



Grant Agreement No.: 955413

Project acronym: ENGIMMONIA

Project title: Sustainable technologies for future long distance shipping towards complete decarbonisation

Call (part) identifier: H2020-EU.3.4. - Smart, Green and Integrated Transport

Thematic Priority: LC-MG-1-13-2020 - Decarbonising long distance shipping

Starting date of project: 1st May, 2021

Duration: 48 months



WP9 – “Dissemination, exploitation and communication of results”

D9.4 – “Stakeholder feedback”

Due date of deliverable

30th April 2023

Actual submission date

08th August 2024

Deliverable version

2.0

Organisation name of lead contractor for this deliverable: RINA-C

Dissemination Level		
CO	Confidential	
PU	Public	X

Executive Summary

The ENGIMMONIA project, now in its 33rd month, presents the "D9.4 First Stakeholder Feedback" deliverable as part of Work Package 9, which is dedicated to the dissemination, exploitation, and communication of the project's results. This deliverable is a crucial milestone, offering a preliminary yet profound analysis of the stakeholder survey conducted under Task 9.2. Focused on pivotal topics such as Photovoltaics, ORC, Chillers, Ammonia as Fuel, and Legislation and Non-Technical Aspects, the survey captures the current pulse of the maritime industry's stance on innovative and sustainable technologies.

The survey has gathered a variety of insights from a diverse group of stakeholders, including shipowners, regulatory bodies, and other industry experts. These insights are invaluable in shaping the future course of the ENGIMMONIA project, ensuring that its direction is congruent with real-world industry dynamics and expectations. Looking ahead, this document will undergo a significant update in Month 48 with the release of D9.7 "Final Dissemination Activities Report." This upcoming report will not only reflect the culmination of the dissemination activities but will also detail the final event, comprehensive stakeholder interactions, and synergies with sister projects, providing a holistic view of the project's outreach and impact.



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Abbreviations and acronyms

GA	Grant Agreement/General Assembly
IMO	International Maritime Organization
ORC	Organic Rankine Cycle
PV	Photovoltaic
WP	Work package
TUM	Technical University of Munich



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1. Introduction

Within the framework of Work Package 9 of the ENGIMMONIA project, "D9.4 First Stakeholder Feedback" emerges as a pivotal document, aligning with Task 9.2's focus on robust stakeholder engagement. As we navigate through Month 33 of the project, this deliverable offers an initial analysis of the feedback received from various maritime industry stakeholders. This analysis is instrumental in laying the groundwork for an informed and strategic approach towards the project's objectives.

The survey has been a key tool in gauging the perspectives of a wide range of industry participants, from shipowners and regulatory bodies to researchers and manufacturers. The insights gleaned are critical in tailoring the project's efforts to the nuanced needs and challenges of the maritime sector. This deliverable is a dynamic document, set to evolve with the project's progression. It will be updated in Month 48 with the "D9.7 Final Dissemination Activities Report," which will provide a comprehensive overview of the project's dissemination journey, encompassing the final event and extensive stakeholder and sister project interactions.

2. Methodology

In developing the ENGIMMONIA project, a systematic approach was employed to gather stakeholder feedback, which was crucial for guiding the project's design activities. The methodology centred around a comprehensive online survey hosted on Microsoft Forms, chosen for its user-friendly interface and robust data collection capabilities. Target stakeholders were meticulously identified, focusing on key groups such as Shipowners, Shipbuilders, Regulatory Bodies, and Port Authorities due to their significant roles in the maritime industry and direct impact on the project outcomes. The survey encompassed four pivotal topics: Organic Rankine Cycle (ORC), Photovoltaic Chiller, Ammonia as a Fuel, and Legislation and Non-Technical Aspects. Each question was carefully designed using a Likert scale format, allowing for nuanced quantification of stakeholder opinions. Partners involved in various WPs collaborated to ensure a well-rounded questionnaire, each contributing specialized questions related to their respective areas of expertise. This collaborative effort ensured that the survey comprehensively covered all critical aspects of the project, facilitating a deep understanding of stakeholder perspectives and expectations.

2.1. Identification of the Target Stakeholders and Tool used

The stakeholder consultation for Deliverable 9.4 is strategically conducted through an online survey implemented on Microsoft Forms (*Figure 1*). This platform has been selected for its accessibility, intuitive interface, and sophisticated data analysis features, facilitating the efficient collection and interpretation of stakeholder feedback.

The survey is available at the following [link](#).



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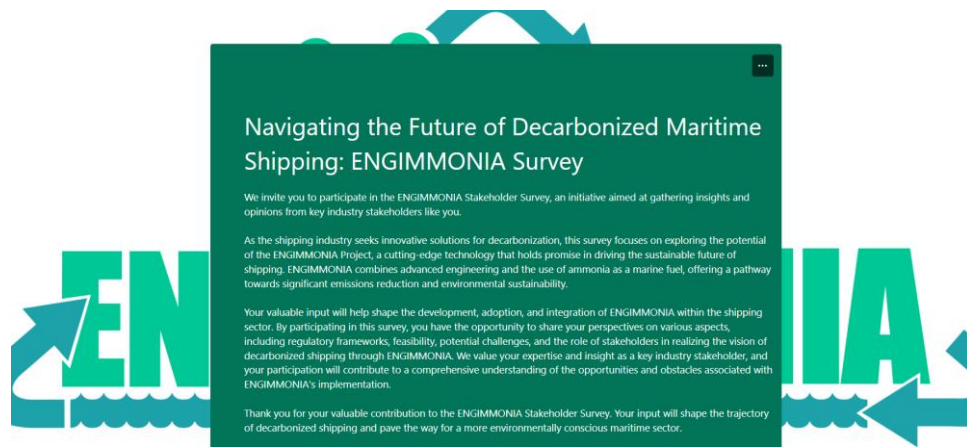


Figure 1: ENGIMMONIA Survey – Opening page

The identification of stakeholders was a comprehensive process, guided by insights from the consortium partners and findings from Task 9.1 activities. We compiled a list of relevant stakeholders, ensuring a diverse representation from various sectors of the maritime industry. This list included but was not limited to:

- **Shipowners:** Their insights are crucial for understanding operational impacts of our project on the maritime industry.
- **Shipbuilders:** They provide a perspective on the practicalities of incorporating new technologies in vessel design and construction.
- **Regulatory Bodies:** Their involvement is key in understanding the regulatory landscape and ensuring compliance with industry standards.
- **Port Authorities:** They offer insights into the infrastructural challenges and opportunities in port operations.

Additionally, important maritime organizations like ECSA, EMSA, and IMO are targeted to provide a broader perspective on the industry's needs and challenges. In addition to these groups, our stakeholder range also encompassed technology manufacturers and consulting companies, each providing unique insights into different aspects of the maritime industry.

This multi-faceted approach in stakeholder identification and engagement was pivotal for capturing a wide range of perspectives, thereby enriching the ENGIMMONIA project's development and ensuring its alignment with industry needs and challenges. The objective was to ensure comprehensive input into the project's design activities in its most crucial phases, aligning with the project's overarching goals of advancing clean energy solutions and alternative fuels in shipping, as outlined in the project objectives.

2.1. WPs involvement and Partners' contribution

The structure of the ENGIMMONIA project survey has been developed in close collaboration with various partners involved in different Work Packages (WPs), each contributing their unique expertise and insights, in particular:

- **Tecnalia** and **TUM**, involved in WP5 and WP6, provided insights related to *Photovoltaic Panels*
- **ORCAN Energy** and **TUM**, involved in WP5 and WP6, in support of section dedicated to ORC



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- **Fahreheit, TUM** and **CNR ITAE**, involved in WP5, support the section dedicated to *Chiller technology*.
- **MAN**, for its part in WP3 and WP4, provided its expertise related to *Ammonia as a fuel*
- **RINA-C**, involved in WP9, provided its expertise on *legislation and non-technical aspects*.

Each WP contributed their expertise in specific areas of the project, ensuring that the survey comprehensively addressed the diverse aspects of maritime decarbonization from technological innovations to legislative and non-technical challenges. By involving multiple WPs, the survey was enriched with diverse, specialized questions, reflecting the multifaceted nature of the ENGIMMONIA project.

2.2. Methodology and Structure

The survey extensively utilizes the **Likert scale format**, where respondents express their level of agreement or disagreement with statements. The questionnaire is composed by statements that the respondent is asked to evaluate by giving it a quantitative value following the format of a typical five-level Likert item:

- Strongly disagree
- Disagree
- Neither agree nor disagree
- Agree
- Strongly agree

This format is chosen for its effectiveness in quantifying subjective opinions and attitudes, making it easier to analyse and interpret data. Moreover, for some specific questions has been decided to utilise multiple choice questions.

The survey begins by collecting basic information about the respondents, precisely the role in the maritime industry. The survey allowed four types of answers:

- Shipowner
- Shipbuilder
- Regulatory bodies, Port authorities
- Other (*open answer*)

This information is vital to contextualize responses and understand the perspectives of different stakeholder groups.

After a brief introduction to the survey and the initial section to collect information about the respondents, the survey dives into specific technologies, seeking stakeholder feedback on various aspects of their implementation. It has been divided into five sections correspondent to five topics on which the project works:

1. *Photovoltaic*
2. *ORC*
3. *Chiller*
4. *Ammonia as a Fuel*
5. *Legislation and non-technical aspects*

The main aspects that we are willing to investigate are:

Renewable Energies Integration: Questions in this section are designed to gauge the willingness of stakeholders to integrate renewable energy technologies, like small wind turbines



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and photovoltaics, in maritime vessels. It helps to understand stakeholder attitudes towards renewable energy adoption in shipping.

Importance of Efficiency and Price: This segment focuses on the perceived importance of efficiency and price in the decision-making process for adopting renewable energy technologies. It provides insights into the practical considerations of stakeholders when it comes to technology implementation.

Installation Experience: Respondents are asked about their experiences with installing technologies like ORC (Organic Rankine Cycle), adsorption chillers, or PV panels. This helps to gather real-world data on the challenges and successes faced in technology integration.

Legislative Gaps: Stakeholders are asked about their experiences with legislative barriers that might hinder technology integration. This helps identify areas where policy improvements are necessary.

Non-Technical Challenges: Questions also cover non-technical aspects such as maintenance and operational challenges. Understanding these challenges is crucial for the practical implementation of new technologies in maritime vessels.

The following subparagraphs will dive into the five topics with an overview of each question.

2.3.1 Photovoltaic

With the technical contribution of **Tecnalia** and **TUM** we have created four questions posed according to the Likert scale format:

1. *“I am willing to integrate renewable energies in vessels, mainly small wind turbines for in-dock conditions, Photovoltaics for sunny daily conditions or both.”*
2. *“The efficiency and price of the Photovoltaic system are important factors for me.”*
3. *“The payback time is an important consideration for me when deciding on renewable energy integration.”*
4. *“The limited weight of Photovoltaic production in the overall energy consumption of a vessel affects my intention to integrate renewables.”*

2.3.2 ORC

With the technical contribution of **ORCAN Energy** and **TUM** we have created four questions posed according to the Likert scale format:

1. *“I am already familiar with the waste heat utilization technology Organic Rankine Cycle (ORC) to save fuel in vessels.”*
2. *“I am already considering installing ORC systems for my vessel.”*
3. *“I am considering installing ORC systems for my vessel retrofitting existing ones.”*
4. *“I would be willing to modify the vessel design to increase/improve the integration potential of ORC systems onboard.”*

2.3.3 Chiller

With the technical contribution of **Fahrenehit**, **TUM** and **CNR ITAE** we have created two questions posed according to the Likert scale format and two with multiple choice format:

1. *“I see benefits in the integration of waste heat using technologies - mainly heat transformation for chilling - to save fuel in large vessels.”*
2. *“Although limited by available space, smaller waste heat cooling systems are still useful.”*



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3. *“Who should we best contact to spread information and offers for waste heat-driven cooling on vessels?”* with the following choices:
 - a. Ship owner
 - b. Planning engineers
 - c. Wharfs
 - d. Other (please specify)
4. *“When planning a new vessel with included adsorption cooling, the most important parameter for integration and operation is:”* with the following choices:
 - a. Space (and flexible spatial design)
 - b. Weight
 - c. Cooling power
 - d. Efficiency

2.3.4 Ammonia as a Fuel

With the technical contribution of **MAN** we have created four questions posed according to the Likert scale format:

1. *“I am willing to integrate renewable energies in vessels, mainly small wind turbines for in-dock conditions, Photovoltaics for sunny daily conditions or both.”*
2. *“It is important for an ammonia engine to be able to cover a wide variety of ship sizes and segments.”*
3. *“During a transition phase, it is important for an ammonia engine to coexist with traditional gas engines.”*
4. *“In my opinion, ammonia engines will be optimized only for new build ships.”*

2.3.5 Legislation and non-technical aspects

With the technical contribution of **RINA-C** we have created four questions modelled according to the Likert scale format.

1. *“I am aware of the initiatives carried out by IMO to favor the adoption of future marine fuels, with particular reference to ammonia (e.g., Development of guidelines for the safety of ships using ammonia as fuel).”*
2. *“I would be in favor of including ammonia-fueled vessels in the fleet if the Regulatory Framework were adequately defined.”*
3. *“I would be willing to participate in a worktable with land and ship-side stakeholders to define possible solutions useful for combining the construction of ammonia-powered ships and the necessary distribution and bunkering network.”*
4. *“I have already installed ORC, Adsorption chiller, or PV panels on board, and I have experienced gaps in the existing legislation that have complicated, slowed down, or prevented their integration on board.”*

The collaborative approach in developing the survey, involving key partners and WPs, ensures a holistic understanding of stakeholder perspectives on various aspects of maritime decarbonization. The comprehensive structure of the survey, with its emphasis on specific technologies, legislative aspects, and the use of Likert scales, enables the ENGIMMONIA project to accurately capture and analyse the attitudes and perceptions of stakeholders, which is pivotal for the project's success in advancing sustainable maritime practices.



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3. Communication & Dissemination strategy and actions

In alignment with Task 9.2 of the ENGIMMONIA project, this section of D9.4 is dedicated to detailing the comprehensive communication strategy employed for the effective dissemination of our stakeholder consultation survey. Recognizing the critical importance of stakeholder input in shaping the path of the ENGIMMONIA project, our approach was designed to reach and engage a broad spectrum of stakeholders in the maritime industry. The strategy encompasses a series of coordinated efforts, leveraging various communication channels and platforms to ensure widespread awareness and participation in the stakeholder consultation process.

The objective was to create an inclusive and interactive dialogue with stakeholders, encompassing shipowners, shipbuilders, regulatory bodies, port authorities, and other key figures in the maritime sector. By doing so, we aimed to gather rich, diverse insights and foster a collaborative environment where stakeholders feel valued and heard. This section outlines the strategic steps taken to compile a comprehensive stakeholder list, the execution of a multi-platform social media campaign, and the targeted presentation of the consultation at industry events, all of which were integral to the success of the stakeholder engagement in Task 9.2.

In the following subsections, we will explore each aspect of this communication strategy in detail, highlighting how they collectively contributed to achieving the objectives set forth in Task 9.2 of the ENGIMMONIA project.

3.1. Stakeholder list and partners engagement

The process of compiling the stakeholder list has been a collaborative and structured endeavour. We developed a detailed Excel file, categorizing potential stakeholders into four key groups: Shipowners, Shipbuilders, Regulatory Bodies, and Port Authorities. This categorization has been aligned with the diverse interests and influences within the maritime industry, ensuring that all relevant perspectives were included.

The development of our stakeholder list has been supported by the active contributions of our consortium partners. Each partner brought to the table their networks and deep industry knowledge, playing a key role in identifying a comprehensive array of stakeholder's integral to the maritime sector. Partners actively participated in categorizing stakeholders, assessing their relevance and potential impact on the project's objectives. This meticulous process not only broadened the scope of our engagement but also ensured a rich diversity and relevance in our stakeholder list.

Moreover, partners' involvement has been prominent in the initial phases of outreach. In crafting our approach for stakeholder engagement, we embraced a highly collaborative method. Upon finalizing this list, we developed an ad hoc newsletter. This communication was designed to effectively disseminate the survey link directly to each identified contact. Emphasizing accessibility and inclusivity, the stakeholder consultation was made available through an open link. We encouraged each stakeholder to further share the survey within their networks, thus creating a cascading effect. This strategy aimed to amplify our reach, leveraging the interconnected nature of the maritime industry to gather a breadth of perspectives and insights.



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3.2. Social Media engagement

The dissemination of the ENGIMMONIA stakeholder survey was strategically amplified through an extensive social media campaign, leveraging both the project's and partners' channels. The campaign was designed to maximize the survey's visibility and encourage widespread participation from a diverse range of stakeholders.

The survey was actively promoted on ENGIMMONIA's official social media pages, specifically on LinkedIn and Twitter (*Figure 2*). More emphasis has been made on LinkedIn for its nature and scope. This platform has been chosen for its wide reach and popularity among professionals: by using this platform, we aimed to tap into a network of industry experts, researchers, and practitioners who are active on social media.



Figure 2: ENGIMMONIA Survey – LinkedIn post

In addition to our own channels, we ask to all consortium partners to repost the survey on their personal LinkedIn pages. This approach was instrumental in extending our reach beyond the ENGIMMONIA network, tapping into the individual networks of each partner. Partners' reposts served to endorse the survey, adding credibility and a personal touch, which likely encouraged higher engagement rates.

Our promotional strategy also included collaboration with sister projects, particularly ZHENIT project, which shared the survey on its LinkedIn page (*Figure 3*). This collaboration allowed us to reach stakeholders who are involved in similar projects and have an interest in maritime decarbonization, thereby enriching the diversity of our respondents.



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Figure 3: ENGIMMONIA Survey – promotion on LinkedIn page of Zhenit Project

To maintain momentum, the survey was posted multiple times across these platforms. Each post was strategically timed to optimize visibility and engagement. The repetitive posting helped in keeping the survey in the public eye over an extended period, increasing the likelihood of it being seen and completed by a broad audience.

Analytics and Impact: The effectiveness of this social media campaign was monitored through analytics, which will be detailed in **Table 1**. The data gathered from these analytics provide insights into the reach, engagement, and overall impact of our social media efforts.

Table 1: Analysis of ENGIMMONIA survey on LinkedIn

Post number	Reaction	Repost	Impression	Engagement rate
1	24	11	426	11,97%
2	23	5	317	11,67%
3	5	1	48	22,73%
4	20	0	846	13,2%



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3.3. Events, conferences and fairs

The ENGIMMONIA stakeholder survey's dissemination was strategically extended to several high-profile events and conferences. These platforms not only facilitated the presentation of the survey to relevant audiences but also provided opportunities for direct engagement and promotion of the project but also enrich the discussion with industry professionals and experts.

The survey has been featured in a series of carefully selected events, each significant in the context of the ENGIMMONIA project's focus areas:

- **EUSEW 2023:** The European Sustainable Energy Week EUSEW 2023 is a key event organized by the European Commission focusing on sustainable energy themes. Our participation here connected us with stakeholders leading the way in energy sustainability, aligning perfectly with ENGIMMONIA's vision. The project has been presented by RINA-C which was present with a stand.
- **SUPEHR23:** The SUPEHR23 conference, hosted by the University of Genoa, brought together experts in shipping and maritime research. The event was an ideal venue to engage with academics and industry professionals deeply invested in maritime innovation. ENGIMMONIA project and the consultation survey has been presented by UNIGE and RINA-C.
- **LEC Sustainable Shipping Technologies Forum:** The LEC Forum in Graz, held in September 2023, focused on sustainable shipping technologies, aligning well with ENGIMMONIA's technological advancements in maritime shipping. RINA-C was present at LEC.
- **Hydrogen Week 2023:** European Hydrogen Week provided a platform to engage with stakeholders involved in hydrogen and alternative fuel technologies, directly relevant to the ENGIMMONIA project's exploration of ammonia as a maritime fuel. RINA-C was present with a stand and display the survey through a flyer reporting a QR code which directly led to survey online page.
- **2nd Workshop on Alternative Fuels and Power Solutions for Shipping:** This workshop, organized by the European Maritime Safety Agency, offered insights into alternative fuels and power solutions. RINA-C was invited to present the project and in that occasion the survey has been conveyed.
- **Enlit Europe 2023:** Enlit Europe 2023 is a comprehensive energy event, gathering a wide range of energy professionals. Our presence here allowed us to reach a diverse group within the energy sector. RINA-C was present with a stand, a flyer with the QR Code of the survey was made available.

At each of these events, ENGIMMONIA representatives engaged with attendees, effectively communicating the survey's purpose and encouraging participation. These opportunities for face-to-face interaction were invaluable, fostering a deeper understanding of stakeholder perspectives and garnering immediate feedback. The discussions and interactions at these events not only facilitated the survey's dissemination but also enriched the overall stakeholder consultation process with diverse and valuable insights.

The event-based strategy for disseminating the ENGIMMONIA stakeholder survey has been a pillar in reaching a broad and diverse audience. By strategically choosing events aligned with the project's themes, we can engage directly with stakeholders, enhancing the visibility and impact of the survey. This multifaceted approach has been instrumental in ensuring comprehensive stakeholder engagement, contributing significantly to the success of the ENGIMMONIA project.



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4. First results

The ENGIMMONIA stakeholder survey, which provides insights into current perspectives within the maritime industry, attracted a diverse group of participants, reflecting the sector's wide-ranging interest in sustainable technological advancements. So far, 30 respondents have participated. Although the sample size is currently limited, efforts will be made to expand it for the updated version of the deliverable, "D9.7 Final Dissemination Activities Report." Upcoming stakeholder events are expected to significantly increase the sample size.

Of the respondents, 20% were shipowners, another 20% represented regulatory bodies and port authorities, and the remaining 60% included a diverse mix of stakeholders, such as researchers, public entities, manufacturers, and ship designers. This broad participation highlights the project's wide relevance and potential impact across various aspects of the maritime industry. As we analyse the survey data, organized into five key areas—Photovoltaic, ORC, Chiller, Ammonia as a Fuel, and Legislation and Non-Technical Aspects—each category offers a distinct perspective on the industry's preparedness and attitudes towards sustainable practices and technologies.

1. Photovoltaic

The survey results reveal a strong inclination towards integrating renewable energy sources on maritime vessels, particularly photovoltaic systems. An impressive 80% of respondents express support for this integration, with opinions evenly split between those who agree and those who strongly agree. This high level of interest highlights the maritime sector's increasing commitment to sustainable energy solutions. However, efficiency and cost remain significant considerations for a majority, with 60% acknowledging these factors as crucial in their decision-making process. Interestingly, opinions on payback time are evenly divided, reflecting a variety of investment strategies and financial priorities within the industry. Despite concerns about the limited contribution of photovoltaics to overall energy consumption, 40% of respondents are still inclined to adopt renewable technologies, indicating a willingness to embrace these innovations despite their current limitations (*Figure 4*).

Most ship owners agree with this perspective, while port authorities tend to be more neutral, though the trend suggests they align with the importance of cost considerations. Among other stakeholders, ship designers and consultants share similar views to those of port authorities. The negative responses come from a mix of different stakeholder categories, making it difficult



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to identify a clear trend. Overall, opinions on photovoltaic systems are positive, with more than 50% of respondents agreeing with the proposed themes.

2. Photovoltaic

Please rate each statement using the following scale

[More Details](#)

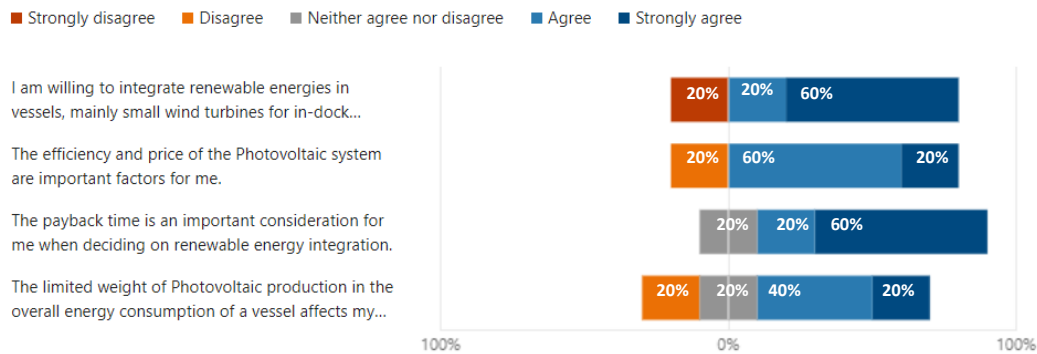


Figure 4: ENGIMMONIA Survey – Results of first cluster of questions about Photovoltaic

2. ORC

Familiarity with ORC (Organic Rankine Cycle) technology among respondents is relatively high, with 60% expressing awareness, suggesting that it has yet to fully establish itself within the sector. Shipowners tend to be more familiar with ORC, while technology providers, researchers, and other categories are less informed about the technology. To gather more meaningful responses for the update, we plan to enhance dissemination efforts on this topic (e.g., LinkedIn posts and newsletters) to broaden awareness among industry stakeholders.

A significant portion—also 60%—remain undecided about installing ORC systems, reflecting a cautious approach likely influenced by factors such as cost, technological maturity, or operational feasibility. Additionally, the survey highlights a reluctance to retrofit existing vessels with ORC systems, suggesting potential challenges or limitations in adapting current designs. Notably, 40% of respondents expressed a willingness to modify vessel designs for better ORC integration, indicating a forward-looking attitude but also underscoring the need for more detailed analysis and industry-wide discussions on the topic.

Responses to second, third and fourth questions reveal that shipowners are more inclined to install ORC systems, as they recognize its potential for improving energy efficiency on vessels.



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Other categories, lacking the facilities to implement the technology, responded more neutrally to the subsequent questions.

3. ORC (Organic Rankine Cycle)

Please rate each statement using the following scale

[More Details](#)

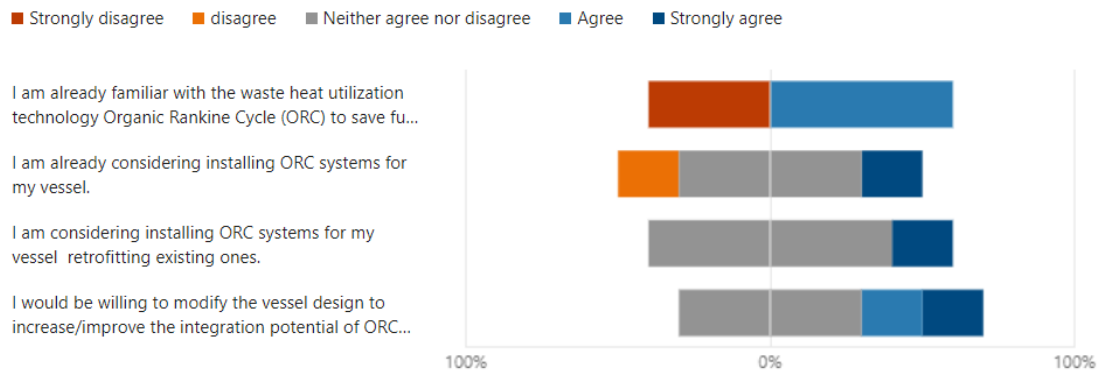


Figure 5: ENGIMMONIA Survey – Results of first cluster of questions about ORC

3. Chiller

The integration of waste heat technologies, particularly for chilling purposes, is positively received by 80% of respondents, indicating a strong recognition of its potential benefits on large vessels. Shipowners are generally supportive of these technologies, while the few negative responses came from researchers and technology providers.

The survey also shows broad agreement on the usefulness of smaller waste heat cooling systems. Across all responses, space and cooling power are identified as the two critical factors to consider. Engineers and ship designers, in particular, emphasized the importance of space, which was also a crucial factor in determining the size of the chiller within the ENGIMMONIA project.

Shipowners and planning engineers emerge as key contacts for disseminating information about these technologies, suggesting a focused strategy for spreading awareness. When designing new



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vessels with adsorption cooling systems, stakeholders prioritize cooling power and flexible spatial design, highlighting the practical considerations essential in vessel design and operation.

4. Chiller

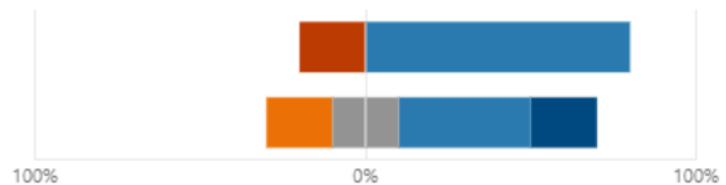
Please rate each statement using the following scale

[More Details](#)

Strongly disagree disagree Neither agree nor disagree Agree Strongly agree

I see benefits in the integration of waste heat using technologies - mainly heat transformation for chillin...

Although limited by available space, smaller waste heat cooling systems are still useful.

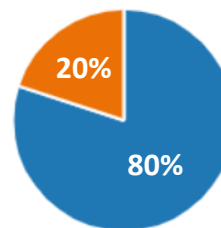


5. Chiller

Who should we best contact to spread information and offers for waste heat-driven cooling on vessels?

[More Details](#)

- Ship owners
- Planning engineers
- Wharfs
- Other (please specify)



6. Chiller

When planning a new vessel with included adsorption cooling, the most important parameter for integration and operation is:

[More Details](#)

- Space (and flexible spatial design)
- Weight
- Cooling power
- Efficiency

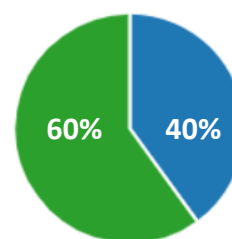


Figure 6: ENGIMMONIA Survey – Results of first cluster of questions about Chiller

4. Ammonia as a Fuel

The survey provides insight into the maritime industry's stance on ammonia as a renewable energy source, revealing a divided opinion: 40% of respondents are in favour, while another 40% strongly oppose it. This split reflects the ongoing debate surrounding the feasibility and readiness of ammonia-based solutions. The majority of respondents value the ability of



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D9.4 First Stakeholder Feedback

ammonia engines to coexist with traditional gas engines during the transition phase, highlighting a pragmatic approach to adopting new fuel technologies.

Most shipowners tend to agree with the survey's findings, with only a small percentage (20%) expressing reservations. Port authorities also generally support the use of ammonia as fuel.

While the overall sentiment towards ammonia as a fuel is positive across all stakeholder groups, a minority of shipowners remain hesitant about adopting this technology. Notably, responses to the final question suggest that ammonia engines are seen as viable not only for new ships but also for retrofitting older vessels. Both shipowners and manufacturers show a willingness to retrofit existing ships with ammonia engines.

7. Ammonia

Please rate each statement using the following scale

[More Details](#)

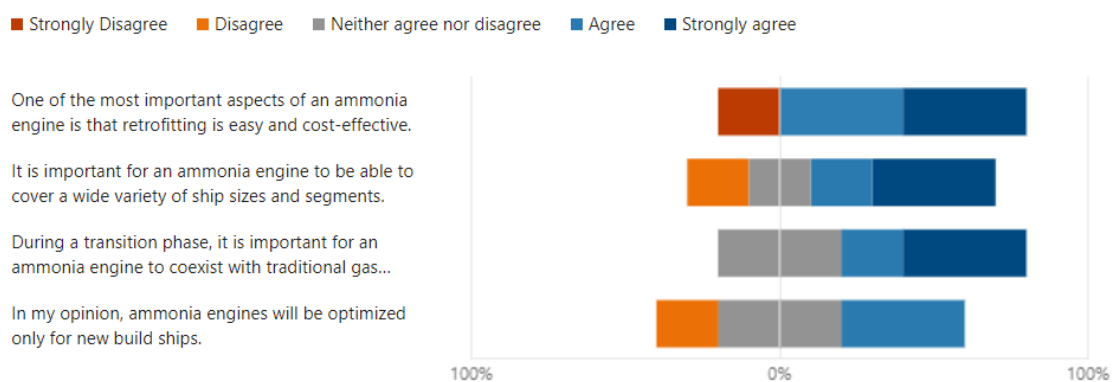


Figure 7: ENGIMMONIA Survey – Results of first cluster of questions about Ammonia

5. Legislation and Non-Technical Aspects

Stakeholder awareness of the International Maritime Organization (IMO) initiatives concerning future marine fuels, particularly ammonia, is notably high, with 80% of respondents acknowledging these efforts. This awareness is critical, as it shapes stakeholders' willingness to integrate ammonia-fuelled vessels into their fleets, provided there is a clear and robust regulatory framework. The survey also reveals that 40% of respondents are open to participating in collaborative efforts to tackle the challenges associated with constructing ammonia-powered ships and developing the necessary infrastructure. However, 40% of respondents pointed out existing legislative gaps that hinder the adoption of new technologies like ORC and PV panels, underscoring the need for a more streamlined and supportive regulatory environment.

On the other hand, some technology providers are unaware of IMO initiatives and are also reluctant to participate in workgroups. Additionally, from the research area some respondents expressed disinterest in joining these collaborative efforts. The polarized responses are not confined to any particular group; both shipowners and technology providers display varying levels of awareness. Given the importance of regulatory updates for the ENGIMMONIA project, these findings highlight the need for continuous communication with the IMO to keep stakeholders informed about legislative and non-technical aspects. The lack of adoption of



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certain technologies among some respondents may be due to the fact that many are not shipowners and, therefore, have not had the opportunity to implement these technologies.

8. Legislation and non-technical aspects

Please rate each statement using the following scale

[More Details](#)

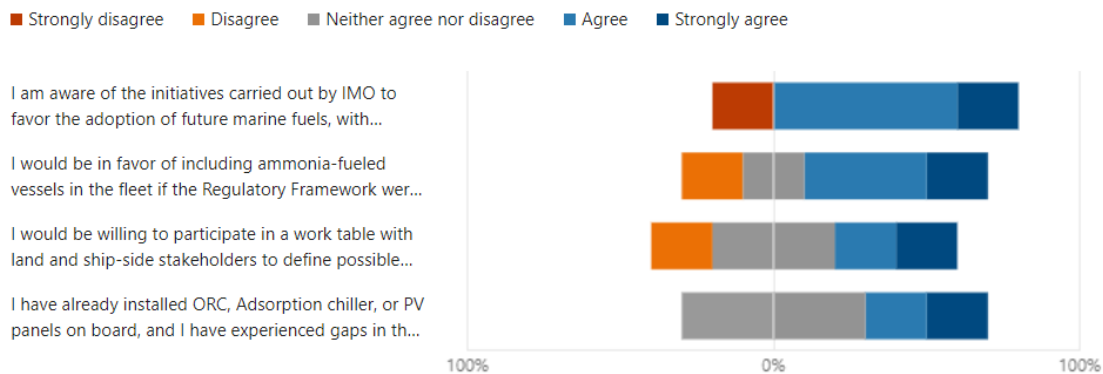


Figure 8: ENGIMMONIA Survey – Results of first cluster of questions about Legislation and Non-Technical Aspects

5. Conclusions

The ENGIMMONIA stakeholder survey has provided a comprehensive highlight of current industry perspectives on sustainable maritime technologies. Although the sample size of 30 respondents is relatively small, it represents a diverse cross-section of the sector, including shipowners, regulatory bodies, port authorities, and other stakeholders. This diversity highlights the broad relevance and potential impact of the project's focus areas, such as photovoltaic systems, ORC (Organic Rankine Cycle) technology, waste heat cooling systems, ammonia as a fuel, and legislative aspects.

The findings reveal a strong interest in integrating renewable energy sources, with a notable inclination towards photovoltaic systems, though considerations of efficiency and cost remain significant. Similarly, ORC technology is gaining recognition, yet many respondents are still cautious about its implementation, reflecting a need for further industry-wide discussion and analysis. The positive reception of waste heat technologies for chilling purposes suggests a trend towards more efficient energy use on larger vessels, while the divided opinion on ammonia as a fuel highlights ongoing debates about its feasibility and readiness.

The survey also underscores varying levels of awareness among stakeholders, with some not fully informed about the technologies or legislative initiatives related to sustainable maritime practices. This indicates a need for improved dissemination strategies, including more targeted outreach and educational efforts to ensure that stakeholders have a clear understanding of the technologies and regulatory developments. The polarizing responses from shipowners and shipbuilders suggest that there may be differing priorities and investment strategies within these groups.

This deliverable will serve as a dynamic and evolving document, culminating in an extensive update with "D9.7 Final Dissemination Activities Report" in Month 48. This final report will not only encapsulate the full range of dissemination activities but will also provide a detailed account of the final event, stakeholder interactions, and collaborations with sister projects. By



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then, with a richer and more representative set of survey results, the report will offer a comprehensive and impactful overview of the ENGIMMONIA project's outreach and its resonance within the maritime industry.



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