIG projects (12 out of 36 organisations) had secured equity further funding by the end of their project. Half had secured investment of some kind (private or public).

Further investments in the future could be expected

Twelve out of 39 respondents (31%) to the 2025 survey had secured investment, and a further 16 (41%) expected to secure investment in the future. A minority of respondents had not, or did not expect, to secure further investment (11 respondents, 28%). Investment secured or expected comes from a mix of private and public sources, both in the UK and overseas. The breakdown is shown in Table 52.

Table 52 Survey responses – number of projects that secured, or expected to secure, follow-on funding from various sources

	Secured	Expected to secure	Not secured or expected to secure
Public UK	8	14	16
Public overseas	0	7	24
Private UK	6	16	16
Private overseas	2	12	20
Total*	12	16	11

Source: 2025 survey

Note: $n = 39$. 'Have you secured, or do you expect to secure within the next two years, any follow-on funding to further develop the technology after the delivery phase of this project? Select all that apply for each column'. *'Total' row refers to: number of organisations that had secured funding of any type; number of organisations that had not yet secured any funding but expected to; and number of organisations that had not secured nor expected to secure any type of funding.

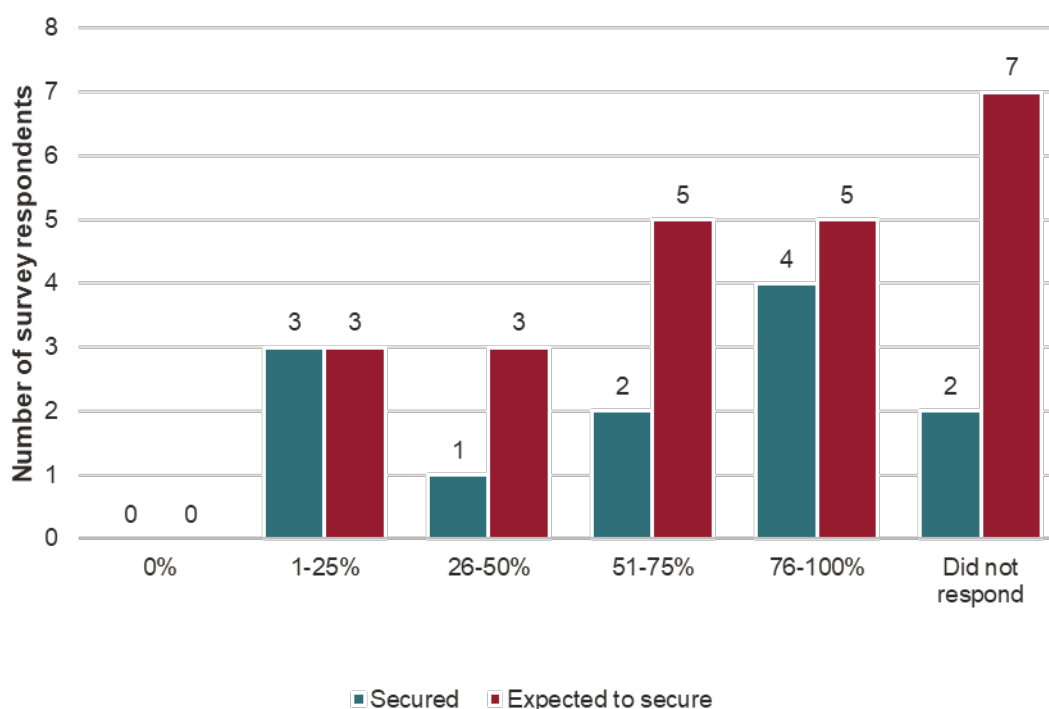
Current evidence limits the ability to assess follow-on funding

End-of-project monitoring data is only able to capture investment secured during the project. It does not capture additional investment generated after project closure. The survey data collected for this evaluation attempts to capture this but only a minority of projects responded. It is therefore difficult to understand whether projects received further funding after their project closed. This is particularly true for schemes such as CMD1 and CMD2, which completed two to three years ago.

There is evidence of additionality in terms of the impact of UK SHORE on follow-on funding

In the survey, respondents who had secured or expected follow-on funding were asked what share they attributed to UK SHORE. Figure 44 shows the distribution of responses. All respondents to the question reported that UK SHORE had contributed to the funding. Half of respondents (6 out of 12 had secured, 14 out of 28 expected) felt that more than 50% of their funding had been received as a result of participation in UK SHORE.

Figure 44 Number of survey respondents who reported the proportion of follow-on funding received as a result of UK SHORE



Source: 2025 survey

Note: n=39. 'Of follow-on funding secured or expected within the next two years, what proportion do you think was received as a result of your participation in UK SHORE?'. Options as shown.

Evidence from CMD3 and CMD4 (see Section 44) also shows how UK SHORE has contributed to generating further investment, for example by building confidence among investors and securing strategic partners. The visibility of projects was noted as a mechanism through which UK SHORE generated investment by delivery partners and projects.

"We've seen a lot of good stuff in the media from those projects [CMD3,4; ZEVI] as well as interest from investors on some of those projects." – **Delivery partners**

How far have commercial benefits for UK businesses been realised, or are expected to be realised in the future, for clean maritime technologies?

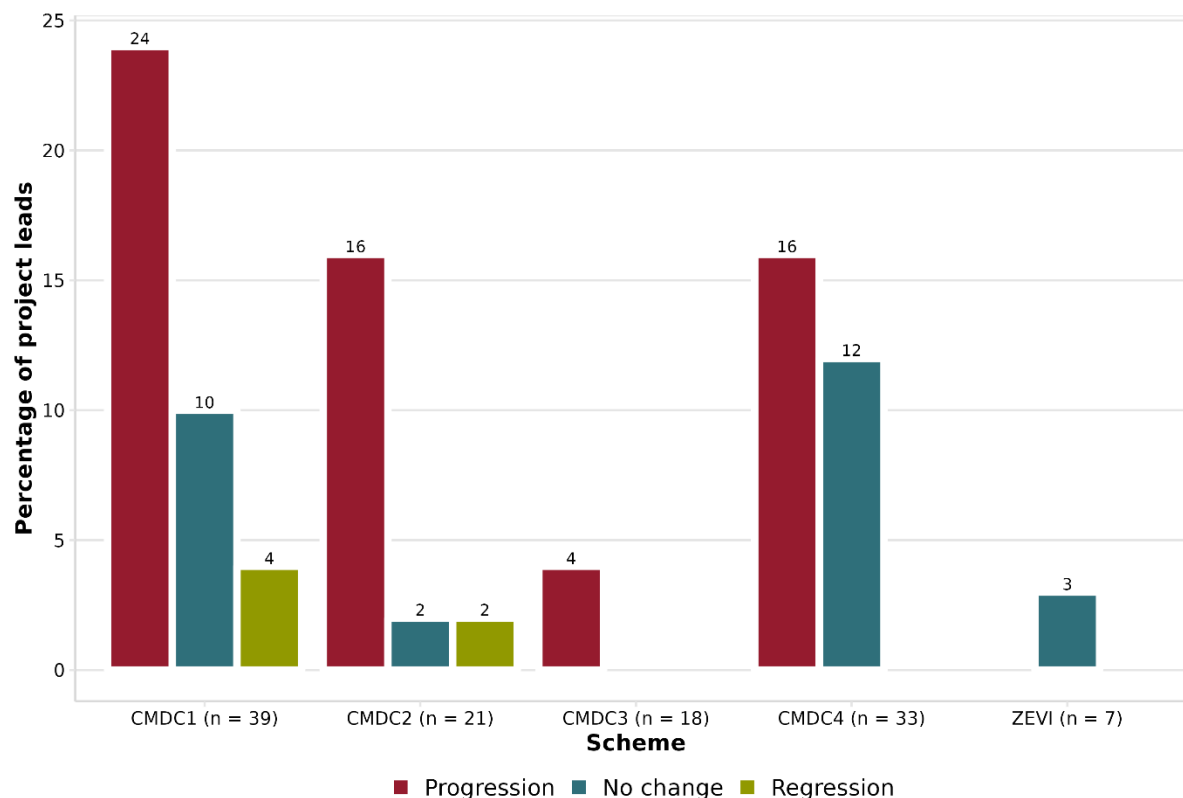
Half of responding CMD3 and ZEVI projects saw CRL or MRL progression

CMD1 to CMD3 project leads were asked about CRL development, while CMD4 and ZEVI were asked about MRL development. Such terms are not directly comparable, but both refer to a project moving closer to being commercially ready. Data collection for CRL/MRL otherwise remained similar across all CMD3 and ZEVI schemes.

Figure 45 shows the number of project leads who reported progression, no change and regression for each scheme round. Across the 119 CMD3 and ZEVI project leads who responded to monitoring data (out of a total 146 projects – the remainder did not respond):

- 50% (60) reported progression
- 23% (27) projects saw no change
- 10% (6) saw a regression in CRL or MRL.

Figure 45 Project leads that reported progression, regression and no change in CRL/MRL



Source: CMD1-4 and ZEVI monitoring data (comparing baseline and end-of-project/inflight data)

Note: Bars do not sum to the total n due to non-response (not included in the graph). CMD1-3 refers to CRL. CMD4 and ZEVI refers to MRL. See Sections 4.3 and 5.3 for further caveats and discussion. For CMD1 and CMD2, some organisations responded multiple times to the monitoring so responses were weighted such that weights summed to 1 for each unique organisation and projection combination. See Section 4.3.2 of the interim report for more details. Rounded figures are reported.

The Hub reported CRL progression for only 4 of its 45 projects. Given The Hub's focus on technology development, CRL progression would not necessarily be expected as a key aim or output. No data was collected for TRIG.

Some projects had resulted in commercial benefits including revenue generation and cost saving at the time of data collection

In the 2025 survey covering all schemes (except The Hub), 7 out of 39 respondents (18%) reported generating revenue over the past 2 years as a result of technology generated during the project.⁹⁰ Considering future revenue, 4 (10%) had signed contracts related to the technology developed during their project and a further 14 (36%) had identified customers but

⁹⁰ 'Over the past two years, have you generated any revenue as a result of the technology developed during your project?'
Options: 'Yes', 'No', Don't know.

had not yet signed contracts.⁹¹ Fifteen (38%) survey respondents felt it was too early to say whether they would generate revenue over the next 2 years.

In addition, scheme-level evidence provides some examples of benefits achieved by the end of project (for CMDC) or at the time of data collection (for The Hub). For example:

- In **CMDC**, 7 CMDC3 organisations reported a total increase in profit of £1.2 million while 10 CMDC4 organisations reported a total increase in profit of £0.4m. Around half of CMDC1 and CMDC2 organisations reported financial benefits (revenue generation or cost reduction) – benefits typically came from revenue generation.
- The **Hub** reported generating 2 spin-out companies.

For CMDC1 and CMDC2, greater commercial benefits may have been expected to date as these schemes finished in 2022 and 2023. Limited data is available to assess this, but none of the 6 CMDC1 and CMDC2 respondents to the 2025 survey reported revenue generation.

In addition, one organisation interviewed commented that UK SHORE funding had ensured the organisation's existence.

"UK SHORE has been absolutely transformational for this industry. My company would not exist without the UK SHORE investment so that is an absolute statement of fact." – CMDC3 organisation

More benefits could be expected in the future

Given the early to mid TRL stage of projects supported by UK SHORE, commercial benefits would not necessarily be expected at this stage.

For schemes at relatively higher TRLs, many projects reported expected benefits in the future. For example, CMDC end-of-project reports often reported that they had not yet generated revenues but hoped to do so in the future. In interviews, one CMDC project mentioned that UK SHORE had enabled it to identify potential customers. Similarly, one of the 2 ZEVI projects interviewed noted that UK SHORE had given it visibility in the market.

For lower TRL schemes, there is evidence which suggests that projects are gaining the skills, collaborations and technology development needed to bring about benefits in the future:

- **TRIG:** 20 out of 27 responding TRIG22, TRIG23 and TRIG24 projects reported improved private sector connections in monitoring data. Eleven out of all 16 TRIG23 and TRIG24 projects reported that they had improved networking skills, while TRIG21 and TRIG22 projects often commented they had achieved these skills in end-of-project reports.
- **The Hub:** The Hub is collaborating directly with industry. The mid-term review was positive about its Co-Innovation methodology. Members of The Hub felt that The Hub's

⁹¹ 'Over the next two years, do you expect to generate any revenue as a result of the technology developed during your project?' Options: 'Yes – contracts signed', 'Yes – customer identified but contracts not signed', 'No', 'Don't know'.

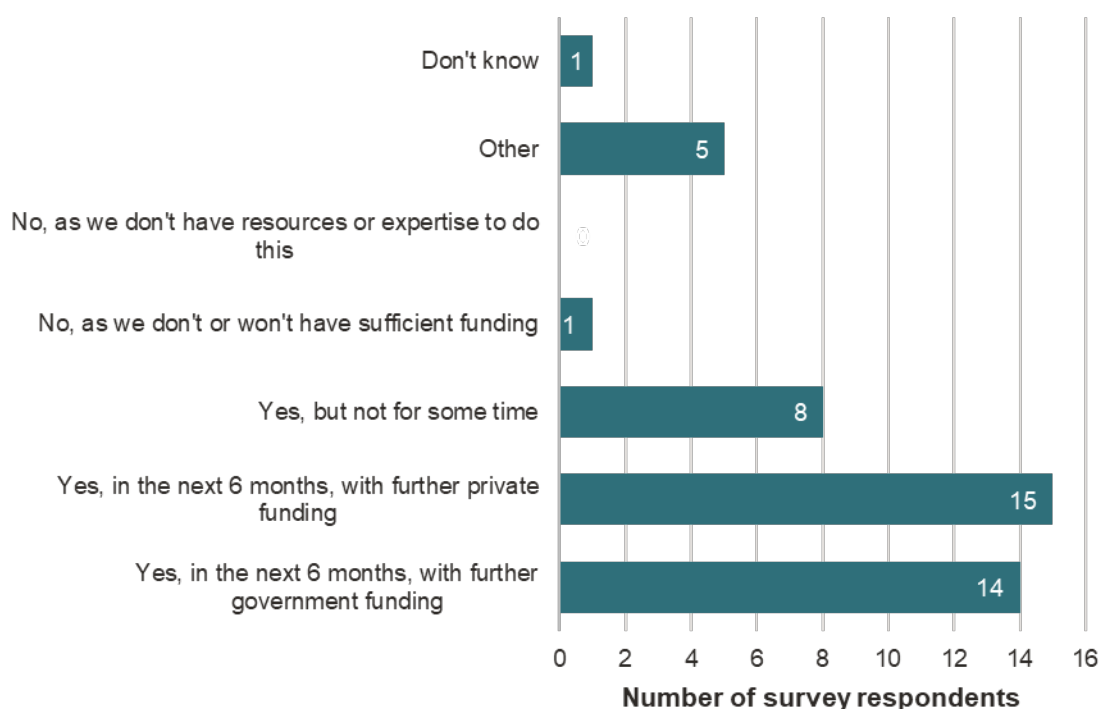
scale and cross-disciplinary approach put it in a better position to deliver benefits for industry.

Nonetheless, it is too early to see whether benefits have yet occurred as a result of these skills and collaborations.

UK SHORE projects plan to take their technology towards commercialisation

In the survey, 21 out of 33 (64%) CMDC3-4, ZEVI and TRIG23-24 respondents reported planning to take their project forwards towards commercialisation within the next 6 months, with a further 7 planning to do so at a longer time scale. Only one survey respondent did not plan to take their project forward to commercialisation. This is shown in Figure 46.

Figure 46 Survey respondents who expected to take their technology further towards commercialisation at the end of their project



Source: 2025 survey, n = 33. Excludes CMDC1 and CMDC2 and TRIG21/22.

Note: 'At this stage, do you expect to take your technology further towards commercialisation at the end of the project? Please select all that apply.' Projects that specified 'other' sometimes also picked other options.

Of those who expected to take their project forward (31, 94%), the vast majority (30, 91%) would see further development in the UK and around a third (12, 36%) would see further

development overseas.⁹² This suggests that, of those who reported taking their projects forwards, the majority would result in benefits in the UK.

Moreover, scheme-level evidence highlights plans for commercialisation. For example:

- Six out of 8 TRIG24 projects reported a next step related to commercialisation, including 4 projects which planned to launch their technology. Across all TRIG schemes, projects reported that TRIG had helped move projects towards commercialisation.
- The Hub aims to provide practical solutions which can be commercialised, such as technology increasing the safety of hydrogen storage tasks.

To what extent did UK SHORE facilitate intellectual property (IP) to be generated and retained in the UK for clean maritime technologies?

Some IP and research papers have been generated

Across all schemes, a minority of organisations had generated IP and/or published papers but benchmarks are typically not available to assess the volume of IP generation:⁹³

- For CMDC1 and CMDC2, 25 out of 260 organisations had been granted IP rights, at the time of end-of-project data collection. A further 73 had applied for or considered IP rights.
- For CMDC3 and CMDC4, 16 organisations had secured 23 IP protections. Fifty-five had published 155 research papers.
- For ZEVI, 2 organisations reported having created 3 IPs in total and one had published one paper.
- Half (4 out of 8) of TRIG24 projects planned to apply for IP. This data is not available for other TRIG scheme rounds.
- The Hub has generated 30 research papers across its key themes; this is on track for its KPI in this area.

There is a risk that IP is not being retained in the UK

A stakeholder organisation highlighted that there were at least 2 examples of UK SHORE IP being bought from overseas organisations (specifically from CMDC projects). This had led to concerns about whether the commercial benefits might be retained in the UK.

“That’s a risk of innovation, but it’s particularly egregious where you have a company that has more or less entirely succeeded due to public funding immediately exiting the marketplace when they have IP, so that they don’t have to grow that business, it goes overseas. ... And so one of the challenges is actually getting some kind of return to the taxpayer.” – Stakeholder organisation

⁹² ‘Where do you expect further development to take place?’ Options: ‘In the UK’, ‘Overseas’ (multi-code possible).

⁹³ For CMDC1 and CMDC2, this is defined as ‘trademarks, registered design, copyright material, patents and other content rights’. For CMDC3, CMDC4 and ZEVI, this is defined as ‘patents, designs, trademarks or copyrights’.

To what extent has UK SHORE contributed to a change in take-up of clean maritime technologies in operational settings?

The UK SHORE business case sets out expectations for the significant commercialisation of clean maritime technologies from 2030. Therefore, take-up of clean maritime technologies would not yet be expected. The focus of the analysis is on the extent to which UK SHORE may support this uptake in the future. Evidence on the potential barriers to uptake discussed in EQ2 are also relevant for this sub-EQ.

Stakeholders felt that UK SHORE had supported the development of the clean maritime market

In interviews, stakeholders, delivery partners and organisations commented that UK SHORE had played a significant role in the development of the market.

“It’s had a massive impact and we hear that from stakeholders all the time. It’s created an industry, really. Over the last three to four years, I think it’s positioned the UK well... I think the UK, thanks to the UK SHORE programme, is in a position to capitalise on that global opportunity, where without UK SHORE that would never have been the case”
– **Stakeholder organisation**

One ZEV project commented that UK SHORE projects provided certainty to the infrastructure providers. Therefore, UK SHORE supported the development of the technologies funded as well as the wider market – which is important for take-up of the technologies.

“They’ve been able to really accelerate their progress because they know of vessels coming in the market, so it’s kind of that chicken or egg, who’s going to deliver first; are they going to deliver the charging system or are we going to deliver the vessel. Now they know there’s a vessel coming, that’s enabling them to be able to progress on their side. So I think not just the vessel, but also the overall market moving towards electrification has been enabled by this funding.” – **ZEV organisation**

Some stakeholders felt that UK SHORE should focus more strongly on commercialisation

One stakeholder felt that there was too much emphasis on innovation for its own sake, rather than focusing on projects moving to commerciality and uptake.

“These products need to be moving to a commercial end state. This is not about funding curiosity. That’s what the low TRL stuff’s for. That’s where we have the university and academic research type activity. And I think we, strategically, it’s being much more ruthless about what we mean by innovation.” – **Stakeholder organisation**

This aligns with other comments from similar stakeholders, around concerns about the TRL split of technologies and the impact on emissions reductions (see EQ1 and EQ2, respectively).

8.4 Spillover benefits

EQ4 asks: To what extent is there evidence that UK SHORE has generated positive spillover benefits?

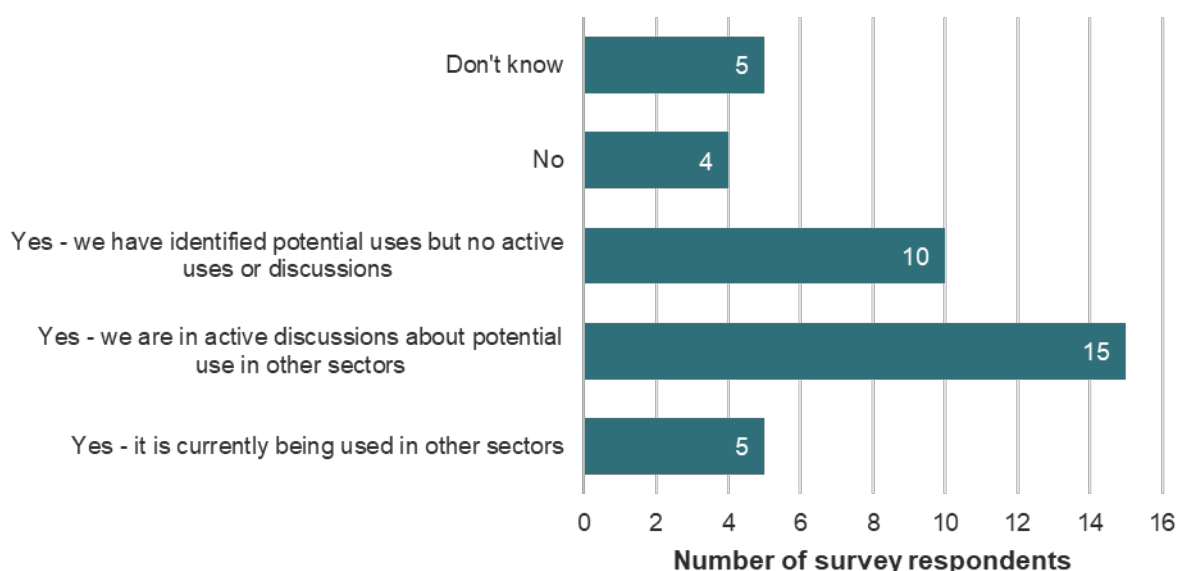
8.4.1 Evaluation evidence

What evidence is there for benefits to other maritime supply chain companies and companies outside of maritime who can use the technologies?

There are examples of current and future potential spillovers, particularly other transport modes

Around three-quarters (30 out of 39) of respondents to the 2025 survey identified uses for their project in other sectors (see Figure 47). Of these, 15 (38%) were in active discussions and 5 (13%) currently had their project in use in other sectors. Common industries were other transport modes (such as rail and HGVs) and power generation. While the question specifically asked about whether project output/findings could be used in other sectors, the high proportion of survey respondents who reported use in other sectors suggests that projects may also have been reporting spillovers into maritime.

Figure 47 Number of survey respondents who reported spillover benefits to other sectors



Source: 2025 survey

Note: $n = 39$. 'Based on your current expectations, could the outputs or findings from your project be used in other sectors?'. Options: 'Yes - it is currently being used in other sectors', 'Yes - we are in active discussions about potential use in other sectors', 'Yes - we have identified potential uses but no active uses or discussions', 'No', 'Don't know'.

One stakeholder identified aviation as a key sector that could benefit from spillovers of UK SHORE research. A delivery partner highlighted the automotive sector as a key beneficiary but could not identify specific examples when interviewed.

“I think there are some companies that have since [UK SHORE] taken the learnings from these maritime projects and putting them into their automotive use cases primarily. There are some projects that are doing like fuel production that could be used elsewhere quite easily. There’s definitely potential. I can’t think of specific examples of people doing that, but there is potential for it.” – Delivery partner

Across scheme-specific evidence, organisations noted technology spillovers to sectors including other transport-adjacent sectors (such as batteries and hydrogen) and offshore renewables (CMD4). Organisations also commented that their learnings could be used in other sectors (for example hydrogen learnings from CMD3).

There is significant evidence that UK SHORE projects have relied on technologies initially developed for other industries

Across many schemes, there are examples of UK SHORE projects relying on technologies from outside UK SHORE. For example, one CMD4 organisation interviewed came from the automotive sector – bringing in the skills and technology from this sector. The Hub has relied on skills and researchers who did not previously work in maritime. In addition, they are using technologies such as ultrasonic sensor technology from outside the sector.

Delivery partners also noted the spillovers from other sectors into maritime.

“Quite often ... we see a lot of the automotive guys, particularly in electrification sector, come into the maritime programme with their technologies, trying to adapt them for maritime use.” – Delivery partner

8.5 Wider social benefits

This section presents findings on EQ5: To what extent has UK SHORE achieved wider social objectives? The 2 sub-EQs are:

- To what extent has UK SHORE contributed to sustaining or creating jobs in the UK in the clean maritime or related sectors?
- To what extent has UK SHORE contributed towards levelling up of coastal areas?

8.5.1 Evaluation evidence

To what extent has UK SHORE contributed to sustaining or creating jobs in the UK in the clean maritime or related sectors?

Portfolio-wide evidence is only available to assess job creation within UK SHORE projects rather than the impact on the wider sector. Qualitative evidence on sector-wide job creation is presented in the relevant scheme-level sections.

There were high levels of non-response to job creation data (particularly for CMDC3 and ZEVI; see Section 2.3 for further discussion of response rates). This will mean that reported total job creation is likely lower than actual job creation. It is not analytically robust to extrapolate from responding organisations to understand job creation across all organisations.

UK SHORE projects have created or retained around 1,000 jobs

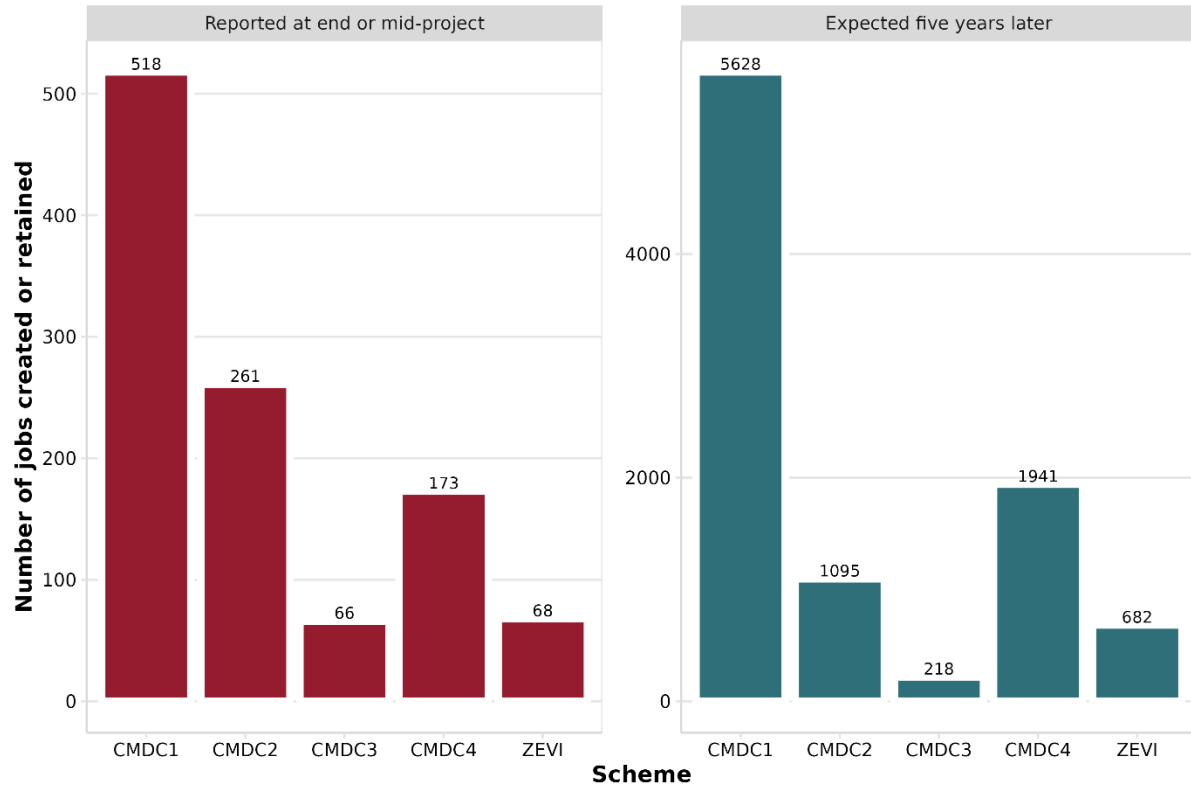
Based on monitoring data, across CMDC and ZEVI, 1,086 jobs were created or retained (either by the end of the respective projects or at the time of inflight data collection taken in 2025 for ZEVI).^{94 95} These jobs cannot be considered additional jobs in the UK economy, but are assumed to create value by being higher-skilled than the average UK job (discussed further in the VfM evaluation, see Section 9). A scheme breakdown is shown in Figure 48.

Of those organisations which responded to the job creation or retention question, around two-thirds (211) had created or retained jobs compared to one-third (111) which had not. Across all organisations, only half responded to job creation or retention questions (a total of 318 organisations responded, compared to 614 organisations across all projects). Response rates were particularly low for CMDC3 and ZEVI, which may explain why job creation/retention is lowest for these schemes (despite the fact that they offered the largest amount of funding). Job creation or retention is highest for CMDC1 – it is unclear why this is the case.

⁹⁴ This figure assumes that 80 jobs were created in total across CMDC3 and CMDC4 for an organisation that had initially reported 1,740 jobs across the 2 schemes (870 for each). A more conservative scenario would remove all these jobs, resulting in 1,004 jobs created in total. See Section 4.5.1 for more detail.

⁹⁵ CMDC1 and CMDC2 figures refer to retention or creation. CMDC3, CMDC4 and ZEVI figures refer to creation only.

Figure 48 Comparison of scheme-level job creation/retention to business case expectations



Source: End-of-project monitoring data and business case expectations

Note: Business case expectations were based on CMDC1 job creation and therefore were not set out for CMDC1. Figures refer to end of project (for CMDC) and inflight data (for ZEVI), and five years after this point (2027 for CMDC1, 2029 for CMDC2, 2030 for CMDC3-4 and ZEVI). Figures assume 40 jobs created for CMDC3 and CMDC4 for the outlier company; see Section 4.5.1 – this is the 'main' scenario.

Data for The Hub and TRIG is not directly comparable, and fewer jobs would be expected from these schemes. Nonetheless, these schemes have created jobs:

- 36 FTEs participated in The Hub between April 2024 and April 2025, of which 20 jobs were created specifically due to UK SHORE funding.
- 13 out of 25 TRIG22, TRIG23 and TRIG24 projects responding to end-of-project monitoring data added FTE employees to their project during TRIG (data not available for TRIG21).
- For TRIG23 and TRIG24, a total of 20.5 FTEs were added to the project by the 9 organisations that reported adding FTEs (data not available for TRIG22). It is not necessarily the case that such FTEs are additional and may instead be FTEs moved from other parts of the business.

In the 2025 survey, 26 out of 33 (79%) CMDC3/4, ZEVI and TRIG23/24 respondents said they had hired people primarily for their project.

Projects expect job creation/retention to grow in the future

In end-of-project monitoring data, CMDC and ZEVI organisations were asked about the number of jobs they expected to create/retain as a result of UK SHORE projects over the next 5 years. In total, projects reported 9,564 jobs created or retained over this period.⁹⁶ Seventy per cent of CMDC and ZEVI organisations which answered the question reported that they were planning to create or retain jobs over the next 5 years, with the remainder not expecting to create or retain jobs. Just over half of organisations answered this question.

In addition, in the 2025 survey, 26 out of 33 (79%) CMDC3, CMDC4, ZEVI, TRIG23 and TRIG24 respondents said they expected the number of FTEs to increase over the next 2 years.

However, caution must be taken when looking at project-level job creation figures. In the 2025 follow-on survey, CMDC1 and CMDC2 respondents were asked whether they had created additional FTEs since their project completed. Of the 6 respondents, one reported a decrease and 2 reported that the number had remained the same. The remainder reported 'don't know'. Similarly, one respondent expected to decrease their number of FTEs in the next 2 years and another 2 expected it would remain the same. The remainder reported 'don't know'.

This suggests that not all jobs created as part of the delivery phase are maintained, and that projects may be over-optimistic about expected jobs. However, the survey achieved only a small sample of CMDC1 and CMDC2 respondents and so the generalisability of this conclusion is unclear.

A comparison to business case expectations is not particularly insightful

Given that not all organisations responded to job creation in the monitoring data, a comparison of the total figures reported above to the business case expectation is not particularly insightful. In addition, business case job creation was informed by CMDC1 self-reporting, which may be a less useful metric for expectations for other schemes. In fact, job creation and retention reported in monitoring data is lower for other schemes than CMDC1. It is unclear why this is the case. Nonetheless, this comparison is presented below for transparency.

Across CMDC2, CMDC3, CMDC4 and ZEVI, the business case expected 4,639 jobs to be created by the end of project (for CMDC) or 2025 inflight data (for ZEVI), and 59,911 jobs to be created 5 years after this point in time (occurring in 2029 for CMDC2 and in 2030 for CMDC3, CMDC4 and ZEVI). Job creation reported by projects is an order of magnitude below these expectations: 568 for the first metric and 3,936 for the second.

⁹⁶ This figure assumes that 80 jobs were created in total across CMDC3 and CMDC4 for an organisation that had initially reported 1,740 jobs across the 2 schemes (870 for each). A more conservative scenario would remove these jobs, with 9,484 jobs created in total. See Section 4.5.1 for more detail.

To what extent has UK SHORE contributed towards levelling up of coastal areas?

The interim report set out the extent to which UK SHORE funding was distributed across the UK. It found that a slightly lower proportion of funding went to the Greater South East than the proportion of total R&D government funding that went to those regions in 2022.⁹⁷ However, it is difficult to benchmark the spread of funding – particularly given the expected bias towards coastal regions, which may have a comparative advantage in clean maritime research.

Out of the 39 survey respondents, 14 said their project was located in coastal areas (36%).⁹⁸ It is not possible to benchmark this proportion. Seventeen were located in inner city or suburban city areas (52%).

In addition, the spread of benefits as a result of UK SHORE must be considered. Limited evidence is available to assess this, particularly given the small sample size for each individual region. Based on responding CMDC3 and CMDC4 organisations, those in the East of England were most likely to receive further funding during the delivery phase of their project. For CMDC1 and CMDC2 responding organisations, the likelihood was highest in the West Midlands, Yorkshire and the Humber, and London. Receiving additional funding suggests that more benefits may be generated in these areas but is not necessarily the case.

8.6 Portfolio-wide impacts

This section assesses the following portfolio-wide impacts:

- the extent to which the portfolio nature of UK SHORE adds value beyond the schemes being run in isolation by allowing projects and technologies to develop and move between schemes
- the extent to which activities delivered across UK SHORE help to disseminate and join up schemes.

8.6.1 Evaluation evidence

Development between schemes

A key goal for UK SHORE was to create a 'pipeline of projects', with projects feeding through from early TRL to high TRL UK SHORE schemes and scheme rounds. The strategic aim was to create a portfolio of interventions which work together to support technology development over a longer timeframe.

⁹⁷ [ONS](#) (2024). UK public-funded gross regional capital and non-capital expenditure on research and development.

⁹⁸ 'Which of the following best classifies the nature of the area in which most of the project is being delivered?' Options included 'Inner city area', 'Suburban city area', 'Town/village', 'Rural', 'Coastal', 'Don't know'.

Section 3.2 in the process evaluation demonstrated that organisations involved in UK SHORE had good awareness of other schemes and were keen to apply for future rounds.

A high proportion of organisations have received funding from multiple UK SHORE schemes

Table 53 updates analysis provided in the interim report with additional information from TRIG23 and TRIG24. Overall, of the 380 organisations that have received funding from UK SHORE schemes, 111 (29%) have received funding from multiple scheme rounds. This includes 2 organisations that received funding from 6 scheme rounds and a further 5 that received funding from 4 scheme rounds.

Table 53 Organisations that received funding from multiple schemes

Scheme / scheme round	Total number of organisations	Percentage that received funding in other schemes
ZEVI	51	51%
CMDC1	166	42%
CMDC2	96	70%
CMDC3	83	54%
CMDC4	129	54%
TRIG21	13	62%
TRIG22	13	77%
TRIG23	8	25%
TRIG24	8	63%
The Hub	13	62%

Source: Frontier Economics, based on scheme-level winners data

Note: Percentages are higher on average than the 29% reported for the portfolio level as organisations that received funding from more than one scheme round are only included once in the portfolio-level calculation but are included multiple times in the scheme round-level calculation. Analysis is based on matching organisations on their organisation name.

There is evidence that some projects have developed between schemes

While it is not proportionate to assess all projects to understand whether they have been built off earlier UK SHORE projects, qualitative evidence suggests that technologies are being developed across schemes. All ZEVI, CMDC3 and CMDC4 organisations interviewed highlighted that their projects had been developed from previous CMDC projects they had been involved in.

*“The involvement in all the CMDC projects then led us to the ZEVl project. I’m not sure we would have got to the ZEVl if we hadn’t done all of those previous, smaller projects.” – **ZEVl organisation***

*“CMDC2 was sort of our intro into UK SHORE, if you like, and we just kept tabs almost by default, having done CMDC2. CMDC4 came in, and so we looked at that and thought, well, that’s a natural progression.” – **CMDC4 organisation***

These organisations applied the lessons learned in earlier rounds to their higher TRL rounds. For example, one project felt that its CMDC projects had allowed it to gain a deeper understanding of the technology and what was needed as part of its ZEVl project. One organisation noted that CMDC had allowed it to gain new partnerships which could also be used in its ZEVl project.

However, one organisation felt that the timing of schemes was not optimal. It would have liked to have been able to take lessons learned from CMDC projects into ZEVl, but its CMDC project had not completed by the time it started the ZEVl project. Timings of schemes are discussed further in Section 3.4.3.

Another caveat to these findings is that organisations interviewed as part of the evaluation were likely to opt in as they were the most ‘bought in’ to the UK SHORE portfolio. It is not necessarily the case that these organisations are indicative of all UK SHORE projects.

In addition, of the 13 CMDC3 and CMDC4 end-of-project reports reviewed, 4 project leads reported that they had applied for CMDC6 (not in scope for this evaluation) to further develop their technology. Similarly, some TRIG projects reported that they had applied for other schemes such as CMDC6 and the Smart Shipping Acceleration Fund. One CMDC4 project reported that its pre-deployment project had built upon its CMDC2 feasibility study, with many of the same collaborators.

*“Five of the [project] partners had collaborated on the original [project] feasibility project (CMDC2) and continued their work in this follow-up initiative to bring those developments to the pre-deployment stage – printing, certifying, and functionally testing optimised structural steel components.” – **CMDC4 end-of-project report***

Delivery partners were positive about the portfolio approach

Delivery partners noted that the UK SHORE portfolio approach had been beneficial for projects.

*“The UK SHORE branding is ... part of why the cohorts come together. I think industry understands it [UK SHORE] as well. I think having that central aim through UK SHORE is definitely clearer than if it’s just odd [schemes].” – **Delivery partner***

In interviews, EPSRC also felt that there were benefits from co-running The Hub with DfT as part of the UK SHORE portfolio. The approach allows The Hub’s research findings to be linked in with other UK SHORE programmes and encourage industry partnerships.

Alternative funding approaches may support further development, particularly commercialisation

In interviews, both CMD3 and CMD4 organisations highlighted a desire for ‘follow-on funding’ for successful projects to help develop further towards commercialisation.

“There should be two phase budgets whereby successful projects are awarded funding to take the project to a certain stage. And if that project has hit all of its milestones, there should be a set of follow up funding that they can bid into. So rather than reopening it to the entire world, there should just be a separate pot of funding [...] whereby companies get to rebid in for additional funding to develop their product or solution.” – CMD3 organisation

Similarly, an unsuccessful applicant organisation felt that the UK SHORE programme did not have as large an impact as it could have had because it did not support projects beyond one round of funding. One stakeholder also highlighted concerns that commercialisation would not be achieved if the research and development which had so far been funded did not gain funding for commercialisation. This aligns with similar comments discussed throughout this section.

A ‘stage gate’ funding approach is something that is used across other sectors and may be helpful in the UK SHORE context. Under stage gate funding, projects would receive funding in stages, with each tranche approved only after a project met agreed milestones (such as completing or putting in place plans for a demonstrator). This being said, the evidence presented above suggests that some projects and technologies are progressing through the current scheme structure.

Cross-scheme knowledge sharing

Section 3.6.7 presents the process evaluation evidence on knowledge sharing. This section builds on such evidence to consider whether the portfolio approach has created additional knowledge sharing benefits (across schemes) that could not have been achieved using a scheme-level approach.

Overall, there is limited evidence that cross-scheme knowledge sharing has generated significant impact.

DfT holds start, mid- and end-of-project knowledge sharing events for each scheme round. A delivery partner noted that cross-scheme knowledge sharing had occurred at London Shipping Week due to the existence of a ‘UK SHORE’ (rather than ‘CMD3’ or ‘ZEV1’) event.

“For instance, at events like the Clean Maritime Day at London Shipping Week, ... there’s a UK SHORE event rather than just a CMD3 or ZEV1 event and therefore you get people mingling between [schemes].” – Delivery partner

As noted in Section 3.6.7, in in-depth interviews, many organisations said they had attended cross-scheme events and had their own stand. However, there was little evidence that these

events were impactful. CMDC3, CMDC4 and ZEVI organisations were less likely to mention the UK SHORE-wide events. One ZEVI project said it would like more learnings from across different projects (including other schemes). It noted that current cross-scheme learning opportunities were not particularly helpful.

“I’m really keen to learn from other projects and that’s something that we probably don’t get to do enough of. I know that there are the clean maritime days, but they’re probably once a year or something like that.” – ZEVI organisation

Knowledge sharing may be facilitated through The Hub’s involvement in other UK SHORE projects, particularly CMDC. In another example, one university involved in The Hub was also involved in a TRIG23 project and felt that its role in The Hub provided a “robust network to support further collaborations”. However, the mid-term review felt that members of The Hub outside of the project lead were not necessarily engaging with other aspects of the UK SHORE portfolio.

“The panel noted that some of the project leads are well connected into other activities like CMDC projects, but it was not clear whether these connections were also present in the rest of the consortium.” – The Hub mid-term review

Additional qualitative examples are set out in Section 3.6.7. No specific quantitative evidence of these events was collected as part of the evaluation.

8.7 Overall portfolio-level findings and future considerations

The interim report concluded that UK SHORE was novel and was impacting the clean maritime sector, particularly through the development of technology, but many of its impacts were expected over the longer term. The conclusions below confirm and build on these findings.

UK SHORE has supported many technologies across the TRL scale. While measurement of success is difficult, projects and organisations self-reported success and stakeholders were happy with projects’ progress to date. Some delays have occurred, including due to regulatory barriers and supply chain issues. Barriers and potential recommendations are considered in Section 10.

A key marker of success for UK SHORE has been the creation of a ‘portfolio’ of projects, with clear evidence of technologies developing through schemes. Many organisations involved (29%) have been funded by multiple UK SHORE schemes, and there are examples of technologies moving through the UK SHORE portfolio. This was a key strategic aim of UK SHORE. However, more could be done to enhance the portfolio effect by increasing knowledge sharing across schemes.

Evidence suggests that technology development is additional to what would have occurred without UK SHORE. In surveys, no respondent said their project would have happened in exactly the same way as it would have without UK SHORE funding. All other sources of evidence also point to additionality across all schemes.

Stakeholders, delivery partners and organisations highlighted that UK SHORE has brought the industry together to work on clean maritime. Individual projects and organisations benefit from increased collaboration opportunities, and this is particularly true from The Hub which has supported the creation of a “clean maritime research community”. Stakeholders also felt that it has “kicked off” the clean maritime market, positioning the UK well globally.

Encouraging investment into the sector is a key goal of UK SHORE to 2025. Public funding has successfully brought in match funding. A significant minority of responding organisations had been able to secure further funding by the end of the project. According to survey data, more projects are expecting to secure funding, but the lack of follow-on data makes it difficult to capture and confirm this investment. There is evidence of at least some degree of additionality in the investment secured.

Another key goal is job creation. Across CMDC and ZEVI responding organisations, 1,064 jobs had been created by the end of project. Organisations reported that they expected to create 9,564 within 5 years of project completion. These job creation levels fall below total job creation expected in the business case, but such a comparison should be heavily caveated.

Some other commercial benefits, such as examples of revenue generation and cost savings, have been achieved to date. However, in interviews, many projects suggested that commercial benefits would be seen in the future and thus they were not captured within the end-of-project monitoring data.

Some project-level and wider industry stakeholders commented that UK SHORE’s impact on commercialisation and emissions savings could be greater. This includes comments about the focus on feasibility studies and technologies for funding which might make a difference in the future but are far from commercialisation. Other stakeholders felt that follow-on funding was needed to ensure that technologies developed during UK SHORE could progress to commercialisation. One potential approach could be stage gate funding. The goal of UK SHORE to 2025 was to focus on technology development and so significant commercialisation and emissions savings would not be expected at this stage. However, it is important that UK SHORE funds projects that can generate emissions and economic benefits in the coming years.

In addition, for such benefits to be realised, other enablers must be put in place. This includes ensuring the right economic conditions (such as zero emissions mandates) are in place for organisations to take up clean maritime technology. Ensuring that the infrastructure can support the technologies is important, but some of this (such as grid reinforcement) falls outside of UK SHORE’s scope. Similarly, removing regulatory barriers and uncertainty will help technology to develop and be rolled out in the longer term.

Enhancements in monitoring data may be better able to capture other benefits now and in the future. This includes investment and job creation beyond the end of the project and expected emissions savings.

9 Value for money evaluation

This section assesses whether UK SHORE has generated value for money (VfM). It considers the following 3 VfM sub-questions:

1. To what extent have UK SHORE and its component schemes demonstrated strategic fit with government priorities?
2. To what extent have UK SHORE and its component schemes been delivered in an economical and effective way?
3. To what extent are the socioeconomic benefits (monetised and non-monetised) of UK SHORE and its component schemes likely to exceed the public costs of delivery?

The second sub-question was addressed in the interim report (Section 9.8.2 of that report provides detailed findings) and no additional evidence is available for the final evaluation. It is therefore not considered again in this report.

As noted both in scheme-level (Sections 4 to 7) and portfolio-level impact evaluation findings (Section 8), at this early stage of UK SHORE the delivery of longer-term benefits is not expected to have been realised. This limits the analysis that is feasible and the strength of the VfM conclusions that can be made at this stage.

9.1 Strategic fit with government priorities

This VfM assessment is supported by an analysis of whether the programme has delivered strategic fit with wider government aims. This is particularly valuable in an early stage evaluation, where less evidence is available to consider monetised benefits.

This evaluation assesses the UK SHORE portfolio against current government priorities relevant to the initial aims of the programme:

- **Decarbonising maritime and supporting net zero.** A key goal of UK SHORE is to support maritime decarbonisation and net zero. The portfolio is a key facilitator of the Maritime Decarbonisation Strategy, which sets out the government's policies to achieve zero fuel life cycle GHG emissions by 2050, with interim goals of a 30% reduction by 2030 and 80% reduction by 2040.⁹⁹ In addition, UK SHORE can be expected to support the government's mission to "make Britain a clean energy superpower", delivering clean power by 2030, as set out in the Plan for Change.¹⁰⁰
- **Growth and regional growth.** A key aim of UK SHORE is to support the creation of high-skilled jobs across the country. This aligns with a critical mission to "kickstart economic growth" and the milestone for the current parliament to improve living standards in all parts

⁹⁹ <https://assets.publishing.service.gov.uk/media/67f4dcb3c2fea2548f4eff64/dft-maritime-decarb-strategy-25.pdf>

¹⁰⁰ <https://www.gov.uk/missions>

of the UK. This mission includes a specific element to deliver net zero “in a way that supports growth and captures economic opportunities”.¹⁰¹

- **Leveraging investment.** By increasing investor confidence and providing public funding, UK SHORE intends to leverage private investment into the clean maritime sector. The Modern Industrial Strategy sets out the government’s aims to increase private sector investment, particularly in 8 sectors with the highest potential.¹⁰² Like the “kickstart economic growth” mission, the strategy includes aims to support areas across the UK and to support the net zero transition.

The remainder of this section draws on evidence from the impact evaluation. It assesses the growth, investment and decarbonisation benefits of UK SHORE to test whether it has achieved strategic fit. It includes references to the impact evaluation, where more detail on each of these benefits can be found.

The caveats set out in the impact evaluation also apply here. In particular, high rates of non-response in surveys and monitoring data mean that the figures presented are based only on a subset of projects that may not be representative of all projects. It also means that totals reported may suffer from under-reporting biases due to incomplete data (for example, only around half of projects responded to questions in monitoring data that underpin evidence of job creation figures). In the other direction, there remain risks of optimism bias in benefits reported or projected.

9.1.1 Decarbonising maritime and supporting net zero

There are 2 main ways in which UK SHORE can align with the Maritime Decarbonisation Strategy.

First, it can support the development of the technologies required for the decarbonisation of the maritime sector. Maritime emission reductions will be achieved through an improved efficiency of vessels and increased use of zero and near-zero GHG emission fuels. Developments in innovative technology will be required to achieve this. Overall, although measurement is challenging, the impact evaluation suggests that **UK SHORE has had additional impacts on technology development**. The majority (43 out of 70, 61%) of survey respondents said that their project would not have gone ahead without UK SHORE funding, and no respondent said their project would have happened in exactly the same way without UK SHORE. Section 8.1 includes further detail on the extent to which UK SHORE has supported technology development.

Second, it can directly support projects which generate emissions savings. Some environmental benefits have been achieved to date, but **benefits would be primarily expected in the future**. Case study analysis of 4 CMDC3 and CMDC4 projects that reported

¹⁰¹ https://assets.publishing.service.gov.uk/media/6751af4719e0c816d18d1df3/Plan_for_Change.pdf

¹⁰² https://assets.publishing.service.gov.uk/media/69256e16367485ea116a56de/industrial_strategy_policy_paper.pdf

emissions savings identified a range of plausible emissions savings that could be achieved. Section 8.2 discusses the extent to which UK SHORE has achieved environmental benefits and more detail on the case studies is set out in Sections 4.2 and 9.2.2.

In addition, the Maritime Decarbonisation Strategy also identifies how maritime infrastructure and vessels can support the government's "make Britain a clean energy superpower" mission. Some UK SHORE projects are working on decarbonising vessels and infrastructure used by the offshore wind sector in particular. It has not been proportionate to quantify the exact number of projects.

9.1.2 Growth and regional growth

The evaluation found evidence of realised **job creation and retention**: 1,086 jobs have been created or retained by the CMDC and ZEVI organisations which responded in monitoring data. The response rate for these questions was around 50%, so actual job creation is probably higher. Further job creation has been achieved by TRIG and The Hub, albeit at a smaller scale. In line with standard job assumptions, these do not refer to newly created jobs in the UK but are assumed to be displaced from elsewhere.

In addition, there is evidence of **some further positive business outcomes** to date:

- Of 39 responding organisations surveyed in 2025, 7 (18%) reported that they had generated revenue in the past 2 years due to the technology produced within the project.
- Seven out of 35 CMDC3 organisations that responded to end-of-project monitoring data reported an increase in profit, totalling £1.19 million. Ten out of 114 CMDC4 responding organisations reported an increase in profit, totalling £0.44 million.
- Around half of CMDC1 and CMDC2 organisations that responded to end-of-project data reported (unquantified) revenue generation or cost reduction.

Job creation/retention and improved business outcomes are of themselves not metrics of growth. However, to the extent that jobs and business activity are additional and displacing less productive activity, these benefits are likely to be associated with increased levels of economic activity and living standards.

The early stage nature of this evaluation means that the full set of benefits are unlikely to have been realised to date. There is also evidence that **larger benefits could be realised in the future**:

- CMDC and ZEVI organisations that responded to monitoring data expected to create or retain more jobs in the future (more than 9,000 jobs over 5 years).
- Stakeholders suggested that UK SHORE had "kicked off" the clean maritime market, positioning the UK well to capitalise on growth in the clean maritime sector.
- Evidence suggests that projects are moving towards commerciality, at which point growth benefits would be expected to increase:

- Half of the responding CMDC and ZEVl projects had seen MRL or CRL development with high levels of reported additionality
- Two-thirds (21 out of 33) of survey respondents reported that they planned to take their project forwards towards commercialisation within the next 6 months, with a further 7 planning to do so at a longer time scale
- Lower TRL schemes (TRIG and The Hub) have benefitted from skills development and collaborations which will help to deliver growth benefits in the future.

Further detail on the extent to which UK SHORE has supported growth is discussed through Sections 8.3 and 8.5.

Regional impacts

It is difficult to assess the regional impact of UK SHORE, given the lack of granular information on where activities and potential benefits are located. In addition, low sample sizes in each region means it is difficult to assess whether organisation-level benefits such as follow-on funding differ across regions (see Section 4.3 for more detail).

Nonetheless, there is evidence of benefits across the UK, for example:

- 58% of CMDC and ZEVl funding is targeted outside the Greater South East, with more than the proportion of total government R&D going to these regions in 2022 (48%)¹⁰³
- Hub organisations are distributed across most UK regions
- 36% of survey respondents said their project was located in coastal areas.¹⁰⁴

9.1.3 Leveraging investment

Leveraging investment is an important part of the Modern Industrial Strategy. Key sectors are identified as priorities for the government, where support will be targeted. Clean maritime sits within a number of these sectors, including 'Clean Energy' (due to the use of hydrogen and support for offshore wind), and 'Digital and Technologies' (as it relies heavily on engineering and electrical manufacturing). Ports are named as a key sector within the foundational industries and inputs.

UK SHORE **has successfully crowded in private investment**. As of December 2023, match funding of £120 million had been raised across schemes, in line with expectations. Based on end-of-project and inflight monitoring data, an additional £31.5 million of private funding had been generated by CMDC3, CMDC4 and ZEVl schemes.

¹⁰³ [ONS](#) (2024). UK public-funded gross regional capital and non-capital expenditure on research and development.

¹⁰⁴ 'Which of the following best classifies the nature of the area in which most of the project is being delivered?' Options included 'Inner city area', 'Suburban city area', 'Town/village', 'Rural', 'Coastal', 'Don't know'.

Further investment benefits would be expected in the future. Investment impacts should be reassessed a few years after project completion to understand the longer-term impacts. Sixteen out of 39 survey respondents expected to secure investment in the future.

There is evidence that UK SHORE **investment outcomes were partly additional**. Half of survey respondents who generated or expected to generate further funding (6 out of 12 secured, 14 out of 28 expected) reported that more than 50% of their funding had been received as a result of participation in UK SHORE.

Section 8.3 provides further detail on the extent to which UK SHORE has helped to leverage investment.

9.1.4 Overall conclusions on strategic fit

Overall, evidence from the impact evaluation suggests that UK SHORE is **well aligned with key government strategic priorities**.

Some growth and investment benefits have been achieved to date. This includes notable job creation, consistent with the growth mission to the extent that the jobs are higher skilled than those displaced. Private investment has been leveraged in line with targets. It is difficult to assess the regional impact of UK SHORE based on current data, but it is likely that the benefits have been distributed across the UK with some impact in coastal areas.

Over the longer term, the evidence suggests that growth and investment benefits are likely to grow as projects develop both technologically and commercially. Moreover, UK SHORE has had an additional impact on technology. This is expected to generate emissions savings in the future, supporting the Maritime Decarbonisation Strategy.

As discussed in Section 8, some stakeholders consulted perceived that UK SHORE could be doing more to achieve shorter-term environmental and commercial benefits. The primary aim of UK SHORE to 2025 is, however, to support technology development and innovation, with longer-term benefits coming from commercial impact and decarbonisation.

9.2 Comparison of costs and benefits

This section discusses the following benefits: monetised job creation and retention benefits; monetised emissions saving benefits; and non-monetised benefits. These monetised benefits are compared to the present discounted public funding cost of UK SHORE investments, calculated at £215 million between 2021 and 2025 (June 2025 prices).¹⁰⁵

¹⁰⁵ This includes the costs of UK SHORE across the 4 schemes in scope of the evaluation up to FY2025/26. It does not include additional costs for The Hub in later years. Admin costs are included for CMDC3, CMDC4 and ZEVI but it has not been possible to determine whether these are included for CMDC1, CMDC2, TRIG and The Hub. Such costs would likely be small and have minimal impact on the Vfm analysis..

It is not plausible to calculate a robust and complete benefit-cost ratio (BCR) at this point in the evaluation, as many of the longer-term impacts have not yet materialised. Instead, and in line with the Magenta Book, the assessment considers whether it is plausible that the future benefits of UK SHORE will outweigh the costs of delivering the portfolio.

The assessment is made for each of the 2 monetised benefits separately, based on **early and non-comprehensive BCRs** for job creation and retention and emissions savings benefits. The focus on individual benefits is to simplify the breakeven assessment.

A further qualitative assessment of the overall VfM of UK SHORE considers both benefits alongside non-monetised benefits.

In practice, UK SHORE would be expected to have a BCR above 1. The DfT value for money guidance treats a 'high' BCR as between 2 and 4 and a 'very high' BCR above 4.¹⁰⁶ The initial business case forecast a very high BCR for the programme.¹⁰⁷

A more detailed discussion of the methodology for monetising benefits is set out in Annex B .

9.2.1 GVA benefits of job creation and retention

Despite the limitations associated with this analysis (described in detail below) and the early nature of the findings, **there is strong evidence that UK SHORE will represent value for money based on current and future job creation and retention alone:**

- Based on the impact evaluation findings, a reasonable estimate is that between 30,000 and 80,000 job-years will be directly created or retained in private sector organisations because of CMDC and ZEVI support.¹⁰⁸ The range is created based on assumptions around the length of job creation/retention. These job figures are based on reporting by roughly 70% of CMDC and ZEVI private sector organisations, and thus may understate total job creation/retention.¹⁰⁹
- These jobs are valued at £19,600 above the average job in the UK, based on the average GVA per worker in the sectors in which UK SHORE companies operate. This assumes that those employed in UK SHORE jobs would otherwise be employed in an 'average' UK job. This may overstate the additional value if the outside option of UK SHORE employment is an above average wage job.

¹⁰⁶ <https://assets.publishing.service.gov.uk/media/6899c8393080e72710b2e338/dft-value-for-money-framework.pdf>

¹⁰⁷ The actual BCR is not included here due to a significant change in the modelling for the VfM compared to the initial business case.

¹⁰⁸ 'Job-years' refers to the number of jobs multiplied by the number of years they are assumed to exist. For example, if 300 jobs were created for 10 years, this would equate to 3,000 jobs.

¹⁰⁹ This 70% is higher than the 50% response rates reported elsewhere in the evaluation. This is because it refers only to private sector organisations whereas the 50% response rate additionally included public sector organisations. The VfM job creation and retention benefits consider only private sector jobs. More details on methodology are included in Annex B .

- Combining these inputs, CMDC and ZEVI have generated present value discounted GVA job creation benefits of between £567 million and £1,356 million. This results in an early and non-comprehensive BCR of 2.6 to 6.3, based on job creation benefits alone (with the range created based on assumptions around the length of job creation).

The above BCR is informed by assumptions which may mean that the BCR is either underestimated or overestimated.

Importantly, the job creation and retention estimates do not include all UK SHORE projects and therefore may be *underestimating* the impact of UK SHORE:

- The analysis focuses on CMDC and ZEVI, ignoring any job-related impacts from The Hub and TRIG (though these are small relative to CMDC and ZEVI).
- Job creation in CMDC and ZEVI is based on only organisations that responded to end-of-project monitoring data. For organisations that did not respond, job creation is assumed to be zero. Response rates to job creation questions are roughly 70% for private sector organisations but they vary significantly across schemes and scheme rounds. However, it is not robust to extrapolate from responding organisations to understand job creation across all organisations.
- The UK SHORE portfolio may create jobs across the clean maritime industry outside of the organisations directly involved in the scheme, for example jobs in the supply-chain. These are not included in the assessment.

However, there are also factors which might lead the estimates to be *overestimated*:

- **Optimism bias and deadweight:** Responses are likely to suffer from optimism bias, where organisations overestimate the size of job creation. This is particularly true for projected job creation, for which the figures rely on a project's expectation being realised. In addition, while organisations were asked specifically about jobs created *because of* UK SHORE support, it is likely that there is some deadweight not captured in the monitoring data responses (some of the jobs would have been created or retained even without UK SHORE). However, significant levels of optimism bias and deadweight would be required to bring the actual BCR below 1. Using the more conservative scenario from our estimates, the benefits would need to be 62% smaller for the BCR to fall below 1 purely based on jobs benefits.
- **Counterfactual GVA:** The methodology assumes that those employed in UK SHORE jobs would otherwise be employed in the average UK job. In reality, they are more likely to be employed in a similar job in a different sector. It is difficult to construct an 'average alternative job'. However, even in the conservative scenario, UK SHORE jobs only need to be 12% more productive than the alternative role (equal to £7,400 of additional value-added) in order to achieve a BCR of 1 (assuming no optimism bias or deadweight).

Combining the early and non-comprehensive BCR with the breakeven analysis provides strong evidence that the BCR from job creation/retention alone is likely to exceed 1.

9.2.2 Emissions savings

Due to the limitations of the data (set out in Annex B.2), it is not possible to aggregate projected emissions savings across UK SHORE projects. Even if this were possible, emissions savings data is only available for a subset of schemes. Therefore, the assessment of whether it is plausible that UK SHORE could generate VfM purely from emissions savings is primarily informed by the CMD3 and CMD4 case studies. This is the only source of independently validated emissions savings data.

An additional source of evidence comes from one CMD4 project which reported emissions savings to date. The project supported the decarbonisation of an entire shipyard, resulting in emissions savings estimated by the project at over 43,000tCO₂e annually. Monetising these emissions alone and comparing them to the costs of the entire UK SHORE portfolio results in an early and non-comprehensive BCR of 0.87 out to 2040. While not all these emissions savings are directly attributable to UK SHORE, this also provides good evidence in support of VfM for UK SHORE.

Case study methodology and results

Four end-of-project reports with positive emissions savings were independently reviewed by ERM to assess the plausibility of the reported scaled and unscaled emissions expected. As described in Section 2.2.3, the case study approach involved:

- Purposive sampling, removing projects with negligible emissions savings (2 projects) and unclear or incomplete reporting (10 projects). The case studies selected aimed to cover a breadth of technology types, vessel types and projects across the UK. As a result, case studies are not 'representative' projects and in particular, as an artefact of this sampling approach, are likely to generate higher emissions savings than the average CMD3 and CMD4 project.
- A review and cross-check of assumptions used to calculate emissions savings against industry references and alternative methods. In some cases, this led to the calculation of more conservative unscaled and scaled emissions estimates.

This resulted in the unscaled and scaled emissions savings (defined in Section 1.2.2) set out in Table 54.

Table 54 Emissions savings generated by case study projects

Case study	Technology type	Vessel application	Unscaled emissions (tCO₂e)	Scaled emissions (tCO₂e)
1	Combustion powertrain	Medium size ships (cargo vessels and others)	623	18,553
2	Efficiency improvement	Medium to large ships (bulk carrier)	2,032	173,699
3	Electric powertrain	Small 12-14m crew transfer vessels	337	2,024
4	Supporting infrastructure or offboard	Crew transfer and offshore wind support vessels	2,813	11,822

Source: Frontier Economics and ERM

Note: Unscaled emissions refer to 'an estimate for the emissions savings achieved by a single demonstrator project in comparison to the relevant counterfactual that exists in the maritime sector'. Scaled emissions are 'an estimate for the emissions savings that could be achieved by the potential deployment at scale of the technology in the wider maritime market'.

Undertaking the case studies highlighted the difficulty of aggregation even within a more limited sample of projects. There is overlap in the market application of case studies 3 and 4. Both relate to crew transfer vessels, with some of the emissions savings claimed by case study 4 already being accounted for by case study 3. Feasibly, both solutions could be deployed in the market independently. This would result in the reported emissions savings from both projects being realised. On the other hand, these technologies could be deployed together, resulting in lower total emissions savings than the combined reported total. It could also be the case that each technology claims a smaller proportion of the market than expected due to the overlap. This would also result in lower emissions savings.

Due to the overlapping applications, case study 3 is excluded from the analysis to prevent a risk of double counting. Case study 4 refers to a broader market than case study 3, which is able to serve more technologies and types of vessel (hybrid as well as electric, from different manufacturers of vessels).

Value for money assessment

The figures in Table 54 are used to calculate a plausible emissions savings profile, which are monetised using DESNZ carbon values for appraisal and then expressed in present discounted terms. Benefits are considered out to 2040, given that UK SHORE projects are not expected to lead to an immediate emissions reduction as they are not yet in deployment

The cost-benefit analysis compares the entire costs of the UK SHORE portfolio in scope for this evaluation with the value of projected emissions savings from these 3 CMDC3 and CMDC4 projects (out of a total of 52 CMDC3 and CMDC4 projects).

Assuming that all emissions savings from these projects are attributable to UK SHORE, comparing the monetised benefits with the entire cost of the UK SHORE portfolio, the early and non-comprehensive BCRs *purely on the basis of emissions reduction from these 3 projects alone* would be between 0.7 and 1.3. The higher scenario assumes projects achieve full scale-up by 2040, while in the lower scenario full scale-up is not achieved until 2050.

Given the uncertainty around these projects and the lack of clear evidence on additionality, breakeven analysis is conducted on the higher scenario:

- **Additionality:** If scale-up is achieved by 2040, to achieve a BCR greater than 1 *on these 3 projects alone*, around 77% of the emissions savings would need to be attributed to UK SHORE. Evidence from the impact findings (see Section 8.1) suggests that UK SHORE has created additionality in terms of technology development and therefore at least partial additionality for emissions savings can be assumed. However, it is not possible to calculate a specific figure for attribution of benefits to UK SHORE.
- **Rate of scale-up:** Unscaled emissions savings are more certain compared to scaled emission savings: unscaled savings depend on technology and can be tested, while scaled savings rely on uncertain projections about technology rollout. The case study validation has relied on conservative assumptions but is inevitably speculative. Across the case studies, scaled emissions are 68 times greater than unscaled emissions. A BCR of 1 would be achieved even if the scaled emissions were just 59 times greater. This reflects a lower deployment of the technology across the market: rather than the technology being deployed 68 times, it only needs to be deployed 59 times.

The focus on a small number of case studies suggests that the analysis will understate the possible emissions savings. A simplified approach to considering a broader range of projects brings together emissions savings projected by 15 CMDC3 and CMDC4 projects which reported unscaled emissions at the same 'unit' (by vessel). Based on conservative assumptions about optimism bias and potential overlap between the projects (resulting in a downscale of total reported unscaled benefits to one-third of their reported values), technologies need to be deployed only 21 times on average to break even. This number is necessarily lower than the scale-up rate from the case study analysis as it draws on a greater number of projects.

The analysis shows that, *even if only these 3 projects* successfully generated expected emissions savings, it is plausible that monetised benefits would exceed the costs of the UK SHORE portfolio. It is highly likely that more projects will generate emissions savings and therefore lower scale-up rates or assumptions about additionality will be needed to generate a BCR above 1.

9.2.3 Non-monetised benefits

On top of project-level job creation and emissions savings, UK SHORE generates other benefits which are not monetised as part of this evaluation. These include:

- **Local economic benefits:** Job creation in areas of the country which are more deprived than average will generate additional local benefits via multiplier effects. The creation of high productivity, high-wage jobs generates additional spending power. It is difficult to assess the local growth benefits of UK SHORE but 14 out of 39 (36%) of survey respondents said their project was located in coastal areas. Coastal areas are typically more deprived than other areas of the UK, with the funding likely to create jobs directly in these areas.¹¹⁰ Additional jobs are also likely to be created in these areas as the technologies are deployed. The previous Green Book set out a methodology for monetising local economic benefits.¹¹¹ However, data is not available on the location of job creation. In addition, it would not be proportionate to conduct a granular assessment of the leakage, substitution and displacement of each area.
- **Industry-wide job creation:** As noted above, the GVA benefits of job creation refer only to job creation by organisations involved in UK SHORE. It does not consider supply chain, downstream or spillover effects within the industry and wider economy. Data is not available to assess industry-wide job creation.
- **Air pollution impacts around ports:** The only environmental benefits monetised are CO_{2e} emissions. UK SHORE is additionally expected to improve air quality around ports through a reduction in nitrogen dioxide and other polluting particulates. Evidence suggests that air pollutants will cost the NHS and social care system £1.6 billion between 2017 and 2028.¹¹² Improvements to air quality would also improve quality of life.

9.3 Overall findings and future considerations

Overall, there is strong evidence that public investment in UK SHORE represents value for money.

UK SHORE is achieving strategic fit: aligning with net zero targets, supporting economic growth, and helping leverage private investment in strategically important sectors. More evidence would be needed to provide strong findings on the local economic benefits.

¹¹⁰ <https://www.ons.gov.uk/releases/coastaltownsinenglandandwales>

¹¹¹ <https://webarchive.nationalarchives.gov.uk/ukgwa/20241207185311/https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010109/EN010109-001912-Norfolk%20Parishes%20Movement%20for%20an%20OTN%20-%20Comments%20on%20Written%20Representations%201.pdf>

¹¹² <https://www.gov.uk/government/publications/air-pollution-applying-all-our-health/air-pollution-applying-all-our-health>

Moreover, the conclusions from the interim evaluation show that there are no significant issues with the economic and effective delivery of the portfolio. This analysis drew largely on the process evaluation of UK SHORE.

Finally, **when combining the 2 separate BCRs which fall in the range of, or exceed, 1 alongside non-monetised benefits, it is very unlikely that the BCR is below 1.** The quantitative comparison of monetised costs and benefits finds that a BCR of more than 1 is likely, based individually on job creation or emissions savings. While the analysis must be caveated, the benefits exceed costs under plausible assumptions. A high degree of deadweight and optimism bias, or very low GVA per job differentials, would be needed to see the BCR from job creation alone fall below 1. In addition, even if only 3 case study projects successfully delivered emissions savings, reasonable additionality assumptions would still result in a BCR of 1, when comparing to the costs of the entire UK SHORE scheme. It is highly likely that more than just the case study projects result in emissions savings. Additional non-monetised benefits include local economic benefits in deprived areas (namely coastal towns), industry-wide job creation and improvements in air pollution around ports.

However, at this early stage of the scheme, a specific BCR figure or range cannot be presented. A future evaluation of the VfM of UK SHORE should draw on realised, rather than expected, job creation and emissions savings. A key lesson learned from this VfM evaluation is the need to consider future guidance to aggregate emissions savings. In addition, where possible, the VfM evaluation should also use counterfactual analysis of business impacts to assess deadweight. It should also consider the proportionality of assessing additional benefits which have not been monetised as part of this exercise.

10 Lessons learned and points to consider from across the evaluation of UK SHORE

This final section draws on findings from across all evaluations (process, impact and VfM) and evidence collected for both the interim and final reports. It draws out key lessons learned and points to consider for future implementation of UK SHORE or similar schemes.

Findings from across all 3 elements of the evaluation are generally positive:

- Processes for delivering the UK SHORE portfolio of schemes appear to be delivered well, with high levels of satisfaction reported by applicants and good working relationships reported across the stakeholders and delivery partners.
- There is evidence that UK SHORE funding is seen as strongly additional by beneficiaries and has contributed to technology development (albeit with some mixed evidence for earlier-stage CMDc schemes). UK SHORE match funding has aligned with expectations. There is also early evidence of follow-on funding, emerging commercial impacts and potential for cross-sector spillovers. Projects are moving through the portfolio of schemes, and The Hub and broader UK SHORE visibility are helping to promote the UK's offer in clean maritime. Job creation or retention figures are lower than expected in the business case, though this could reflect issues with the methodology used in the business case and low response rates to data collection processes that informed the evaluation.
- Assessment of the jobs and emissions impact, as well as wider evidence of non-monetised impacts, suggests that it is likely that UK SHORE represents value for money for public spending.

Nonetheless, lessons learned from this evaluation could be considered for the development of future schemes, and for existing schemes, to maximise the impact of the UK SHORE (or similar) portfolio.

10.1 Setting up projects for success

Some improvements to the delivery and application phases of UK SHORE could help to maximise projects' success. A detailed set of recommendations are provided in Table 17 in the process evaluation (Section 3.7). A summary of some key recommendations include:

- **announce schemes earlier**, and/or allow **more time** for applicants to prepare their applications
- **tailor application timelines** to the scale and scope of each scheme
- consider the possibility of providing **follow-on funding** for projects that have achieved their desired objectives but would not be able to pursue next steps without further funding (for example bringing technology to market)

- consider exploring different avenues for **recruitment of assessors** with the desired level and range of technical expertise and diversity
- ensure **monitoring officers** have an appropriate level of technical expertise to support projects.

10.2 Ensuring the correct enablers are in place

Enablers are factors beyond DfT's input which allow the outcomes and impacts of UK SHORE to be achieved. These enablers are not always within DfT's remit.

During the delivery phase, **support provided by delivery partners** received generally positive feedback from respondents to the survey and in interviews. However, some interviewees felt that delivery partners could have had **better technical knowledge** and there were some areas in which more support might have been valued, such as on regulatory, commercial and investment aspects.

In addition, **continued engagement with regulatory bodies** will help to reduce the regulatory barriers faced by projects. Engagement with the MCA started from the design of CMD3 onwards and has continued through subsequent schemes. Stakeholders and delivery partners argued that this improved the design and delivery of schemes. However, regulatory issues remain a significant barrier for many projects, with evidence of delays to project delivery or increased costs, particularly where regulatory input had not been anticipated. One potential improvement could be the MCA critically auditing applications to ensure that sufficient time has been factored in to accommodate for regulatory procedures.

In addition, some projects and delivery partners perceived existing regulation, as well as processes within the MCA, as out of date and lacking agility. A dedicated unit for innovation within the MCA is due to be established. It may be beneficial to incorporate this unit into the UK SHORE stakeholder portfolio to help prevent delivery delays driven by regulatory issues in future schemes.

In addition, DfT should consider whether it is helpful to educate and support projects on regulation as part of the planning phase. It might be helpful to provide support to get to the simplest appropriate regulatory route.

Moreover, over the longer term, the following enablers will be important for a wider rollout of UK SHORE schemes:

- **Economic and policy incentives:** Stakeholders felt that there was little commercial incentive for companies to adopt clean maritime solutions at present. Some suggested the need for a zero-emission mandate.
- **Further funding:** Stakeholders felt that the real-world benefits of UK SHORE would not be achieved without additional funding to take the concepts developed to commercialisation. Lack of future funding was listed as a barrier for some projects.

- **Infrastructure:** Many projects also thought that lack of shoreside and other infrastructure was a barrier to rollout. This also includes the need for grid reinforcement.

Where feasible, DfT should work with the relevant stakeholders to ensure these enablers can be put in place.

10.3 Maximising the value of the portfolio

This evaluation found evidence of projects progressing through schemes and of organisations participating in multiple schemes (see Section 8.6 for more details). Moreover, organisations funded by UK SHORE have a good awareness of the other UK SHORE funding opportunities. Therefore, organisations are aware of, and successfully make use of, other schemes to further their technology development. However, some actions could be taken to enhance the benefits of organising UK SHORE as a portfolio, as compared to individual schemes.

First, **scheme timings should be optimised** for both efficiency of management and for maximising outcomes. For example, one project noted that it was unable to draw learnings from one project into another as the earlier TRL project (CMD3) had not been complete by the time it had begun work on later TRL projects (ZEV). DfT acknowledged that the timing of schemes was not always optimal and was constrained by spending timelines and government processes.

In addition, some applicant organisations (both successful and unsuccessful) supported the potential for a **two-tiered funding process** or stage-based or milestone-based funding releases. Two-tiered funding would mean projects that had been successful in (for example a feasibility study) could apply for follow-on funding to progress their technology towards commercialisation. These processes would reduce the burden on projects which were applying for multiple schemes but they would carry risks about the breadth and diversity of technologies supported. DfT should consider the trade-offs around future funding options.

The phasing of future schemes and scheme rounds may provide new opportunities for projects to bid for further support to continue their technology development. DfT should seek to ensure an early and comprehensive announcement of expected future funding opportunities to ensure that projects can plan to bid for the most suitable opportunities

While some **knowledge sharing** and engagement events are already organised by DfT and delivery partners, these events could be enhanced. Some organisations sought more opportunities for exchanging technical knowledge with other projects both within their own scheme and across the UK SHORE portfolio. Most engagement events were conducted online and were in some cases noted to generate limited discussion. There could be benefits to arranging more events held in person, as this would provide more opportunities for informal networking and knowledge sharing. This evaluation has also not considered the extent of knowledge sharing with industry beyond those involved in the UK SHORE portfolio.

In addition, there may be a need to **review the objectives of UK SHORE schemes**. Some stakeholders expressed concerns that the projects funded by UK SHORE were not those which could have the largest environmental or commercial benefits. There was some concern about focusing too much on feasibility studies and ‘innovation for innovation’s sake’, rather than on projects which could make a real-world difference over a short time scale. Such views should be caveated as UK SHORE’s primary goal out to 2025 was to support the development of technology. However, it is important that UK SHORE supports projects which have the potential to generate emissions savings and support growth in the UK.

Considering this feedback from stakeholders, DfT should ensure that the schemes continue to address gaps and market failures, exploring the need and potential for more later-stage funding. When engaging with stakeholders, it would also be helpful to ensure clarity and consistency on the objectives of UK SHORE as a portfolio and how its individual schemes fit within this. This should be done throughout funding calls and with industry and stakeholder engagement.

10.4 Enhancing future evaluations

As part of this work, Frontier Economics and SYSTRA have developed a framework to assess the longer-term benefits of UK SHORE (out to 2028). This section includes recommendations which will aid future evaluations (whether early stage or longer term).

10.4.1 Understanding success

Section 10 of the interim report discussed in detail the difficulties of reporting project outcomes in a standardised way. This may partly explain some of the potentially inconsistent results with TRL and CRL where earlier scheme rounds showed higher rates of regression.

DfT should consider how to collect information on failure rate. This should include information on whether the failure is ‘positive’ (helping technology to ‘fail faster’ fail quickly) or ‘negative’ (for example, where a project received funding but should not have, failed to receive the support it needed or was poorly managed).

In addition, there are a lack of benchmarks for success which could be used as part of this evaluation. The exception is job creation, where comparisons could be made to the business case, but these were not particularly insightful due to response rates.

Future evaluations would benefit from clear documentation of the assumptions made as part of the business case that might be testable by the evaluation. In addition, where possible, it would be helpful to ask projects to define what success would look like upfront. This would allow for comparison of what was achieved and project-level benchmarks, while recognising the fluidity of objectives as projects are delivered (as highlighted by findings from TRIG23 and TRIG24 that projects achieved a mix of anticipated and unanticipated success indicators when comparing baseline and realised indicators).

Moreover, there is not always a clear unit of analysis when considering the impacts of the project. Typically, the unique organisation-project combination is used because monitoring data asks organisations about the impact of the specific project. However, some organisations provide the same response for each project when involved in multiple projects and so could result in double counting. DfT should consider how best to collect monitoring data from organisations involved in multiple projects (particularly within one scheme). This may involve tailored questions or clearer instructions for these organisations.

10.4.2 Data collection

Increasing response rates

A significant limitation of the evaluation is incomplete response rates. Findings from a limited subset of organisations or projects cannot be generalised to the entire group.

All organisations that receive funding are obliged to fill in baseline and end-of-project monitoring data collected by delivery partners (plus mid-term data in some cases). However, some schemes, including CMDC3 and ZEVI, saw particularly low response rates. It may be that these projects responded to the data collection beyond the cut-off point for analysis, although this date was more than a month after the data collection deadline.

With delivery partners, DfT should consider ways to enhance messaging around requirements for monitoring data to be completed in a timely and accurate way and the obligations that accompany public investment. This would also reduce the need to collect additional evidence as part of any future evaluation, reducing respondent burden and potentially increasing response rates to future surveys by reducing the number of questions that need to be asked.

Process monitoring

Monitoring data for CMDC1 and CMDC2 included questions about satisfaction with the competition and delivery process. These questions were not asked of CMDC3, CMDC4 and ZEVI, following changes to Innovate UK monitoring processes. Restarting such monitoring questions will ensure the ability to track satisfaction across all schemes and the extent to which updates to processes have increased satisfaction.

Capturing environmental benefits

There have been marked improvements in reporting of emissions savings for CMDC3 and CMDC4 (this report) compared to CMDC1 and CMDC2. However, as discussed in Section 4.2, there are still numerous issues with the data and aggregation is not possible.

Further work will be needed to review reporting standards and create standards which allow for aggregation of future data collection. Such a review could include reviewing the best examples of reporting from the current CMDC3 and CMDC4 to understand what worked well. Some potential changes include:

- specific guidelines on what is meant by a 'unit' so all projects report on a common basis
- specific guidelines about deployment of their technology, although such an approach should be carefully considered as projects may feel that they have the best awareness of their technology rollout
- independent assessment of some, or all, reporting to assess whether assumptions and methodology are standardised and implemented correctly
- support and advice for projects to help them apply emissions reporting guidance.

The proportionality of such a task will depend on the number of projects and the amount of funding provided. For ZEVI, the technical evaluation will provide a good opportunity to accurately capture environmental benefits.

Follow-on monitoring

It is understood that follow-on data will only be collected by Innovate UK for CMDC3, CMDC4 and ZEVI, one year after project completion. Follow-on data will not be collected by delivery partners for many other schemes.

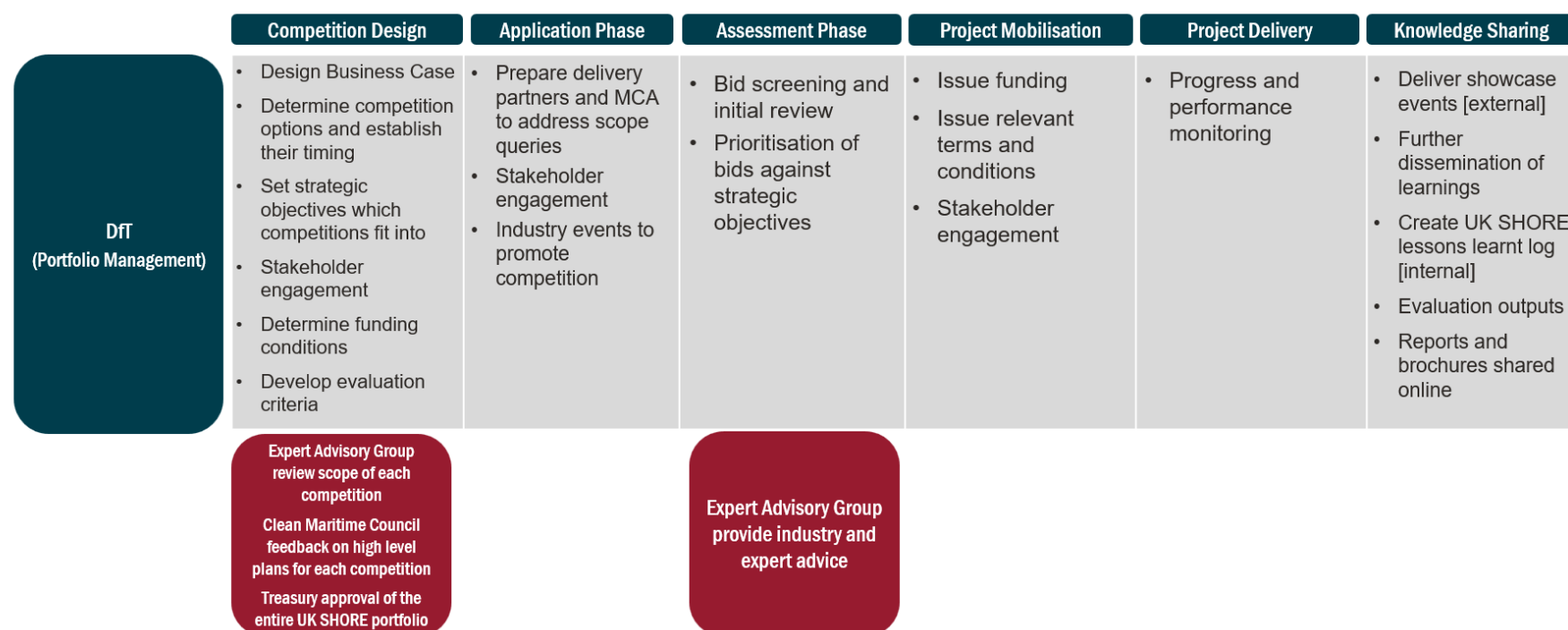
Many of the key impacts of UK SHORE will not be realised by the end-of-project, or one-year follow-on, data collection. Many benefits take longer to be seen and should be assessed for example over a 5-year time scale. This is particularly true for job creation and investment – these are key goals for UK SHORE. It is also important to capture how technologies develop over time, including whether they are rolled out commercially and able to generate emission and commercial benefits.

DfT should consider potential options to collect follow-on data as projects have not agreed to this data upfront. For future schemes, it should consider incorporating longer-term follow-on data as an upfront part of data collection design. The long-term evaluation framework developed as part of this evaluation sets out an evaluation approach out to 2028 and provides suggestions for future data collection.

Annex A Portfolio-wide process map and logic model

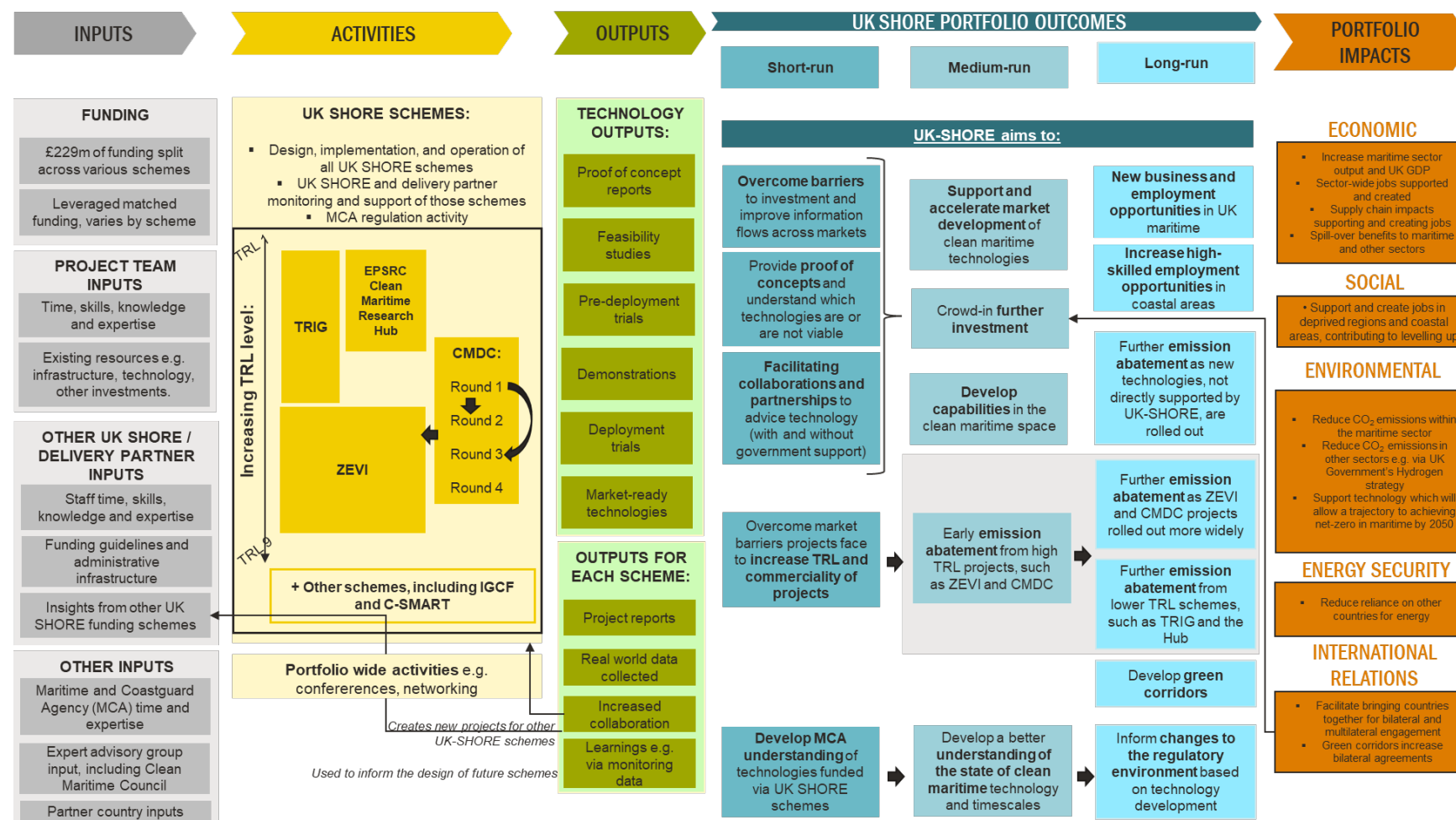
Figure 49 and Figure 50 set out the UK SHORE portfolio-wide logic model and process maps.

Figure 49 UK SHORE portfolio-wide process map



Source: SYSTRA Ltd.

Figure 50 UK SHORE portfolio-wide logic model



Source: Frontier Economics

Annex B Value for money methodology

This Annex sets out the methodology for the third value for money (VfM) sub-question: ‘To what extent are the socioeconomic benefits (monetised and non-monetised) of UK SHORE and its component schemes likely to exceed the public costs of delivery?’. It considers specifically the monetised socioeconomic benefits.

There are 3 elements of this assessment, as set out in Figure 51.

Figure 51 Methodology for VfM calculation



Source: Frontier Economics

For each element, a time series of costs or benefits is created. The values are converted to 2025 prices using ONS inflation data.¹¹³ They are then discounted to create a net present value using the standard Green Book discounting rate (3.5%).¹¹⁴

The cost of UK SHORE was provided by DfT on an annual basis. This amounts to a real 2025 net present value figure of £215 million.

The methodology for job creation and retention and emissions savings benefits is set out below.

B.1 GVA benefits from job creation and retention

As set out in Figure 52, the job creation and retention is valued by combining self-reported job creation with the GVA value of these jobs. More detail on each input is set out below. In the interest of brevity, the phrase ‘job creation’ is used to mean ‘job creation and retention’ throughout the remainder of this annex.

This analysis assumes that jobs created by UK SHORE displace the ‘average’ job in the economy measured in terms of GVA per worker. This is in line with standard DfT approaches to job creation using appraisal processes.

¹¹³ <https://www.ons.gov.uk/economy/inflationandpriceindices/timeseries/l522/mm23>

¹¹⁴ <https://www.gov.uk/government/publications/the-green-book-appraisal-and-evaluation-in-central-government/the-green-book-2020#a6-discounting>

Figure 52 Methodology for GVA benefits from job creation

Source: Frontier Economics

Total job creation

In end-of-project monitoring data, projects are asked to report jobs created or retained because of UK SHORE support.¹¹⁵

As the question asks about jobs as a *result of* UK SHORE, such figures are assumed to be additional, i.e. without UK SHORE support, these jobs would not have been created or would have been lost. Sensitivities are used to test this assumption in applying the methodology.

Where organisations are asked about ‘created’ and ‘retained’ jobs, these are combined as they both refer to jobs in the organisation that would not have existed without funding.

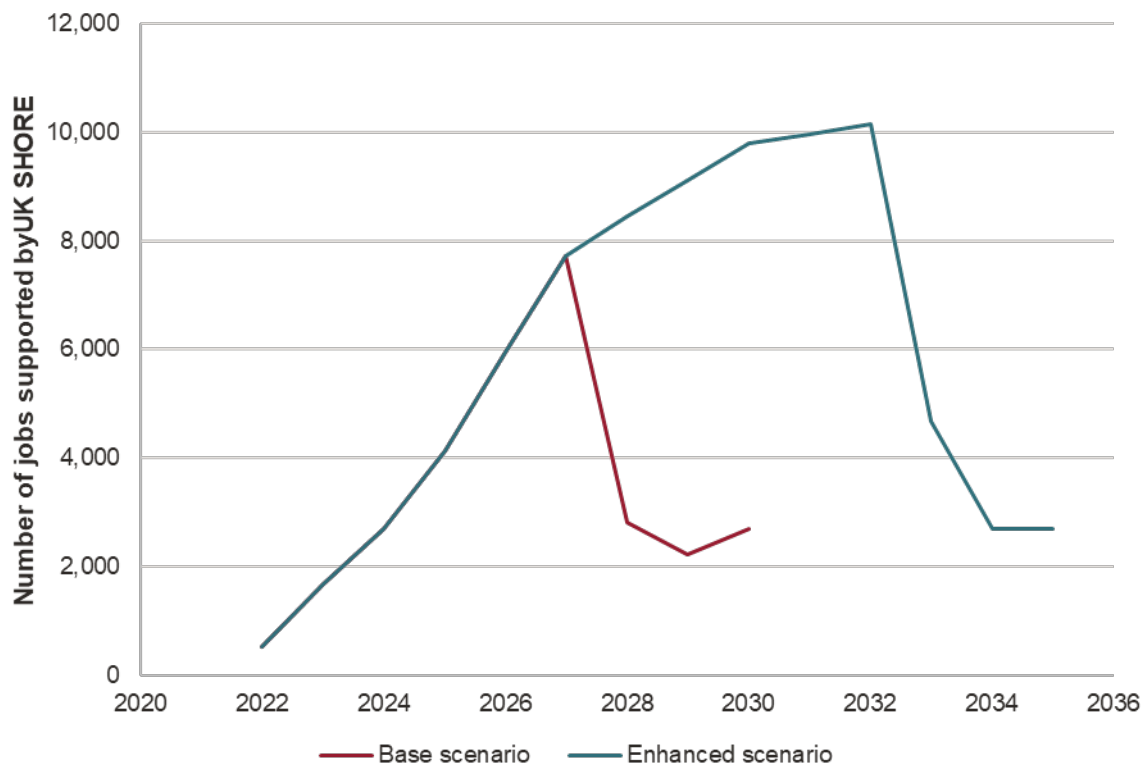
The following steps are applied to the data:

- Remove job creation in universities and public sector organisations: the counterfactual for jobs created in these organisations is that individuals would be employed in similar roles but just not in the clean maritime sector. For example, a researcher employed at a university to work on clean maritime would likely otherwise be employed in a university but working on another research area. The GVA of such roles is expected to be similar.
- Create a time profile for jobs: Projects only report job creation at specific points in time: end of project (CMDC) or inflight (ZEVI), 2 years after end of project (CMDC1 and CMDC2), 5 years after end of project (CMDC) or inflight (ZEVI), and 10 years after end of project (CMDC1). Therefore, the following assumptions are made about the profile of jobs:
 - No jobs are created before they are reported (where a project begins multiple years before the first collection of follow-on monitoring data, no jobs are assumed until monitoring data is collected – this is likely to underestimate the total impact)
 - Jobs grow linearly between points in time (for example between reported at end of project compared to expected creation 5 years after end-of-project reports)
 - In the base scenario, there is no further job creation after 5 years. In the enhanced scenario, jobs are maintained for an additional 5 years.

¹¹⁵ CMDC3: ‘As a result of this Innovate UK support, how many more or less Full Time Equivalent (FTE) employees are in your business today?’ and ‘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?’

This methodology results in a job creation profile as set out in Figure 53.

Figure 53 Assumed job creation profile



Source: Frontier Economics, based on end-of-project monitoring data

Note: 'Enhanced scenario' assumes that UK SHORE has an impact on jobs up to 10 years after project end, while 'base scenario' assumes this is only up to 5 years after project end.

This profile may overestimate the benefit of job creation directly related to UK SHORE projects because:

- optimism bias means reported figures are likely to overestimate total job creation within their project – this is particularly true for future years
- while organisations were asked specifically about jobs created because of UK SHORE support, it is likely there is a degree of deadweight in these figures.

On the other hand, the results will be underestimated because the response rate is not 100% and so job creation may be higher than the totals reported in monitoring data. Response rates are set out in Table 55.

In addition, this figure refers only to within-project job creation and does not consider industry-wide job creation (this is considered as a non-monetised benefit in presenting the findings). Any job creation or retention relating to TRIG and The Hub is also excluded.

Table 55 Response rates by private sector organisations

Scheme	Number of private sector organisations across the scheme	Number that responded to end-of-project monitoring	Number that answered job 'realised' job creation figures	Number that answered job 'expected' job creation figures
CMDC1	154	156 (>100%)*	146 (94%)	146 (94%)
CMDC2	91	86 (95%)	78 (88%)	77 (85%)
CMDC3	72	21 (29%)	19 (26%)	19 (26%)
CMDC4	108	86 (80%)	75 (70%)	75 (70%)
ZEVI	38	36 (95%)	12 (32%)	11 (29%)
Total	463	385 (83%)	330 (71%)	328 (70%)

Source: Frontier Economics, based on monitoring data

Note: For CMDC1 and CMDC2, 'expected' refers to 5 year job expectations to align with CMDC3 and CMDC4, but there is little variation between 2, 5 and 10 year job expectations. Percentages represent the percentage of all private sector organisations across the scheme. *More private sector organisations are found in the data than there are involved in the scheme. This is likely due to duplicate organisations which were not identified using the cleaning procedure set out in Section 4 of the interim report. In this case, the % of organisations that responded to the job creation numbers are out of the total number that responded to end-of-project monitoring.

Valuing the jobs created

The following steps were undertaken to calculate the average GVA of jobs created by UK SHORE:

- The SICs of companies supported by CMDC and ZEVI were identified using Companies House data.¹¹⁶
- Based on the number of companies in each SIC, a weighted average 'UK SHORE GVA per worker' was calculated.¹¹⁷ SIC codes with a GVA per worker value more than £200,000 above the UK average were removed ('Mining and quarrying related activities' (3 organisations) and 'Water transport' (27 organisations). This is a conservative approach as these figures may be outliers that bias the results upwards
- UK SHORE GVA per worker was compared to UK-wide GVA per worker.

Using this methodology, jobs created within UK SHORE are valued at £19,600 above the average job in the UK (2025 prices).

The limitation with such an approach is that it assumes those employed in UK SHORE jobs would otherwise be employed in the 'typical' UK job. In reality, these employees are more

¹¹⁶ <https://find-and-update.company-information.service.gov.uk/>

¹¹⁷ <https://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/labourproductivity/datasets/outputperjobbydivisionuk>

likely to be employed in similar style industries. This figure is therefore likely an overestimate of the benefit of a single job. Nonetheless, it is expected that those who are moving job into a UK SHORE job do so because it is an improvement from their current job (or those who would have lost jobs absent UK SHORE would not have been able to find an equivalent job elsewhere).

B.2 Monetised emissions savings

Calculating the monetised emissions impact of UK SHORE would ideally combine project-level emissions savings, monetising using DESNZ carbon values. However, it is not possible to calculate aggregated emissions savings from UK SHORE projects for several reasons.

First, emissions savings are not yet realised. Projects are developing technologies which will result in savings if they are rolled out. Few projects are yet at the commercialisation stage. Therefore, *projected* emissions savings would be needed to consider the potential impact of UK SHORE on emissions.

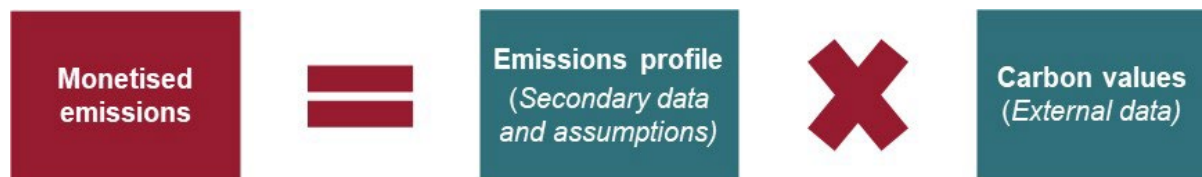
To date, emissions savings are only reported for CMDC. Reporting improved for CMDC3 and CMDC4 compared to CMDC1 and CMDC2, but it has not been possible to aggregate across projects in a meaningful way. A fuller discussion is set out in Sections 4.2 of this report and 6.2 of the interim report.

Second, even if projects were able to consistently report potential emissions savings from the deployment of their technology, issues would remain with aggregation. It would be important to avoid double counting, either due to technologies progressing through rounds (and therefore the same emissions benefits being attributed to multiple UK SHORE schemes) or competing technologies being developed to tackle the same challenges. It would also be important to consider synergies across the projects, where some technologies may not be able to be rolled out without others.

Finally, the additionality of UK SHORE is an issue. It may be challenging to understand what proportion of emissions savings could be attributed to UK SHORE. Scenarios would need to be developed to consider this.

In light of these issues, 2 types of analyses are conducted, set out below. Both analyses assume a profile of emissions, which are then valued using the Green Book carbon values. This methodology is set out in Figure 54.¹¹⁸ The analyses consider profiles of emissions benefits over 2 time horizons: first to 2040, and then to 2050. This reflects time needed for emissions benefits associated with UK SHORE to materialise fully.

¹¹⁸ <https://www.gov.uk/government/publications/valuation-of-energy-use-and-greenhouse-gas-emissions-for-appraisal> Table 3.

Figure 54 Methodology to monetise emissions savings

Source: Frontier Economics

Case study analysis

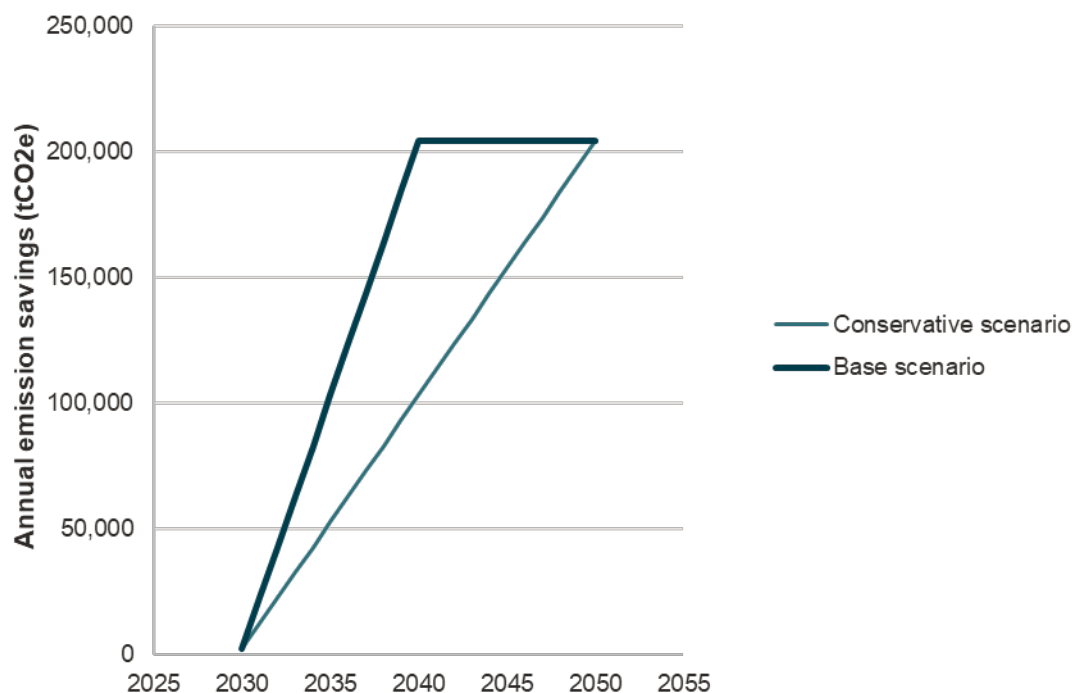
An in-depth review of 4 CMDC3/CMDC4 end-of-project reports was undertaken by ERM. Purposive sampling was used to select projects which would be helpful for the VfM analysis, namely those that reported positive emission savings and with clear reporting. Projects were chosen to represent a range of technologies, TRLs, location and vessel types.

The resulting scaled and unscaled emissions savings calculated by ERM as part of this assessment are used to answer the question: 'Could VfM, interpreted as a benefit-cost ratio in excess of 1, be achieved by 2040 based on the potential emissions savings of these 4 projects alone?'.

Profile of emissions

The following assumptions are made as part of this analysis to construct a profile of emissions (shown in Figure 55):

- Two projects (case studies 3 and 4) develop technology which would compete against each other as they would be applied on the same vessels. Including both these case studies would double count the potential emissions savings from the 4 case studies. Therefore, case study 3 is removed from the analysis. Case study 4 refers to a broader market than case study 3, which is able to serve more technologies and types of vessel (hybrid as well as electric, from different manufacturers of vessels).
- Unscaled emissions are assumed to be achieved by 2030. Projects' TRLs suggest that it is plausible for each project to have one vessel in deployment, even if this is only at demonstrator phase.
- Two scenarios are considered for when scaled emissions savings are achieved:
 - In the base case, full deployment of the technology, and therefore the scaled emissions savings, are achieved by 2040
 - A more conservative scenario assumes that this level of deployment is not achieved until 2050
- Emissions savings are assumed to grow linearly between the unscaled and scaled amounts.

Figure 55 Profile of emissions savings based on the selected case studies

Source: Frontier Economics, based on input from ERM and end-of-project reports

Considering a broader pool of projects

The case study analysis is based on just 3 projects achieving emissions savings. It is highly likely that a larger pool of projects will generate emissions savings. A simplified, high-level approach is taken to understand the potential benefits if more CMD3 and CMD4 projects are successful.

As noted above, emissions savings across UK SHORE projects cannot be aggregated. One reason is because reporting is not on a standardised basis, with projects using different assumptions. However, unscaled emissions savings are more reliable than scaled emissions savings. For 2 out of 4 projects, ERM's case study analysis arrived at similar estimates for potential unscaled emissions as reported by projects (with one even more conservative than ERM's assumptions). In the other 2 cases, ERM's analysis offered a more conservative estimate for unscaled emissions, around two-thirds of those reported by the projects.

Therefore, a potential initial starting base of emissions is calculated by aggregating unscaled emissions savings from 15 CMD3/CMD4 projects. These 15 projects all report emissions savings at the 'vessel' unit and so are deemed to be roughly comparable. Unscaled emissions savings from these projects range from 7.2tCO₂e to 5,400tCO₂e.

In practice, it is unlikely that exactly these 15 projects will comprise the entire set of projects that achieved savings. Some of these projects may not be successful while other projects

likely will be. The analysis is purely illustrative to consider the size of the impact if more projects achieve emissions savings.

The following plausible but conservative assumptions are made to downscale the total reported benefits:

- The technologies developed by these projects may overlap. Total unscaled emissions savings are downscaled by 50%. In practice, this means assuming that 2 projects will be working on decarbonisation of the same vessel type and so will each scale to only half their potential market. This is an illustrative assumption and likely does not reflect the actual degree of overlap between these projects.
- Projects may overestimate potential benefits. Total unscaled emissions are downscaled by one-third, based on a conservative estimate of the degree of over-estimation from the 4 case studies.

The 2 downscales are applied cumulatively, resulting in an overall downscale to one-third of a project's reported unscaled benefit.

Analysis is used to back out the required scale-up of the starting base of emissions to achieve VfM, based on the net present value costs of UK SHORE. This rate is then compared to the scale-up rate from the four case studies. The scale-up rate of the case studies may not be representative of the rest of the projects due to the purposive sampling approach. However, it provides a useful benchmark to assess plausibility of the resulting breakeven value.

Annex C Survey questionnaire

QNo.	Question	Routing Notes
Q1	Through which competition(s) have you successfully received funding? (select all that apply)	
a	CMDC1 (Feasibility/Demonstration)	If CMDC version
b	CMDC2 (Feasibility/Collaborative R&D)	If CMDC version
c	CMDC3 (Combined Demonstrations)	If CMDC version
d	CMDC4 (Vessel and/or Infrastructure Demonstrations)	If CMDC version
e	TRIG 2021	If TRIG version
f	TRIG 2022	If TRIG version
g	TRIG 2023	If TRIG version
h	ZEVI	Hide question

QNo.	Question	Routing Notes
Q1a	Which strand(s) did you receive funding for?	CMDC Only
a	Strand 1 – Feasibility Studies	If CMDC1
b	Strand 2 - Demonstration	If CMDC1
c	Strand 1 – Feasibility Studies	If CMDC2
d	Strand 2 - Collaborative R&D	If CMDC2
e	Strand 1 - Vessel or Infrastructure demonstrations	If CMDC3
f	Strand 2 - Vessel and Infrastructure demonstrations	If CMDC3
g	Strand 1 - Vessel or Infrastructure demonstrations	If CMDC4
h	Strand 2 - Vessel and infrastructure demonstrations	If CMDC4
i	Strand 3 - Feasibility studies and pre-deployment trials	If CMDC4

QNo.	Question	Routing Notes
Q1b	Which strand(s) did you receive funding for?	ZEVI Only
a	Strand 1: Battery electric vessels and charging infrastructure (this strand)	
b	Strand 2: Shore power technologies, shore-side and vessel-side	
c	Strand 3: Alternative fuel vessels and refuelling infrastructure	

QNo.	Question	Routing Notes
Q2	What type of organisation do you represent?	Ask All

	a	Academic Institution	
	b	Private Business (SME <250 employees)	
	c	Private Business (Large)	
	d	Charity	
	e	Research and technology organisation (RTO)	
	f	Other non-profit organisation	
	g	Public sector organisation	
	h	Other (please specify)	

QNo.	Question	Routing Notes
Q2a	Please could you write in the name of your organisation, and the project name and/or reference number? If you have successfully secured funding for more than one project, please use the most recent to tell us about in this survey.	Ask All
	a Organisation name:	
	b Project:	

ABOUT YOUR ROLE and ORGANISATION

QNo.	Question	Routing Notes
Q3	What was/is your role with this competition?	Ask All
	a I was involved in the bid, but not the project delivery	
	b I was/am involved in the project delivery, but not the bidding stage	
	c I was/am involved in both bidding and project delivery.	

QNo.	Question	Routing Notes
Q3a	Is your organisation's role....?	Ask All
	Lead organisation	
	Collaborator organisation	
	Other (please specify)	

QNo.	Question	Routing Notes
Q3b	And what is your individual role on this project? Please describe below.	Ask All

QNo.	Question	Routing Notes
Q4	Did you submit your bid as part of a consortium?	Ask All
	a Yes	
	b No	

QNo.	Question	Routing Notes
Q5	What other organisations form part of your consortium? Please tick all that apply.	Ask Q4=a
a	Academic Institution	
b	Private Business (SME <250 employees)	
c	Private Business (Large)	
d	Charity	
e	Research and technology organisation (RTO)	
f	Other non-profit organisation	
g	Public sector organisation	
h	Other (please specify)	

QNo.	Question	Routing Notes
Q7	Which stage is your funded project at? Please select the one that most closely represents your project.	Ask All
a	Mobilisation (funding confirmed, and preparatory stages commenced)	
b	Delivery (project is underway)	
c	Complete (final deliverables and reporting completed)	

QNo.	Question	Routing Notes
Q8a	Which Technology Readiness Level (TRL) is your project <i>currently</i> at?	Ask All
a	TRL 1: Basic principles observed and reported	
b	TRL 2: Technology concept or application formulated	
c	TRL 3: Analytical and experimental critical function or characteristic proof-of-concept	
d	TRL 4: Technology basic validation in a laboratory environment	
e	TRL 5: Technology basic validation in a relevant environment	
f	TRL 6: Technology model or prototype demonstration in a relevant environment	
g	TRL 7: Technology prototype demonstration in an operational environment	
h	TRL 8: Actual technology completed and qualified through test and demonstration / incorporated in commercial design	
i	TRL 9: Actual technology qualified through successful mission operations	
j	TRL 10 : The technology is successfully in service	
k	Don't know	

QNo.	Question	Routing Notes
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Q8b		Which Commercial Readiness Level (CRL) is your project currently at?	Ask All
	a	CRL 1: Basic hypothesis that a new technology would be commercially viable.	
	b	CRL 2: Basic market awareness demonstrated.	
	c	CRL 3: Applications of technology found.	
	d	CRL 4: Identify support needed from supply chain, plus any certification and regulatory requirements	
	e	CRL 5: Financial model for sales, costs and margins established.	
	f	CRL 6: Confirm exploitation routes; form partnerships across the value chain; and certification and regulatory requirements underway.	
	g	CRL 7: Financial model/commercial viability validated.	
	h	CRL 8: First commercial system built; route to market established; market assumptions updated.	
	i	CRL 9: Technology has been introduced to market	
	j	Don't know	

QNo.		Question	Routing Notes
Q9		In which geographical region(s) is your project being delivered? I.e., where are the activities of your project taking place? Select all that apply.	Ask All
	a	East Midlands	
	b	East of England	
	c	London	
	d	North East	
	e	North West	
	f	Northern Ireland	
	g	Scotland	
	h	South East	
	i	South West	
	j	West Midlands	
	k	Yorkshire and The Humber	
	l	Wales	
	m	UK-wide	

QNo.		Question	Routing Notes
Q10		What is the first half of the postcode in which most of the project is being delivered? (For example SW1A, PO2)	Ask All

QNo.	Question	Routing Notes
Q10a	Which of the following best classifies the nature of the area in which <u>most</u> of the project is being delivered?	Ask All
	Inner city area	
	Suburban city area	
	Town / Village	
	Rural	
	Coastal	
	Don't Know	

If Q3=b, skip to PROJECT MOBILISATION section

If ZEVI, CMDC1, CMDC 2, TRIG 2021, TRIG 2022, Skip to Delivery Section

ABOUT THE COMPETITION STAGE (Only for CMDC3,4 and TRIG 2023)

QNo.	Question	Routing Notes
Q11	To what extent were you satisfied or dissatisfied with the amount of time you had for preparing your bid?	Ask All
	a Very satisfied	
	b Satisfied	
	c Neither Satisfied nor Dissatisfied	
	d Dissatisfied	
	e Very dissatisfied	
	f Don't know	

QNo.	Question	Routing Notes
Q12	To what extent were you satisfied or dissatisfied with the information and guidance provided by the organisation leading the competition?	Ask All
	a Very satisfied	
	b Satisfied	
	c Neither Satisfied nor Dissatisfied	
	d Dissatisfied	
	e Very dissatisfied	
	f Don't know	

QNo.	Question	Routing Notes
Q13	To what extent were you satisfied or dissatisfied with the clarity of the eligibility criteria and scope of the competition?	Ask All
	a Very satisfied	
	b Satisfied	
	c Neither Satisfied nor Dissatisfied	

	d	Dissatisfied	
	e	Very dissatisfied	
	f	Don't know	

QNo.		Question	Routing Notes
Q14		To what extent were you satisfied or dissatisfied with the experience of the interview panel stage of the competition?	Ask All
	a	Very satisfied	
	b	Satisfied	
	c	Neither Satisfied nor Dissatisfied	
	d	Dissatisfied	
	e	Very dissatisfied	
	f	Not applicable	
	f	Don't know	

QNo.		Question	Routing Notes
Q15		To what extent were satisfied or dissatisfied with the timeliness of notification of the outcome of your bids for the competition?	Ask All
	a	Very satisfied	
	b	Satisfied	
	c	Neither Satisfied nor Dissatisfied	
	d	Dissatisfied	
	e	Very dissatisfied	
	f	Don't know	

ABOUT THE MOBILISATION PHASE (Only for CMDC3,4 and TRIG 2023)

QNo.		Question	Routing Notes
Q16		To what extent were you satisfied or dissatisfied with the timeliness of allocation of funding for the competition?	Ask All.
	a	Very satisfied	
	b	Satisfied	
	c	Neither Satisfied nor Dissatisfied	
	d	Dissatisfied	
	e	Very dissatisfied	
	f	Don't know	

QNo.		Question	Routing Notes
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Q17		Did you utilise any other funding sources for your project, either within the 12 months prior to receiving this funding or in parallel?	Ask All
	a	Yes	
	b	No	

QNo.	Question	Routing Notes		
Q18	What other funding sources did you use? Please Enter the value of this funding.	If Q17=a Prior to this funding	In parallel to this funding	Ask if not CMD1/CMD2 and TRGI21/22
	UK local or regional authorities			
	UK central government	000	000	
	European Union (EU) institutions or programmes	000	000	
	Rest of the world (e.g. World Bank, UN)	000	000	
	Venture Capital	000	000	
	Own Funds	000	000	
	Loans	000	000	
	Other (please specify)	000	000	

If Q3=a, skip to AWARENESS and NEXT STEPS section

ABOUT THE DELIVERY PHASE

QNo.	Question	Routing Notes
Q19	To what extent were you satisfied or dissatisfied with the information and guidance provided by the Connected Places Catapult / Innovate UK? [Scripting note: edit according to competition]	Ask All
	a Very satisfied	
	b Satisfied	
	c Neither Satisfied nor Dissatisfied	
	d Dissatisfied	
	e Very dissatisfied	
	f Don't know	

QNo.	Question	Routing Notes : Ask All		
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Q20		Thinking about the monitoring and reporting requirement during project delivery, to what extent do you agree or disagree with the following statements?	The nature of the data and information requested was appropriate	The timescale of the requests was appropriate	The format of the templates/reports was clear and easy to understand
	a	Strongly agree			
	b	Agree			
	c	Neither Agree nor Disagree			
	d	Disagree			
	e	Strongly Disagree			
	f	Don't know			

QNo.		Question	Routing Notes
Q21a		Please can you tell me a little about the reason for your answers above?	
		Open ended	

QNo.		Question	Routing Notes
Q22		What engagement, knowledge sharing, marketing and promotion did you do or take part in for your project? (Please select all that apply)	Ask All
	a	UK-based conferences, seminars, webinars	
	b	International conferences, seminars, webinars	
	c	Academic papers / articles	
	d	Articles / press releases in industry publications / websites / social media	
	e	Articles in organisations own websites / social media	
	f	Networking events led by Innovate UK, CPC or DfT	
	g	Roadshow / Showcase events	
	h	Bespoke branding for the project / technology	
	i	Other	

QNo.		Question	Routing Notes
Q22a		To what extent were you satisfied or dissatisfied with the level of engagement and knowledge sharing you had with other projects within the competition?	Ask All
	a	Very satisfied	
	b	Satisfied	
	c	Neither Satisfied nor Dissatisfied	

	d	Dissatisfied	
	e	Very dissatisfied	
	f	Don't know	

QNo.		Question	Routing Notes
Q23		To what extent were you satisfied or dissatisfied with the support you received regarding necessary regulatory approvals?	Ask All
	a	Very satisfied	
	b	Satisfied	
	c	Neither Satisfied nor Dissatisfied	
	d	Dissatisfied	
	e	Very dissatisfied	
	g	Not applicable	
	g	Don't know	

QNo.		Question	Routing Notes
Q23a		Is there any other support you would like to have had to support the delivery of your project?	
		Open ended	

QNo.		Question	Routing Notes
Q24		How many FTE employees are or were hired to deliver your project?	Not CMDC1 and CMDC2 and TRIG 21/22
	a	Enter number	

QNo.		Question	Routing Notes
Q24a		Since the end of your projects, has the number of FTE employees in your organisation increased/decrease/remained the same as a result of your project?	CMDC1 and CMDC2 and TRIG21/22
	a	Increased	
	b	Decreased	
	c	Remained the same	
	d	Don't know	

QNo.		Question	Routing Notes
Q24b		What has been the change in your number of FTEs (increase or decrease)? The number of FTE has [Dynamic text ans Q24a] by:	If above = a or b

	a	Enter number	
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QNo.	Question	Routing Notes
Q24c	Over, the next 2 years do you expect the number of FTE employees in your organisation to increase/decrease/remained the same as a result of your project?	All
	a Increase	
	b Decrease	
	c Remained the same	
	d Don't know	

QNo.	Question	Routing Notes
Q24d	What do you expect the change in your number of FTEs (increase or decrease) to be? The number of FTEs is anticipated to [Dynamic text ans Q24a] by:	If above = a or b
	a Enter number	
	b Don't Know	

Q24e – Is there anything else you can tell us about the changes made to your number of FTEs and the reasons for this?

QNo.	Question	Routing Notes
Q32	Based on your current expectations, what do you think is going to be the scope of environmental benefit - in terms of Net Zero: reducing carbon and other GHG emissions - of your project?	Ask All
	A None	
	B Whole Energy System Scope	
	C Sector Scope	
	D Sub-sector scope	
	E Niche-Sector Scope	
	f Organisation Specific	

QNo.	Question	Routing Notes
Q32	Based on your current expectations, what do you think is going to be the scale of environmental benefit - in terms of Net Zero: reducing carbon and other GHG emissions - of your project?	Ask All if above != None
	A Paradigm shift / gamechanger	
	B Considerable Effect	
	C Some Effect	
	d Negligible effect	

QNo.	Question	Routing Notes
Q32a	Based on your current expectations, could the outputs or findings from your project be used in other sectors?	Ask All
A	Yes – it is currently being used in other sectors	
B	Yes – we are in active discussions about potential use in other sectors	
c	Yes – we have identified potential uses but no active uses or discussions	
D	No	
E	Don't know	

QNo.	Question	Routing Notes
Q32b	Please provide additional details (e.g. which sectors, how it could be used, scale of the impact)	Ask if above not D /E
	Free text	

AWARENESS and NEXT STEPS

QNo.	Question			Routing Notes
Q33	Have you secured, or do you expect to secure within the next two years, any follow-on funding to further develop the technology after the delivery phase of this project? Select all that apply for each column	Secured	Expected to secure	Ask All
a	UK public sector			
b	public sector overseas			
c	private investors in the UK			
d	private investors overseas			
i	None secured			

QNo.	Question	Routing Notes : If Q33 NEI	
Q33bb	What is the total value of follow-on investments secured or expected within the next two years from all sources?	Secured	Expected to secure
	UK public sector	£	£
	public sector overseas		

		private investors in the UK		
		private investors overseas		

QNo.		Question	Routing Notes : if Q33 NEI	
Q34		Of follow-on funding secured or expected within the next two years, what proportion do you think was received as a result of your participation in UK SHORE? (select one for each column)	Secured	Expected to Secure
		0%		
	A	1-25%		
	B	26-50%		
	C	51-75%		
	D	76-100%		

QNo.		Question	Routing Notes : Not CMD1,2, ZEVI, TRIG 21,22		
Q25		To what extent did you experience any of the below barriers, in the delivery phase of your project?	Significant barriers	Some barriers	No barriers
	a	Regulatory challenges			
	b	Procurement or supplier challenges			
	c	Governance challenges			
	d	Resourcing challenges – recruitment and expertise			
	e	Resourcing challenges – funding (from DfT)			
	f	Resourcing challenges – funding (from other sources)			
	g	Technological limitations			
	h	Challenges with partners / collaborators			
	i	Other (please specify)			

QNo.	Question	Routing Notes
Q26	Can you tell us a little about the nature of these challenges, what impact they had and, if so, how they were overcome?	Ask if Q25a~i=1

QNo.	Question	Routing Notes
Q27	Have there been any significant changes in the scope or scale of your project during delivery? If yes, please can you tell us briefly about the nature of these changes and the reasons?	Not CDMC1,2, ZEVI, TRIG 21 22

ABOUT YOUR PROJECT OUTCOMES

QNo.	Question	Routing Notes
Q28	To what extent, if any, has your participation in this competition accelerated the pace of development of your technology? Select one.	Not CMDC1 and CMDC2 or TRIG21/22
	a By 1-6 months	
	b By 7-12 months	
	c By 1-2 years	
	d By more than 2 years	
	e Not at all	
	f Too soon to say	
	g Don't know	

QNo.	Question	Routing Notes
Q29	To what extent, if any, has your participation in this competition supported the development of your technology? Please select all that apply.	Not CMDC1 and CMDC2 or TRIG21/22
	a It wouldn't have happened at all without the competition funding	
	b It wouldn't have happened in this country without the competition funding	

	c	It wouldn't have happened with the same number of partners without the competition funding	
	d	It would have happened anyway, exactly the same way	
	e	it would have happened anyway but with a reduced scope	
	f	It would have happened anyway, but not at the same pace	
	g	Not sure	
		Is there anything else you can tell us about this ?	

QNo.		Question	Routing Notes
Q29		Have you diverted internal resources away from other activities in order to complete the funded project	Not CMDC1 and CMDC2 or TRIG21/22
	a	Yes	
	b	No	
	c	Don't know	

QNo.		Question	Routing Notes
Q29		Which type of activities have you diverted internal resources from? Tick all that apply	If above = a
	a	Other R&D activities	
	b	Non-R&D activities	

QNo.		Question	Routing Notes
Q29		Approximately what proportion of the project's total costs would you say were diverted from other activities? Please state a % amount from 1% to 100%.	If above = a
	a	Enter value [000 numerical]	

QNo.		Question	Routing Notes
Q30		To what extent, if any, did you generate the learnings you were hoping to from your participation at this stage of the competition? Select one.	Not CMDC1 and CMDC2 or TRIG21/22
	a	Generated most of all of learning hoped for	
	b	Generated some of learning hoped for	
	c	Generated a little of the learning hoped for	
	d	Generated none of the learning hoped for	
	e	Too soon to say	

	f	Don't know	
		Is there anything else you can tell us about this ?	

QNo.		Question	Routing Notes
Q34b		Please can you briefly outline the next steps for your project after the funded delivery phase, e.g. moving on to commercialisation, or further development/testing?	Ask CMDC3 and CMDC4 TRIG23, ZEVI

QNo.		Question	Routing Notes
Q35		At this stage, do you expect to take your technology further towards commercialisation at the end of the project? Please select all that apply.	Ask CMDC3 and CMDC4 TRIG23, ZEVI
	a	Yes, in the next 6 months, with further government funding	
	b	Yes, in the next 6 months, with further private funding	
	c	Yes, but not for some time	
	d	No, as we don't or won't have sufficient funding	
	e	No, as we don't have resources or expertise to do this	
	f	Other (please specify)	
	g	Don't Know	

QNo.		Question	Routing Notes
Q35a		Where do you expect further development to take place?	Ask if above = a, b, c, f
		In the UK	
		Overseas	

Qno.		Question	Routing Notes
Q35b		Since project completion, how has your project developed? Select all that apply.	Ask CMDC1 and CMDC2, TRIG21/22
	a	No development – Project was not deemed viable	
	B	Moved to further testing and validation (e.g. up to TRL5)	
	C	Moved to prototype demonstrations or demonstrations in an operational environment (e.g. TRL 6-7)	
	D	Moved to qualified technology (e.g. TRL8+)	

	E	Developed commercialisation, but technology not yet introduced to market	
	F	Technology introduced to market	
	g	Project on hold (e.g awaiting additional funding or resources)	

QNo.	Question	Routing Notes
Q35c	Where has further project development taken place?	Ask if above = ! a
	In the UK	
	Overseas	

QNo.	Question	Routing Notes
Q35d	Over the past two years, have you generated any revenue as a result of the technology developed during your project?	Ask All
	a Yes	
	b No	
	c Don't Know	

Qno.	Question	Routing Notes
Q35e	Please state the value of revenue generated as a result of your project during the last 2 years.	Ask if above = Yes
	Number	
	Don't Know	

Qno.	Question	Routing Notes
Q35f	Over the next two years, do you expect to generate any revenue as a result of the technology developed during your project?	Ask All
	a Yes – contracts signed	
	b Yes – customer identified but contracts not signed	
	c No	
	d Too early to say	
	e Not sure	

Qno.	Question	Routing Notes
Q35g	Please state the expected value of revenue generated as a result of your project over the next 2 years.	Ask if above = a or b

	Number	
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QNo.	Question	Routing Notes
Q36	Following your participation in the project, how likely or unlikely are you to participate in future similar competitions?	Ask All
	a Very likely	
	b Likely	
	c Neither Likely nor Unlikely	
	d Unlikely	
	e Very unlikely	
	f Don't know	
Q36	Please provide a reason for your answer:	Ask All

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