BLUESKILLING INNOVATION

(EAPA_0008/2022)

Strategy to Contribute to the Reduction of Greenhouse Gas Emissions in the Atlantic Area Maritime Industry

Environmental Sustainability and Climate Impact Strategy

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Interreg Atlantic Area

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1. Introduction

BLUESKILLING INNOVATION project overall objective is to provide innovative training and skills to workers and researchers in the shipbuilding industry and maritime technology value chain, focusing on digitalization, green transition, sustainable connectivity and cutting-edge technologies, with the objective of increasing their contribution to value generation and encouraging the rapid adoption of technologies supporting a cleaner industry.

This project will accelerate the deployment of marine renewables and green shipping technologies and solve the skills gaps that are hampering the rapid deployment of innovation in green and offshore technologies.

The project's climate relevance is therefore intrinsic to its intervention logic. Atlantic maritime regions and industries are committed to delivering the enabling technologies, ships and offshore technologies necessary to achieve the Green Deal objectives and carbon-neutral, sustainable and healthy seas and regions by 2050.

The project identifies two immediate requirements for companies and workers:

1. Introducing and adapting advanced manufacturing technologies into design and production processes
2. Reducing the environmental impact of those processes

2. Strategy Purpose

The purpose of this document is to establish a coherent strategy through which BLUESKILLING INNOVATION project contributes to the reduction of GHG emissions in the Atlantic Area maritime industry.

The strategy has four functions: strategic, operational, monitoring and legacy.

Strategic function: To establish a clear relationship between the project's skills-development activities and maritime decarbonization.

Operational function: To identify the project activities, training areas and stakeholder actions most capable of contributing to emissions reductions.

Monitoring function: To establish indicators through which the project's contribution to climate mitigation can be monitored after training activities have been implemented.

Legacy function: To ensure that the project's climate contribution continues after the end of ERDF funding through continued use of its curricula, training methodologies, professional networks and institutional partnerships.

3. Strategic Objective

3.1. Overall Objective

The overall objective of this project is to accelerate the development and deployment of skills, technologies and professional capacities that enable the Atlantic Area shipbuilding and maritime technology industry to reduce GHG emissions, improve energy efficiency, deploy renewable-energy solutions and transition towards low and zero-emission maritime technologies.

3.2. Specific Objectives

Develop decarbonization skills: Ensure that workers, students and researchers possess the technical knowledge required to support maritime decarbonization.

Accelerate alternative-fuel adoption: Develop skills related to new propulsion systems and alternative fuels, including hydrogen, ammonia and electric propulsion.

Support zero-emission maritime technologies: Strengthen professional capabilities required for the development, construction, operation and maintenance of zero-emission vessels and related technologies.

Improve energy efficiency: Develop skills that allow companies to identify and implement energy-efficiency opportunities in maritime and shipbuilding activities.

Support offshore renewable energy: Develop the skills required for the development, construction, installation, maintenance and decommissioning of offshore renewable-energy structures.

Enable green industrial transformation: Support companies and workers in reducing the environmental impacts associated with shipbuilding and maritime industrial processes.

Use digitalisation as an enabler of decarbonization: Develop digital, Industry 4.0, robotics, IoT, AR/VR and intelligent-navigation capabilities where these contribute to more efficient, safer and lower-emission maritime operations and industrial processes.

Scale climate impact through Atlantic cooperation: Ensure that knowledge and skills developed in one region can be transferred and applied across the Atlantic Area.

4. Changing the Paradigm

The central climate-impact hypothesis of BLUESKILLING INNOVATION project is:

"If the maritime industry has access to workers, researchers and professionals with the skills required to develop, deploy, operate and maintain low-carbon technologies, the rate at which those technologies can be adopted will increase, thereby enabling reductions in GHG emissions."

The intervention logic is collected in the following table.

PROJECT INTERVENTION	IMMEDIATE RESULT	BEHAVIOUR/TECHNOLOGY CHANGE	CLIMATE CONTRIBUTION
Skills-gap analysis	Priority green skills identified	Training responds to real decarbonization needs	Greater capacity for climate action
Green curricula	New skills available	Workers can apply low-carbon technologies	Faster deployment of solutions
Alternative-fuel training	Qualified personnel	Greater capacity to handle new propulsion/fuels	Reduced fossil-fuel dependence
Zero-emission vessel training	Specialist workforce	Increased capacity to design/build/maintain zero-emission vessels	Potential reduction in vessel emissions
Offshore renewable training	Qualified workforce	Renewable projects can be developed and maintained	Enables displacement of fossil-based energy
Energy-efficiency training	Improved technical competence	Efficiency measures implemented	Lower energy consumption and associated emissions
Digital skills	Digital capability	Better optimisation and advanced manufacturing	Potential efficiency gains
Navalisation	Additional skilled workforce	More workers enter maritime green technologies	Increased capacity for transition
Transnational cooperation	Shared knowledge	Faster replication	Larger geographical climate impact

Table 1: Intervention logic

5. Main Climate Impact Areas

5.1. Alternative Fuels and New Propulsion Systems

Alternative fuels constitute one of the clearest direct links between BLUESKILLING INNOVATION project and maritime decarbonization. The project specifically identifies skills for the research, development and manipulation of new propulsion systems and new-generation fuels, including hydrogen, ammonia and electric batteries. The curriculum-development work package further identifies modules covering the decarbonization of maritime transport and the state of the art in ammonia, hydrogen, electric vessels, biofuels, LNG, new propulsion systems, safety and applicable regulations, handling, storage and transport of new fuels and high-voltage equipment and systems in electric and dual-propulsion vessels.

BLUESKILLING INNOVATION project will contribute to GHG reduction by ensuring that the workforce has the skills required to:

1. Understand new propulsion technologies
2. Design and develop new systems
3. Safely handle and operate alternative fuels
4. Maintain new propulsion systems
5. Support ship conversion and retrofitting
6. Develop and operate electric and dual-propulsion vessels
7. Support research and innovation in emerging propulsion technologies.

The intended pathway is collected in the following picture.

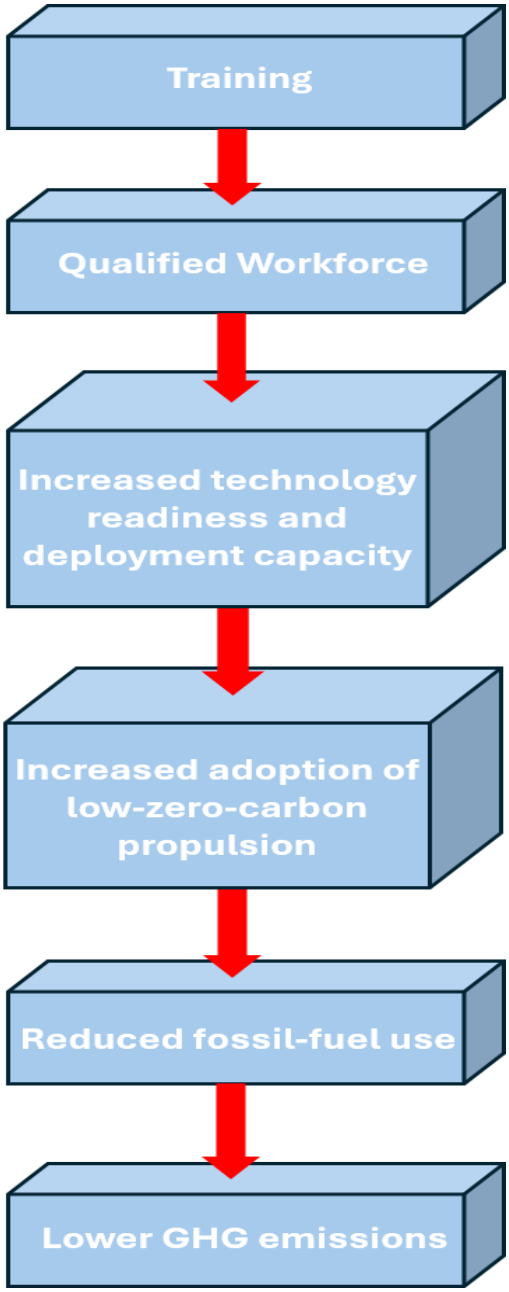

Fig. 1: From training to GHG emissions reduction

The project should not claim direct emissions reductions merely from training. Reductions should be attributed to BLUESKILLING INNOVATION project only where there is credible evidence that trained personnel contributed to a technology deployment or operational improvement.

5.2. Offshore Renewable Energy

Offshore renewable energy is another central climate-impact pathway. The project explicitly identifies offshore clean and renewable energy among the technologies to be addressed by the new curricula. The curricula are intended to respond to emerging skills requirements related to development, construction, installation, maintenance and decommissioning of offshore renewable-energy structures.

The project will strengthen the human-capital capacity required to expand the offshore renewable-energy value chain. This includes professionals able to design and engineer offshore renewable technologies, manufacture components, construct and install structures, maintain installations, operate associated technologies and manage decommissioning.

The intended pathway is collected in the following picture.

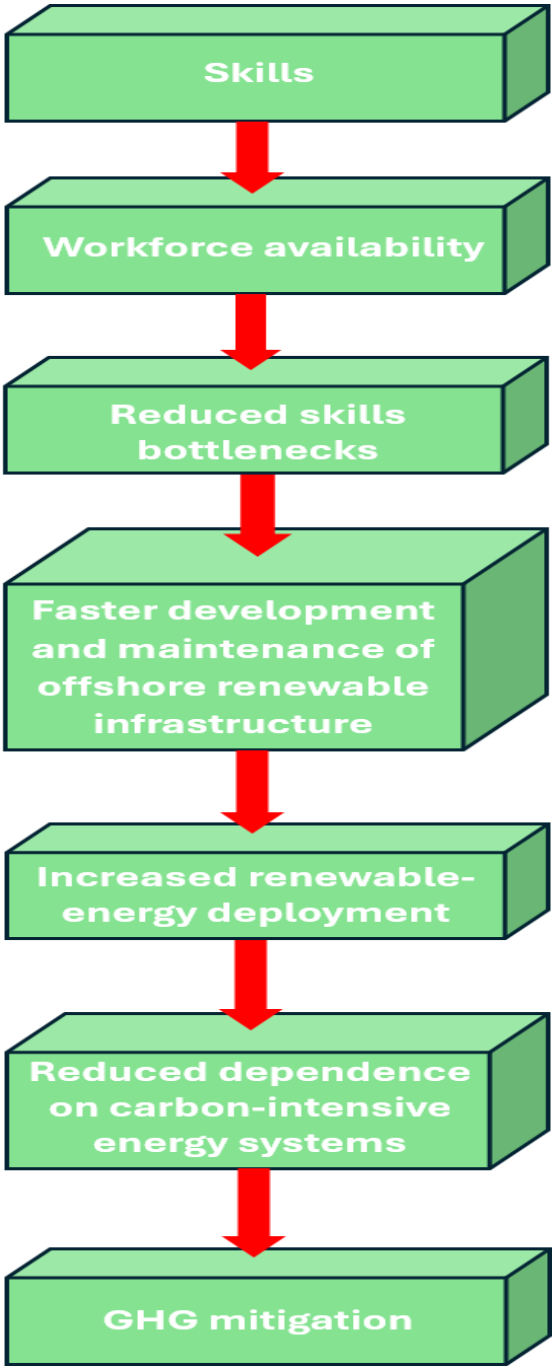

Fig. 2: From workforce upskilling to GHG emissions mitigation

The project's role is particularly important because it addresses the skills constraint that can prevent investment in renewable technologies from translating into actual deployment.

5.3. Zero-Emission Vessels and Marine Technologies

The project specifically foresees the development of new courses and modules relating to *"the development, construction and maintenance of ... new generation of zero-emission vessels and marine technologies."* This creates a direct training pathway for the emerging zero-emission vessel value chain.

Training should support, as relevant to each professional profile, vessel design, propulsion, energy, battery, electrical and high-voltage systems, alternative fuels, safety, maintenance, digital monitoring, intelligent navigation and integration of new technologies.

The development of these capabilities will allow Atlantic shipyards, maritime technology companies and research institutions to participate more effectively in the development and deployment of low and zero emission vessels.

5.4. Energy Efficiency

Energy efficiency is explicitly identified as a project green skill. The project therefore has a second climate pathway that does not depend on replacing fossil fuels. Training should enable professionals to understand energy consumption in industrial processes, identify energy-intensive activities, apply energy-efficiency technologies, optimise equipment and processes, use digital tools for monitoring and optimization, incorporate energy-efficiency considerations into design and reduce avoidable energy consumption.

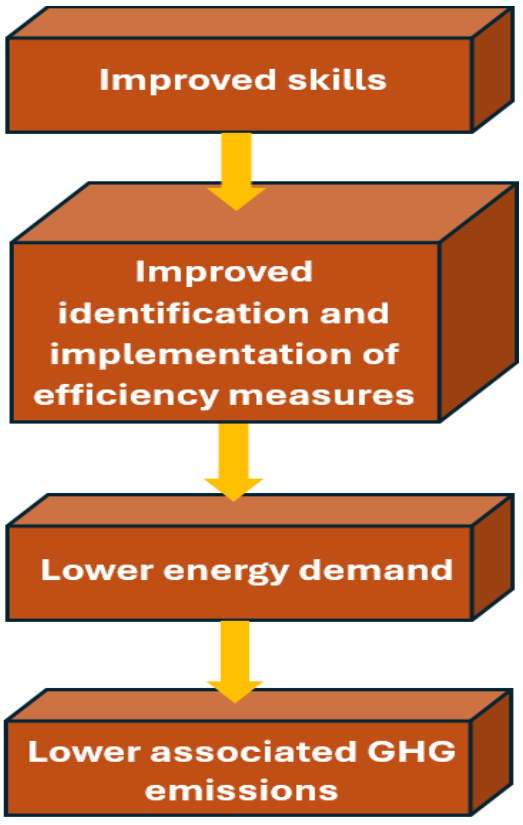

Fig. 3: From improved workforce skills to lower GHG emissions in maritime industry

Where project-trained personnel contribute to measurable energy savings, participating companies should be encouraged to document the resulting reduction in energy use and associated emissions.

5.5. Green Shipbuilding and Industrial Processes

The project does not limit its green-transition approach to vessel operation. It explicitly recognises the need for companies and workers to reduce the environmental impact of shipbuilding and maritime industrial processes. The curriculum-development work package also refers to green and environment-friendly industry, energy efficiency, new technologies, digitalization and offshore clean and renewable energy.

Green skills should therefore be incorporated into professional profiles throughout the maritime industrial value chain, including design, manufacturing, ship building, ship repair, maintenance, offshore construction, installation, logistics and supply-chain activities and decommissioning.

The objective is to make environmental performance part of normal technical decision-making rather than treating decarbonization as a specialist activity limited to a small group of experts.

6. Digitalisation as a Climate Enabler

The project identifies digital skills, including augmented and virtual reality (AR/VR), robotics, IoT, intelligent navigation, sensors and advanced manufacturing technologies. Digitalisation should therefore be considered a cross-cutting enabler of the climate strategy.

Potential contribution areas of digital applications:

- Advanced manufacturing: Digital manufacturing technologies can support more efficient production and reduce unnecessary resources and energy use.
- Robotics: Robotics can support more precise and efficient industrial operations.
- IoT and sensors: Connected systems can provide data needed to monitor equipment and energy performance.
- Intelligent navigation: Intelligent navigation and autonomy-related competencies can contribute to more efficient vessel operation if deployed appropriately.
- AR/VR: AR/VR training and support tools can improve workforce competence while reducing some of the resource requirements associated with conventional training and operational procedures.

The project should nevertheless avoid automatically classifying every digitalisation activity as a GHG reduction. Climate impact should be claimed only where a digital application produces a demonstrable efficiency or technology-adoption effect.

7. Skills-Gap Analysis

The project's first work package provides an important foundation for the climate strategy. The project conducts a transnational analysis of skills gaps based on company needs, surveys, interviews, focus groups, regional reports and harmonized analysis across participating regions. This methodology should be extended after project completion to include an explicit climate-skills dimension.

Every future skills-gap assessment should identify:

1. Technologies required for decarbonization
2. Professional profiles required to deploy them
3. Existing availability of those skills
4. Training gaps
5. Barriers to technology adoption caused by skills shortages
6. Emerging technologies likely to create new skills requirements
7. Regional differences in skills availability

The result should be an Atlantic Maritime Green Skills Observatory function, even if no separate institution is created.

8. Climate-Oriented Curriculum

The project proposes several new or updated courses and/or curricula of professional profiles, addressing new technologies, digitalisation, offshore clean and renewable energy, energy efficiency and environmentally friendly industry. To maximize their climate impact, all relevant curricula should be reviewed against the following framework.

CURRICULUM DIMENSION	CLIMATE REQUIREMENT
Technology	Identify its role in maritime decarbonization
Energy	Address energy consumption and efficiency
Fuels	Include relevant low-/zero-carbon alternatives
Materials/processes	Address environmental impacts where relevant
Operations	Include opportunities for efficiency
Safety	Include safety requirements associated with new fuels and technologies
Digitalisation	Identify applications supporting efficiency and optimisation
Maintenance	Address maintenance of low-carbon technologies
End-of-life	Include decommissioning/recycling considerations where relevant
Regulation	Include applicable environmental and technical requirements
Industry application	Use real industrial examples
Assessment	Test practical ability to apply climate-related knowledge

Table 2: Climate-oriented curriculum framework

9. Training Priority Table

The following areas should receive priority when developing or updating training.

PRIORITY	TRAINING AREA	CLIMATE RELEVANCE
1	Alternative fuels	Direct support for maritime decarbonization
2	Hydrogen	Low-carbon propulsion and energy systems
3	Ammonia	Alternative maritime fuel systems
4	Electric vessels	Zero-emission propulsion pathway
5	High-voltage systems	Operation and maintenance of electric propulsion
6	Zero-emission vessels	Direct maritime decarbonization
7	Offshore renewable energy	Renewable-energy deployment
8	Energy efficiency	Reduction of energy demand
9	Green industrial processes	Reduction of environmental impact
10	Intelligent navigation	Potential operational efficiency
11	IoT and sensors	Monitoring and optimisation
12	Robotics and advanced manufacturing	Potential industrial efficiency
13	AR/VR	Digital support for skills and operations
14	“Navalisation”	Expanding the workforce available for the green transition

Table 3: Training priority table

The first nine areas are particularly closely connected to the climate objectives documented in the project application.

10. The "Green Skills Multiplier"

A central concept of this strategy is the Green Skills Multiplier. A person trained by BLUESKILLING INNOVATION project can potentially contribute to decarbonization beyond their individual training activity.

For example:

One trained engineer
→ Participates in the development of a new propulsion system.
→ Supports several colleagues.
→ Contributes to a new vessel or retrofit.
→ Enables a company to adopt a low-carbon technology.
→ Contributes to emissions reductions over the technology's operational lifetime.

Similarly:

One trained VET technician
→ Acquires skills in electric/high-voltage systems.
→ Maintains several electric vessels.
→ Improves technology availability.
→ Supports continued operation of zero-emission equipment.

Therefore, the climate impact should not be measured only by the number of people trained. The monitoring system should also attempt to identify the downstream applications of acquired skills.

11. Industry Involvement

Industry participation is essential because the project's training is intended to respond to real skills needs. The project brings together sectoral clusters involving industry, research and public institutions with VET and higher-education providers to identify common professional profiles and skills gaps and design specific training.

The climate strategy will strengthen this model by asking participating companies to identify decarbonization technologies they intend to deploy, skills preventing deployment, energy-efficiency opportunities, new propulsion systems, renewable-energy activities, zero-emission vessel projects, training requirements and environmental competencies needed in production. This ensures that training follows actual technological transition rather than theoretical expectations.

12. The Role of “Navalisation” Courses

The project identifies a shortage of maritime-specific training and proposes "navalisation" courses to attract professionals from other sectors into maritime activities. This is relevant to climate action because the transition to low-carbon maritime technologies will require rapid growth in specialized technical capabilities.

The strategy therefore proposes to use “navalisation” modules to attract professionals with transferable competencies in areas such as electrical engineering, electronics, telecommunications, digital technologies, automation, robotics, energy systems and advanced manufacturing.

The project documentation specifically identifies the potential to attract industrial, electronic and telecommunications engineers into maritime activities through micro-credential-based “navalisation” courses. This mechanism can significantly increase the pool of workers available to support maritime decarbonization.

13. Transnational Climate Cooperation

The Atlantic Area presents common maritime challenges across participating countries. The project identifies the need to exchange information between training centres in different Atlantic countries and to develop common solutions to common challenges. The climate strategy will use this transnational structure to compare green-skills gaps, share curricula, exchange good practices, compare alternative-fuel training, share experience in offshore renewable energy, coordinate training for emerging technologies, facilitate worker mobility, avoid duplication of training development and accelerate replication.

A technology or training solution developed in one Atlantic region should therefore be considered a potential resource for the entire Atlantic network.

14. Post-Project Climate Continuity

The climate impact strategy must continue after the end of ERDF funding. The post-project continuation model should therefore ensure that:

- Universities and VET institutions: Continue delivering green and decarbonization-related training.
- Maritime clusters: Continue identifying company skills needs.
- Companies: Continue providing feedback on technology deployment and training requirements.
- Public authorities: Continue supporting relevant curricula and skills programmes.
- Project partners: Continue transnational exchange and dissemination.
- New projects build on BLUESKILLING INNOVATION results to address new technologies and new emissions-reduction challenges.

15. Climate Impact Framework

The project application does not establish a quantified GHG-reduction target. Consequently, this strategy does not retrospectively attribute a specific number of tonnes of CO_2 avoided to BLUESKILLING INNOVATION project. Instead, it proposes a progressive framework in five levels.

Level 1 – Activity Indicators

These measure what the project does:

- Number of green-skills courses developed
- Number of courses updated with green skills
- Number of participants trained
- Number of companies involved
- Number of training institutions involved
- Number of alternative-fuel modules delivered
- Number of offshore renewable-energy modules delivered
- Number of energy-efficiency modules delivered
- Number of zero-emission vessel modules delivered

Level 2 – Output Indicators

These measure immediate results:

- Number of people successfully completing training
- Number of workers obtaining new green competencies
- Number of institutions adopting project curricula
- Number of companies using project-trained personnel
- Number of professionals entering the maritime sector through “navalisation” courses
- Number of women participating in relevant training
- Number of regions using project results

Level 3 – Technology Adoption Indicators

These measure whether skills are being converted into action or not. Participating organisations should be asked whether project-trained personnel have contributed to:

- development of alternative-fuel systems
- vessel electrification
- zero-emission vessel development
- energy-efficiency projects
- renewable-energy projects
- digital optimisation projects
- industrial decarbonization initiatives
- retrofit or conversion projects

Level 4 – Energy and Emissions Indicators

Where sufficient data were available, participating companies may report:

- Annual energy consumption before and after an intervention
- Fuel consumption
- Electricity consumption
- Renewable energy use
- Energy savings
- Estimated GHG emissions
- Estimated GHG reductions attributable to the relevant intervention

Level 5 – Long-Term Climate Impact

Where robust evidence permits, the project network may estimate:

- Tonnes of CO_2 avoided
- Tonnes of CO_2 reduced
- Fossil-fuel consumption avoided
- Renewable-energy capacity enabled
- Energy savings enabled by trained personnel

16. Attribution Principle

A critical element of the strategy is avoiding exaggerated claims. BLUESKILLING INNOVATION is a skills-enabling project. Therefore, the project should claim contribution to GHG reductions, not sole causation of those reductions.

For example, if a company introduces an electric vessel after employing a technician trained through BLUESKILLING INNOVATION, the project may reasonably report that its training contributed to the availability of skills supporting the deployment. It should not automatically claim that all emissions avoided by that vessel are attributable to the project.

The strength of attribution should therefore be classified as:

- **Direct contribution:** Clear evidence that project-supported training enabled or materially contributed to a specific emissions-reduction action.
- **Significant enabling contribution:** Evidence that trained personnel played a meaningful role, although other factors were also essential.
- **Indirect contribution:** The project supplied skills and knowledge relevant to a technology or activity, but no specific downstream application can yet be demonstrated.
- **Potential contribution:** The training is relevant to a climate technology, but there is insufficient evidence of application.

This approach provides credibility and avoids overclaiming.

17. Climate Impact Indicators

INDICATOR	UNIT	TYPE	FREQUENCY
Green/decarbonization courses developed	Number	Output	Annual
Existing courses updated with green skills	Number	Output	Annual
Participants trained in green skills	People	Output	Annual
Participants trained in alternative fuels	People	Output	Annual
Participants trained in zero-emission technologies	People	Output	Annual
Participants trained in energy efficiency	People	Output	Annual
Participants trained in offshore renewable energy	Persons	Output	Annual
Companies participating in green-skills activities	Number	Output	Annual
Institutions delivering green curricula	Number	Result	Annual
Companies employing project-trained personnel in relevant activities	Number	Result	Annual
Low-carbon technology projects involving trained personnel	Number	Result	Annual
Renewable-energy projects supported by trained personnel	Number	Result	Annual
Energy-efficiency projects supported	Number	Result	Annual
Energy savings associated with supported interventions	MWh	Impact	Where available
Fossil-fuel consumption avoided	Energy/fuel unit	Impact	Where available
Estimated GHG emissions avoided	CO_2 Tons	Impact	Where robust data exist
Additional regions adopting project results	Number	Capitalization	Annual

Table 4: Climate impact indicators

18. Data Collection Methodology

The project's existing survey and skills-gap methodology provide a suitable basis for the climate monitoring system. The project already envisages questionnaires distributed to companies and training structures, with results consolidated and analysed across the partnership. A climate-impact module should therefore be added to future company consultations.

The questionnaire should ask:

Technology:

- Which low-carbon technologies is the company currently using?
- Which technologies do it plan to adopt?
- Which technologies are being developed?

Skills:

- Which skills are currently missing?
- Which green skills are difficult to recruit?
- Which skills are required for alternative fuels?
- Which are required for electrification?
- Which are required for energy efficiency?

Training:

- Have employees participated in BLUESKILLING INNOVATION project-related training?
- Which competencies were acquired?
- Are those competencies being applied?

Impact:

- Has training contributed to technology deployment?
- Has it contributed to an energy-efficiency measure?
- Has it contributed to renewable-energy deployment?
- Has it contributed to a low-/zero-emission vessel?
- Can the company quantify the resulting energy or emissions impact?

This creates a practical link between the project's original skills-gap methodology and long-term climate-impact monitoring.

19. Regional Implementation

The strategy should be implemented across the four participating Atlantic Area regions.

- **Spain – Basque Country:** The Basque maritime ecosystem can use the project network to connect maritime companies, universities and VET providers around green shipbuilding, advanced manufacturing, alternative propulsion systems, energy efficiency, digitalization and zero-emission technologies.

- **France – Brittany:** The French partners can focus on maritime technology, offshore renewable energy, new propulsion systems, shipbuilding and maritime supply chains and green industrial processes.

- **Ireland:** The Irish partners can exploit the training and research dimension to support maritime technology, offshore renewable energy, advanced engineering, digital technologies and green skills.

- **Portugal:** The Portuguese partners can contribute through maritime engineering, ocean technologies, renewable-energy applications, alternative propulsion and research and higher education.

The precise implementation should remain responsive to each region's skills needs rather than imposing an identical training package on all four Atlantic Area regions.

20. Stakeholder Roles

STAKEHOLDER	CONTRIBUTION TO GHG REDUCTION STRATEGY
Foro Marítimo Vasco	Overall coordination, industry engagement, dissemination and monitoring.
Euskal Herriko Unibertsitatea - Universidad del País Vasco	Research, higher education and development of green/technical curricula.
Bretagne Pôle Naval	Firms engagement and identification of maritime decarbonization skills
Munster Technological University	Training, innovation and technical skills development.
Instituto Superior Técnico (Universidade de Lisboa)	Maritime engineering, research and technology skills.
Université de Brest	Research, training and technical knowledge.
CIFP Blas de Lezo LHII	Vocational training and practical workforce skills
CIFP San Jorge LHII	Vocational training and professional upskilling
Maritime companies	Technology needs, testing, application and impact evidence.
Public authorities	Institutionalisation and public support for green skills
Researchers	Technology development and knowledge transfer
Students/workers	Acquisition and application of green skills

Table 5: Stakeholders role

21. Risk Management Grid

RISK	POTENTIAL CLIMATE CONSEQUENCE	MITIGATION
Insufficient green skills	Delayed technology deployment	Maintain regular skills-gap analysis
Training becomes outdated	Skills no longer support latest technologies	Review curricula periodically
Lack of industry uptake	Limited translation of skills into action	Increase company involvement
Alternative fuels develop rapidly	Training becomes obsolete	Flexible modular curriculum
Insufficient public support	Limited continuation of training	Institutionalise curricula
Lack of emissions data	Climate impact cannot be demonstrated	Establish voluntary report in firms
Workforce shortage	Slower green transition	Navalisation and reskilling
Limited transfer	Climate benefits remain local/regional	Transnational dissemination

Table 6: Risk management grid

22. Implementation Roadmap

The impact of the project on the reduction of greenhouse gases, according to the model developed in this strategy, is being developed in six phases that began with the start of the project itself and will continue active after its completion.

- **Phase 1 – 2023–2024 Establish the Evidence Base:** The project identifies common skills gaps, industrial needs, regional differences, emerging green technologies and training gaps. The analysis explicitly addresses skills required for sustainable development of offshore renewable energies and decarbonization of maritime transport and infrastructure by 2030.

- **Phase 2 – 2024–2025 Develop Green Curricula:** Develop and update training courses addressing alternative fuels, new propulsion systems, energy efficiency, offshore renewable energy, zero-emission vessels, green industry, digital technologies.

- **Phase 3 – 2025–2026 Pilot and Validate:** Test the training with students, workers and relevant professional groups. Collect training outcomes, industry feedback, technology relevance, skills improvements and lessons learned.

- **Phase 4 – 2026 Capitalize:** Use the project's closing activities to disseminate the results to companies, universities, VET centers, public authorities and other maritime regions. The project's closing event is specifically intended to present results to stakeholders and organizations that may benefit from their transfer.

- **Phase 5 – 2026–2029 Institutionalize:** After ERDF funding ends, continue training, integrate curricula into institutional provision, maintain industry consultation, monitor technology uptake, collect climate-impact evidence, update curricula and transfer results.

- **Phase 6 – 2029 Onwards Scale:** Use the established network and evidence to extend training to new regions, address new maritime technologies, develop new partnerships, pursue future European funding, strengthen the contribution to maritime decarbonization.

23. Conclusion

BLUESKILLING INNOVATION project has a strong potential contribution to climate mitigation in the Atlantic Area because it addresses a fundamental enabling condition for maritime decarbonization: the availability of people with the right skills to develop, deploy and maintain cleaner technologies.

The project's own documentation establishes this relationship clearly. It identifies the maritime sector as a driver of the digital and green transition, identifies the reduction of environmental impacts as a requirement for companies and workers, and identifies skills shortages as a barrier to innovation and sustainable development.

The project further identifies specific skills and technologies directly relevant to decarbonization, including hydrogen, ammonia, batteries, intelligent navigation, digital technologies, sustainability, energy efficiency and offshore renewable energy.

The curriculum-development activities reinforce this orientation by explicitly addressing alternative fuels, the decarbonization of maritime transport, electric vessels, new propulsion systems, offshore renewable energy and zero-emission vessels.

The strategic contribution of BLUESKILLING INNOVATION project can therefore be expressed in one sentence:

"BLUESKILLING INNOVATION project contributes to maritime GHG reduction by removing the skills barriers that can delay the development and deployment of low-carbon, renewable and zero-emission technologies across the Atlantic maritime economy."

Its impact will not be measured simply by the number of courses delivered or people trained. The ultimate objective is to demonstrate the progression from training to technological application and, where evidence permits, from technological application to measurable reductions in energy consumption and GHG emissions.

The enduring value of BLUESKILLING INNOVATION project will therefore be its ability to create a human-capital infrastructure for maritime decarbonization—one that remains active after ERDF funding ends, is continuously updated as technologies evolve, and can be transferred across the Atlantic Area.

Annex: Climate-Relevant Project Results

PROJECT RESULT / ACTIVITY	CLIMATE RELEVANCE
Skills-gap analysis	Identifies skills barriers to decarbonization
Green skills	Provides sustainability and energy-efficiency competencies
Alternative-fuel training	Supports transition away from conventional propulsion
Hydrogen training	Supports emerging low-carbon maritime technologies
Ammonia training	Supports alternative maritime fuel systems
Electric-vessel training	Supports zero-emission propulsion
High-voltage training	Supports electric and dual-propulsion vessels
Offshore renewable-energy training	Supports renewable-energy deployment
Zero-emission vessel training	Supports low-/zero-emission shipbuilding
Energy-efficiency training	Supports reduction of energy demand
Intelligent navigation	Enables potential operational efficiency
IoT/sensors	Supports monitoring and optimisation
Robotics/advanced manufacturing	Supports industrial transformation and efficiency
“Navalisation”	Expands workforce available for green technologies
Transnational cooperation	Accelerates replication across regions

Table 7: Climate-relevant results