



GreenShip Quality Assurance and Control

Introduction

The Spanish NA funded Intellectual Outputs 5 and 6 but did not support the fund requested for an external evaluator. To this end a novel means had to be put in place to ensure the ultimate goal of the project viz., recognition for GreenShip courses (IO7) by an internationally recognised professional body is achieved as planned. To realise such an important undertaking a decision was made early in the project implementation to monitor the quality of the project outputs by internal and external quality controls based on the total quality principles of one of the professional bodies chosen as a key quality circle partner to work with selected industrialists and academics to plan the external accreditation process. For this reason the internal and external quality control were integrated and carried out in conjunction with institutions of IMarEST¹ and support from the IMechE² as well as the members of the partners' industrial and academic networks. With regard to accreditation issues and what were needed to be done and by when the Professional Affairs & Education Committee of IMarEST was consulted and the committee acted in effect as the project steering committee. In addition to monthly partner meetings it was agreed to produce a six-monthly report so that project progress could be monitored effectively and efficiently and within funds available. Despite Covid pandemic all meetings planned took place albeit sometimes virtually rather than in person. There were regular communications by email and via Skype and telephone conversation as a group or two or more partners getting together to discuss specific aspects of the project work throughout the project. The Professional Affairs & Education Committee of IMarEST is made up of experience decision makers, industrialists and specialists from the maritime leading academic institutions. The intention was to petition IMarEST, one of the international accrediting, licensing and professional bodies, to accredit the intended GreenShip training programme which was the main output of this project. However, due to involving IMarEST early in the project and well before the UK and first project multiplier, the recognition for the training programme was achieved earlier than expected.

The project in effect has 3 forms of external quality control which came from a variety of sources: 1. the project quality management, 2. IMarEST acting as independent quality assessor and 3. Industrialists and academics in the partners' network, becoming involved in project multiplier events and providing feedback on range of issues related to IOs. This ensured that the GreenShip outputs complied with the regulatory needs of the industry as well as meeting the practical needs of the maritime institutions (METs) and seafarers to a high level of quality, here quality meaning fitness for purpose and compliance with specifications. The multiplier events allowed the partners to interact directly with the target groups during the main implementation phase of the project. The events also enabled the target groups to see and understand the GreenShip project in-depth as well as the latest work undertaken by the partnership at each stage of project development. The target groups were encouraged to provide their feedback and recommendations based on their practical needs and experience. This feedback was then considered by the partners for integration in the project work and outputs during the partner meetings. The benefit of this approach meant that any problems

¹ <https://www.imarest.org/>

² <https://nearyou.imeche.org/near-you/UK/Midland#:~:text=The%20Midland%20Region%20is%20a,organise%20a%20orange%20of%20events>



spotted in a multiplier event would be in the main implementation phase of the project and so changes, both additions and omissions, could be taken into considerations effectively and efficiently. The feedback from the multiplier events allowed the partnership to tailor the training content and the intended online platform to the practical needs as well as the regulatory needs of the target groups in the partner countries which were selected strategically to represent all key regions of the EU.

The GreenShip partners also engaged with international regulators working with the IMO and international awarding, accrediting and licensing bodies such as IMechE and IMarEST, etc. when securing recognition for the Greenship training specification, programme and its e-learning platform. Each of these international bodies undertook their own extensive review process to ensure that the project outputs meet their own specific quality requirements. The partnership had access to the findings of many similar projects which received high grades and many were classed as 'Best in Europe'. The innovative aspects of these projects were carefully studied, rapidly prototyped and benchmarked and then incorporated into the GreenShip project. In fact the project proposal was presented to IMO by Professor Ziarati, C4FF chair and project initiator.





Professor Ziarati presenting the need for GreenShip at IMO at the Meeting of 19th April 2019.

The extent the project reached its results and objectives and indicators used to measure the quality of the project's results

In order to ensure the overall quality of the project Intellectual Outputs (IOs) a Quality Manual for GreenShip courses was developed as planned, the partners involved the major professional bodies right from the start allowing the 'right first time' concept to be applied effectively. The Quality Manual for the GreenShip courses includes the Quality Assurance (QA) procedures to be used for the delivery of the courses. These procedures are based on enterprise QA procedures tailored, as appropriate, to fit the needs and requirements of the GreenShip courses. The QA procedures included are as follows:

1) QA Plan Procedure - this procedure defines how the project QA will be implemented consistent to end-users' and other stakeholders' requirements. This procedure includes the following steps:

- identification of requirements that impact QA (standards, outputs, activities, reviews),
- definition of the project QA procedures considering the requirements for each course,
- development of QA schedule (Gantt chart) to identify project activities, review IO's, and IO delivery points,



- definition of tools to be used to support the QA function and tasks (e.g. feedback from the trainees), and
 - templates to assist in documenting results including schedule, effort, resource data and tailoring information and procedures (e.g. minutes of the monthly meetings, six-monthly reports, etc.).
- 2) QA Product recognition Procedure - this procedure ensures products developed and produced conform to defined requirements and standards. This procedure includes the following steps:
- identification of the product to be recognised and preparation for the accreditation,
 - accreditation performance (e.g. end-of-course trainee feedback form),
 - accreditation documentation and findings report of accreditation results (e.g. feedback from the Instructor and trainees), and
 - maintenance of courses (e.g. checklists, reports, non-conformance data and correspondence).
- 3) QA Process/Project Activity Audits - this procedure, similar to the Product Audits Procedure, ensures that processes used effectively produce quality products.
- 4) QA Measurement - this procedure defines project QA and reviews its effectiveness. This includes the following steps:
- Analysis of QA progress (e.g. conformance to the schedule),
 - Analysis of QA effort (e.g. human resources requirements),
 - Record of QA measurement results (e.g. success rate, dropout rate).

The objectives of the GreenShip project are to:

1. Design the first international standardised job specification for the Maritime Emissions Manager position.
2. Design and develop the first international training specifications and training programme for the Maritime Emissions Manager role including learning materials.
3. Design and develop a tailor made e-learning delivery platform for the new Maritime Emissions Manager training programme.
4. To present the GreenShip job specification, training specification, training programme, and online delivery platform to International Regulators and awarding, accrediting and licensing bodies to secure international recognition and begin the process of setting the international standard for this new job.
5. Design a training programme and delivery method that will result in seafarers and cadets becoming qualified Maritime Emissions Managers which will result in more energy efficient vessels and maritime industry as a whole thus helping the EU meet its 2050 energy emissions targets.



The project has already been successful as it has achieved all its objectives set above and received recognition from a major and internationally recognised maritime professional body.

Once the funding period is concluded the project success will be measured by counting the number of non-partner MET institutions (METs) which express interest in running the GreenShip training programme and ultimately the number of seafarers and cadets who express interest in the GreenShip programme to become qualified Emissions Manager.

However, the achievement of recognition for the GreenShip training programme and its e-learning platform from major awarding and accrediting body such as IMarEST and the endorsement by Maritime/Shipping Industry professionals for the GreenShip outputs are clear success of this project.

All multiplier events and the final conference achieved their expected number of Participants. The papers produced by the partnership were accepted and published by major and well respected international conferences.

The Quality Manual for the GreenShip courses and the Course Manual submitted to the IMarEST are available and will be forwarded if requested.

Appendix - Continuous Improvement

Plan to measure and evaluate the course and develop a cycle of continuous performance

Self and Tutor Assessment Sheet

Chapter 1 - Climate Change

Able to:

Competence	Self assessment	Tutor assessment
demonstrate understanding of climate system & global warming	Y/N	Y/N
explain the requirements of combating air pollution & the role of international bodies	Y/N	Y/N
describe different shipping structures, cargo types and characteristics	Y/N	Y/N

Areas for improvements

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Chapter 2 - Fuel Management

identify the emission measures of different types/sizes of ships and their designs	Y/N	Y/N
assess safety concerns in different environmental conditions	Y/N	Y/N
describe operational requirements at sea/in port and their environmental impacts	Y/N	Y/N
Identify mitigating technologies for fuel emissions from vessels such as CO ₂ , NO _x , SO _x and PMs from the combustion of fuels and their compliance with legislations	Y/N	Y/N
describe different types of emissions generated from incinerated waste mainly from cruise vessels and compliance with environmental requirements	Y/N	Y/N

Areas for improvements

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Chapter 3 - Energy Efficiency and Operational Measures

explain ship's emission management systems	Y/N	Y/N
assess different ship emission management options	Y/N	Y/N
assess fuel emissions management systems of ships regarding CO ₂ , NO _x , SO _x and PMs from the combustion of fuels and their compliance with relevant legislations	Y/N	Y/N
identify different types of waste discharges generated from incinerated waste mainly from cruise vessels in compliance with	Y/N	Y/N



environmental requirements		
audit and inspection requirements including ISO 50001 and/or ISO 14001 as well as EU Monitoring, Reporting and Verification (MRV), and IMO fuel oil consumption data collection system	Y/N	Y/N
describe the outline of company emission management plan in compliance with IMO SEEMP	Y/N	Y/N

Areas for improvements

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Chapter 4 - Efficiency Operations and Maintenance of Ships, Engines and Machinery

describe different ship propulsion systems	Y/N	Y/N
identify the sources of emission from the engines	Y/N	Y/N
identify a mitigating solution for various ship emissions on board a vessel	Y/N	Y/N
describe the monitoring systems for fuel emissions from ships regarding CO ₂ , NO _x , SO _x and PMs from the combustion of fuels and their compliance with legislations	Y/N	Y/N
communicate and manage conflicts with regards to effective and efficient use of engine energy usage	Y/N	Y/N
describe the outline of a company engine emission management sub-plan in compliance with IMO SEEMP	Y/N	Y/N



Areas for improvements

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Chapter 5- E-Navigation and Weather Routing

Understand how e-navigation works	Y/N	Y/N
Describe how weather routing is used in passage planning	Y/N	Y/N
Identify key factors in e-navigation and weather routing that can save fuel	Y/N	Y/N

Areas for improvements

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Chapter 6 - Port operations, Air Emissions and Efficiency

Demonstrate fuel usage through at least six methods including slow steaming.	Y/N	Y/N
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Areas for improvements

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Any areas of concern or need for amendment/revision?

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Summary end of course report to the Faculty/Department/School Board of Studies for actions:

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