



D6.7 | First dissemination activities report also reporting sister projects interaction and IMO/IACS activities

WP6 – Dissemination, Communication and Exploitation

Version 1.6 | May 2024

HORIZON-CL5-2021-D5-01-10

Clean and competitive solutions for all transport modes -
Innovative on-board energy saving solutions



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This project has received funding from the European Union's Horizon Europe research and innovation programme under grant agreement No 101056801.



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Document History

Project Acronym	ZHENIT
Project Title	ZHENIT - Zero waste Heat vessel towards relevant Energy savings also thanks to IT technologies
Project coordination	RINA-C
Project duration	42 month – from 1/06/2022 to 30/11/2025
Title	D6.7 - First dissemination activities report also reporting sister projects interaction and IMO/IACS activities
Dissemination Level	PU - Public
Status	Final version
Version	1.6
Work Package	6
Lead Beneficiary	RINA-C
Other Beneficiaries	All
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23/05/24	1.2	Amedeo Domenico Rinaldi (RINA-S)	Draft Writing and Review
24/05/24	1.3	Martina Losito (RINA-C)	Review
24/05/24	1.4	Francesca DI GRUTTOLA (RINA-C)	Review
28/05/24	1.5	Simone Panfiglio (NAVTEC)	Review
29/05/24	1.6	Martina Losito (RINA-C) and Francesca DI GRUTTOLA (RINA-C)	Final Review

D6.7 | First dissemination activities report also reporting sister projects interaction and IMO/IACS activities

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3	Danelec	KYMA	Norway	
4	Fundacion tecnalía research & innovation	TECNALIA	Spain	
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6	Consiglio nazionale delle ricerche	CNR	Italy	
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Table of Content

Abbreviation and Acronyms	6
Executive Summary.....	7
1 Introduction	8
2 D&C Objectives, KPIs and their status up to M24.....	9
D&C KPIs TRACKING	16
3 Performed communication and dissemination activities up to M24.....	18
PROJECT WEBSITE	18
SOCIAL MEDIA	19
NEWSLETTER.....	20
PROJECT VIDEO PROMOTION	20
EVENTS, TECHNICAL CONFERENCES, WORKSHOPS	22
PUBLICATIONS.....	23
4 Activities performed with Sister Projects	25
5 Interaction with International Maritime Regulatory Committees (IMO/IACS)	27
5.1 IMO action to reduce GHG emissions	27
5.2 Working groups and partnerships	34
5.3 EU strategy	36
6 Industrial stakeholder engagement	38
7 Conclusions.....	39



Abbreviation and Acronyms

Acronym	Description
B2B	Business-to-business
CII	Carbon Intensity Indicator
CO ₂	Carbon Dioxide
D&C	Dissemination and Communication
EEDI	Energy Efficiency Design Index
EEXI	Energy Efficiency Existing Ship Index
ESSF	European Sustainable Shipping Forum
EU	European Union
GA	Grant Agreement
GHG	Greenhouse gases
GT	Gross Tonnages
IACS	International Association of Classification Societies
IMO	International Maritime Organization
KPIs	Key Performance Indicators
MEPC	Marine Environment Protection Committee
NGOs	Non-Governmental Organizations
R&D	Research and Development
SDP	Safe-Decarbonisation Panel
VOC	Volatile Organic Compounds
WHR	Waste Heat Recovery
ZEWT	Zero Emission Waterborne Transport

D6.7 | First dissemination activities report also reporting sister projects interaction and IMO/IACS activities

Executive Summary

The ZHENIT project aims to promote Waste Heat Recovery (WHR) as key and “ready-to-implement” solutions to achieve 2030 IMO/EU targets for shipping sector decarbonization. ZHENIT goal is to fully untap “on-board WH potential” developing and validating WHR solutions at different temperature levels towards the exploitation of WH for different on-board services (cooling, power, desalination) thus able to valorise heat in different vessel processes.

This report follows up D6.4 “ZHENIT Dissemination and Communication Plan – Update” and gives an update of the communication and dissemination activities performed in the framework of WP6 under RINA-C coordination.

The communication and dissemination plan was prepared to define the communication tools to be developed and used towards a successful dissemination of the Project and its results. The project Grant Agreement (GA), through the Description of Action, contained the draft of this plan as part of the measures to maximise the Project’s impact. D6.4 described the dissemination goals, target audience and appropriate channels to provide a regular flow of information and it was structured as a “living document” to properly track project Dissemination and Communication (D&C) along project duration.

The report is structured in three main sections:

- ***Description of D&C activities performed from project start up to May 2024 (RINA-C)***: this section collects the communication and dissemination activities performed since M1 up to M24 thus both updating the D6.4 and tracking D&C activities. Based on the key points remarked in the D6.4, and thanks to the effort of all the members of the ZHENIT project consortium, a strong effort has been made in this period of the project progress in order to reach the maximum industrial actors, potential end-users and general public who can be interested in ZHENIT solutions.
- ***Description of Stakeholders’ engagement activities and collaboration with sisters project (RINA-C)***: this session presents how the project will interact with sisters projects to share project results and collect insights for project R&D results and development.
- ***Description of interactions with IMO and IACS (RINA-S)***: this session presents how the project interacted with relevant international maritime committee to collect regulatory and nontechnical barriers aspects for the promotion and exploitation of project results.



1 Introduction

This deliverable was prepared in the framework of Work Package 6, and it is released at M24 (may 2024) as a public report to present:

- 1) How the project consortium put in place D&C measures described in D6.4 within M1-M24 and how the key objectives, key measures and channels of the dissemination and communication activities have been updated following project's results and feedback from project stakeholders;
- 2) How the project interacted with other R&D Projects for mutual benefit support;
- 3) How the project interacted with relevant international maritime regulatory committee to share project results.

Then, it serves to develop the project's D&C plan for the future months (M25-M42).

The present document is divided in six chapters, listed as follows:

- Chapter 1: Introduction
- Chapter 2: D&C Objectives, KPIs and their status up to M24
- Chapter 3: Performed communication and dissemination activities up to M24
- Chapter 4: Activities performed with Sisters Project
- Chapter 5: Interaction with International Maritime Regulatory Committees
- Chapter 6: Conclusions



2 D&C Objectives, KPIs and their status up to M24

In order to maximize the impact of the ZHENIT project, the communication and dissemination activities were focused on:

- promoting the project action and activities to raise the awareness beyond the project internal as well as external communities to wider audience, including the media and the general public;
- raising interest among stakeholders and the exploitation-oriented dissemination of the benefits provided by the innovative technology proposed in the project toward potential target endusers/adopters;
- exploitation of the project's results, also drafting a roadmap for their widespread and market introduction.

ZHENIT main objectives within the communication and dissemination strategy are the following:

O1: to develop a project visual identity and public image

STATUS AT M24

As presented in D6.4 a solid visual identity has been built to make the ZHENIT project easily recognisable by potential stakeholders, and to raise awareness and visibility. A solid image, evocative of the project and that captures its uniqueness is therefore needed for long lasting and wide dissemination activities. The project logo is always present in all type of communication and dissemination channels and material. There was no need to update the visual identity of the project as reported in D6.4.



Figure 1: ZHENIT project logo

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O1: to communicate the main impacts of the project to specialized and non-specialized audience

STATUS AT M24

Project communication has been promoted via project website, social media and communication materials (more updates are reported in the next sections).

As presented in D6.1 and D6.2, the following promotional material has been developed at the beginning of the project:

- ZHENIT Brochure
- ZHENIT Poster
- ZHENIT Flyers

The project's promotional material according to the Grant Agreement rules, provide information on the EU funding through the EU Emblem and the official disclaimer "The project received funding from the European Union's Horizon research and innovation programme under grant agreement No 101056801".

The project brochure is used by project partners during dissemination events, and it is freely available on the ZHENIT website. The brochure will be periodically updated according to the project's developments and to the informational needs of selected target groups.

The technical messages of ZHENIT project have been translated into simpler messages by the use of representative scheme, vessel and sea images so that the leaflet can be used to disseminate ZHENIT also to the general public.



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D6.7 | First dissemination activities report also reporting sister projects interaction and IMO/IACS activities



Figure 2: ZHENIT Brochure

The project poster focuses on the technical messages of ZHENIT as it is meant to disseminate the project's results to the scientific community and to industry stakeholders during fairs, conferences, booths, events etc. Its contents are similar to brochure ones and, maximising the use of icons, key messages and pictures, it aims to attract people interest to the project via a first glance approach.

D6.7 | First dissemination activities report also reporting sister projects interaction and IMO/IACS activities



Figure 3: ZHENIT Poster

There was no need to update these materials of the project as reported in D6.4.

O3: to provide up-to-date information about ZHENIT through the whole duration of the project

STATUS AT M24

The ZHENIT project website creation has been managed by RINA-C and a description of its function and structure can be found in report D6.1 "ZHENIT Project Website" prepared at M3.

The project website is the principal communication and dissemination platform; it is used to increase the visibility of the project as a whole, presenting the news, results, and documents and thus highlighting the consortium work and its role. By the use of more penetrating channels, such as social media and partners' online platforms, the ZHENIT website concentrates all the necessary materials to better engage technical and non-technical audience, translating into simple and easy-to-read content, the

D6.7 | First dissemination activities report also reporting sister projects interaction and IMO/IACS activities

main project advancements. For this reason, it has been designed to be responsive and accessible from different devices.

Thus, ZHENIT project website defined objectives are:

- 1) Explain and describe project concept and make it clear also for a non-technical public to achieve societal acceptance;
- 2) Provide information about project and thematic events in order to attract sister projects to collaborate creating synergies;
- 3) Allow stakeholders to subscribe to ZHENIT community;
- 4) Make disclosable project results available (public reports, scientific publications, presentations) for the scientific and industrial communities in an unique point.

There was no need to update the website of the project as reported in D6.1 and website stats up to M24 are reported in the next chapters.

O4: to communicate the competitive advantages of the project's novel technologies to selected target Audiences and O7: to disseminate and to ensure public access to the non-confidential project's results

STATUS AT M24

The overall project results have been communicated mostly to three type of target groups, via different actions:

TARGET GROUP	ACTION
General Audience	With whom the project interacted via project website and social media
Scientific Community	With whom the project interacted thanks to: a) publication of scientific papers (5), b) participation to specific events organized in collaboration with other R&D projects (e.g. ENGIMMONIA, HEMOS...), This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101056801 Disclaimer: The sole responsibility for any error or omissions lies with the editor. The content does not necessarily reflect the opinion of the European Commission. The European Commission is also not responsible for any use that may be made of the information contained herein. c) presentation in relevant conferences and symposia (4).
Industrial Stakeholders	Among industrial stakeholders four sub-groups could be identified: ship-owner manager, port authorities, technology manufacturer, policy makers and regulators.

D6.7 | First dissemination activities report also reporting sister projects interaction and IMO/IACS activities

O5: to support the diffusion of results to the general public and O6: to translate the scientific/technical results into messages for public outreach, comprehensible also by a non-technical public

STATUS AT M24

This activity has been mostly performed via Social Media and Public website, where main project outcomes will be presented in a simple and accessible way and public deliverables will be available for download. More information are reported in the next chapters.

Social Media - LinkedIn: 96% of B2B (business-to-business) organizations rely on LinkedIn for content marketing and distribution¹, so [ZHENIT LinkedIn page](#) has been created and it is used to inform and engage stakeholders like technology providers, maritime transport companies, industrial manufacturers and certification societies policies. Up to M24, 188 Followers have been engaged since M1 and 15 posts have been published to promote news, results and events related to the project.

Social Media - X (formerly Twitter) - X was chosen as a project's channel by the consortium because it is a conversation-based social media enabling to engage customer sending short and captivating messages. ZHENIT X account (<https://twitter.com/zhenit12>) has been created since M1 to increase awareness on the project among possible stakeholders in the field of maritime technologies and transports, and also other media agency, partners and general public to promote online conversation and debates. The project account promotes the ZHENIT brand identity thanks to the repeated presence of the project logo both in the banner and in the profile picture. Furthermore, the project's information are highlighted in the public account such as: title, number of the grant agreement and EU disclaimer. To promote engagement on X: 1. Strategic hashtags have been identified and included in the project's tweets, such as #shipping, #sustainability and #decarbonisation, #ThermalEnergyStorage, #technologyintegration, #maritime, #innovation, etc; 2. Several questions will be asked to the project's followers in order to create online debates; 3. Strategic Twitter accounts (such as partners, events' account, horizon europe accounts, journalists etc....) will be mentioned in all ZHENIT tweets; 5. Captivating images and videos will be included in all the project's tweets in order to catch the users' attention.

¹ <https://sproutsocial.com/insights/social-media-statistics/>

D6.7 | First dissemination activities report also reporting sister projects interaction and IMO/IACS activities

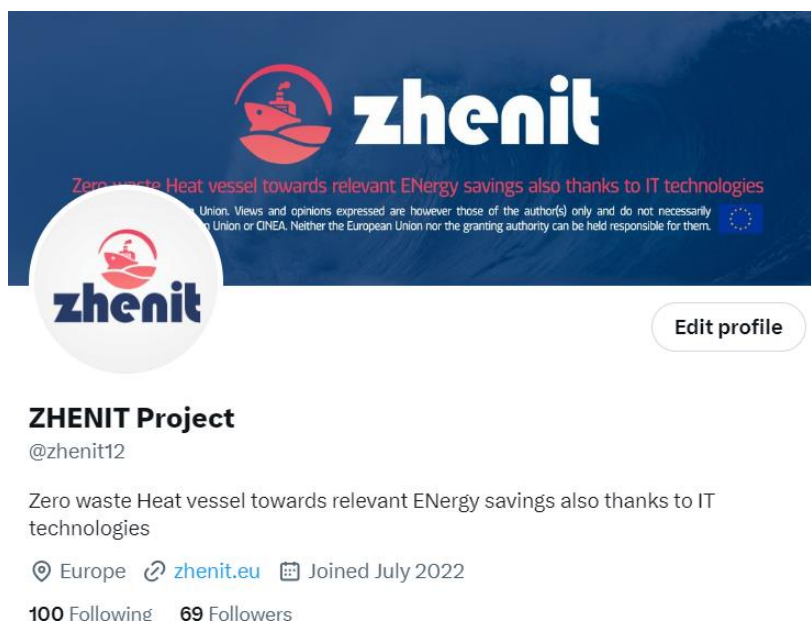


Figure 4: ZHENIT Twitter Account homepage

Newsletter: The consortium initially intended to setup a periodic project newsletter to be delivered every 6 months and the page for the subscription has been carefully highlighted in the homepage of the website (Figure 5). The aim of the newsletter is to keep up-to-dated potential stakeholders about the project and to create the ZHENIT community. Nevertheless during the first two years, RINA-C as D&C Leader preferred to activate different type of channels/media to promote the project which could be more direct like social media and website. However, it has now been planned to active the project newsletter in the upcoming months.

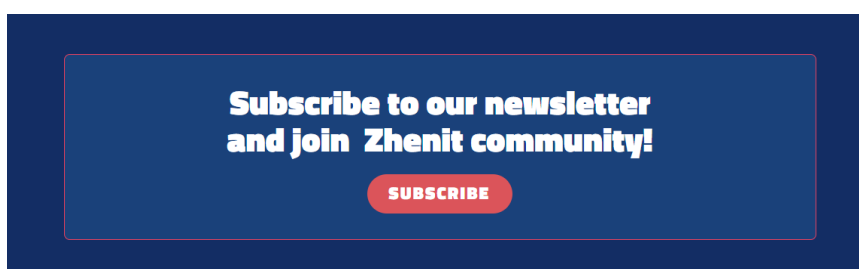


Figure 5: ZHENIT Website - Newsletter Subscription Page

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O8: to foster the exploitation of the project's results and O9: to promote knowledge transfer of project innovative solutions, along with the benefits they can provide, toward potential target end-users/adopters to speed up their adoption.

STATUS AT M24

The ZHENIT project is actively pursuing its objectives to foster the exploitation of the project's results and to promote knowledge transfer of project innovative solutions, along with the benefits they can provide, towards potential target end-users and adopters to speed up their adoption. In alignment with these goals, ZHENIT is organizing its first exploitation workshop during the upcoming General Assembly, scheduled to be held on the 30th and 31st of May 2024 in Milan.

This exploitation workshop is a key event designed to maximize the impact and uptake of ZHENIT's innovative solutions. By bringing together project partners, the workshop aims to facilitate the transfer of knowledge and showcase the practical benefits of ZHENIT's advancements in maritime transportation decarbonization and energy storage technologies.

D&C KPIs TRACKING

To understand if the above-mentioned objectives are well on-track, in D6.4, the consortium identified Key Performance Indicators and quantitative targets to be reached for specific communication and dissemination activities.

The effectiveness of the project's communication activities was monitored via the following KPIs in order to track the proper key performance indicators:

- Project Awareness: Website traffic, page views, video views, etc...;
- Engagement: Social media statistics, rate of attendance to the project's event;
- Lead generation: Newsletter subscription;
- Target loyalty: Percentage of content consumed by target groups.

In particular, the success of ZHENIT communication and dissemination strategy was measured through the KPI presented in Table 1.

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Table 1: ZHENIT D&C KPIs list and status up to M24

Content	KPI	Value	Status at M24
Project website	Number of visits	Visits: <5000 = poor; 5000- 10,000 = good; >10,000 = excellent	= 7000
Public Material	Number of download from the website	<100 = poor; 100-200 = good; >200 = excellent	= 150
Promotional material	Number of distributed copies	<500 copies = poor; 500- 1,000 copies = good; >1,000 copies = excellent	= 1200
Technical project epublication	Number of download from website	<25 = poor; 25-50 = good; >50 = excellent	< 25
Scientific papers	Number of paper published	5 = poor, 5-8 = good, >8 = excellent	< 5
Conference presentations	Number of conferences/events presentations	<10 = poor, 10-15 = good, >15 = excellent	< 10

3 Performed communication and dissemination activities up to M24

Communication and dissemination activities have to be performed in a structured way, and they have to be tracked and monitored. At this purpose, RINA Consulting prepared a dynamic sheet (available on consortium project repository) to plan, collect and to monitor all the planned partners' communication and dissemination activities.

In this section, all the communication and dissemination activities performed in M1-M24 and tracked in above mentioned tracking tool are collected and presented as classified by categories.

PROJECT WEBSITE

The Project News section of ZHENIT project website has been regularly updated. It has been the main reference channel for all project communications.

Table 2: ZHENIT project website posts

POST	DATE	TITLE
1	June 6, 2022	ZHENIT Kick-off Meeting
2	July, 2022	Visit to the Olympic Champion Vessel
3	August, 2022	ZHENIT Website is online
4	November, 2022	ZHENIT First General Assembly
5	May, 2023	ZHENIT at Eurotherm Seminar
6	May, 2023	Second ZHENIT General Assembly held in Birmingham
7	June, 2023	ZHENIT at Seafuture 2023
8	June, 2023	ZHENIT at Sustainable Places 2023
9	June, 2023	ZHENIT at Nor-Shipping
10	September, 2023	ZHENIT at SUPEHR23
11	November, 2023	ZHENIT GA M18
12	November, 2023	ZHENIT at ENLIT Europe 2023

D6.7 | First dissemination activities report also reporting sister projects interaction and IMO/IACS activities

SOCIAL MEDIA

The social media strategy followed by the project consortium aims to ensure the opportune, convenient and prompt dissemination of ZHENIT activities and has allowed a close interaction with the right audiences and profiles of interest.

Table 3: ZHENIT Social Media

SOCIAL MEDIA	LINK	FOLLOWERS
X (Twitter)	https://twitter.com/zhenit12	69
LinkedIn	https://www.linkedin.com/company/zhenit-project/	188

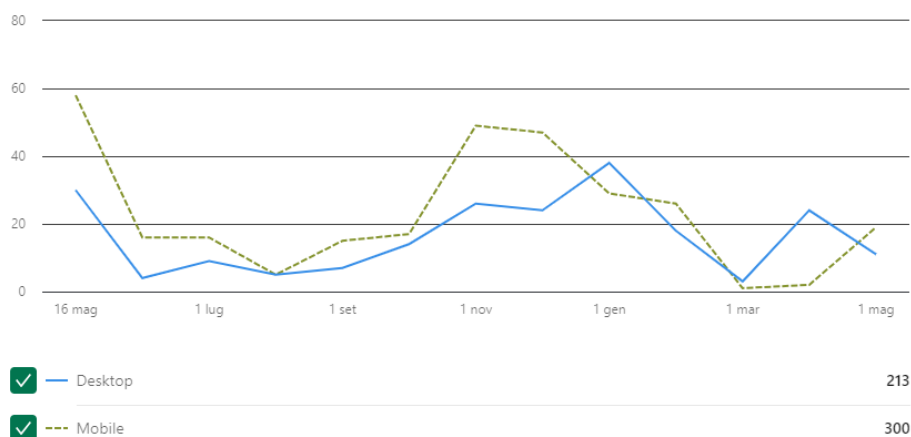


Figure 6: ZHENIT LinkedIn Stats. visitor metrics in the last year

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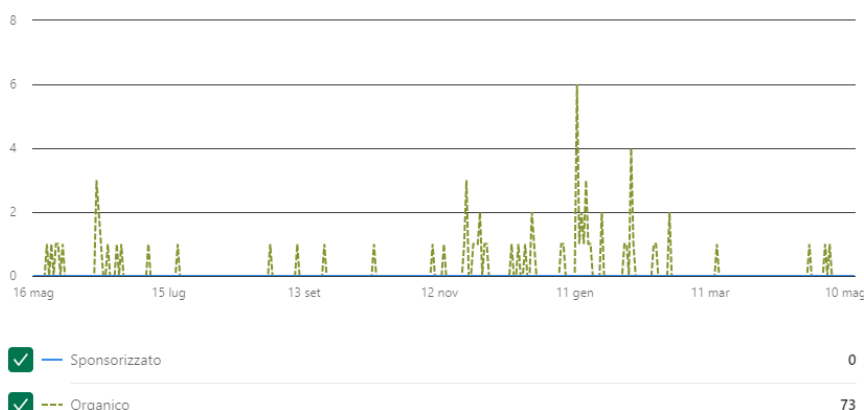


Figure 7: ZHENIT LinkedIn Stas. Followers in the last year

NEWSLETTER

Regrettably, despite the information provided in deliverable D6.4, no periodic newsletters have been disseminated to project stakeholders as of yet due to unforeseen technical difficulties with the project's email system. This issue, which temporarily hindered our communication capabilities with the newsletter, has been promptly and effectively resolved by a dedicated IT team. We are pleased to announce that the inaugural project newsletter is scheduled to be sent out by the end of June 2024.

PROJECT VIDEO PROMOTION

In the upcoming months, we are set to create a project video promotion for ZHENIT Project. The upcoming project video promotion represents a pivotal element in our communication strategy, serving as an engaging and versatile tool to enhance the visibility and impact of our project. By leveraging the power of visual storytelling, this video will succinctly encapsulate the essence of our project, highlighting its innovative aspects and key achievements. Its role extends beyond mere information dissemination; it aims to captivate and inspire a diverse audience, ranging from industry professionals and stakeholders to the general public. The video will be instrumental in simplifying complex technical concepts, making them accessible and relatable to a wider audience. Additionally, its potential uses are multifaceted: it can be featured on various digital platforms such as our website, social media channels, and email newsletters, as well as at conferences, workshops, and other promotional events. By doing so, the video will not only enhance the project's visibility but also foster a deeper understanding and appreciation of its significance, encouraging further engagement and collaboration. It will be prominently featured on our official website, shared through our dedicated YouTube channel, and actively promoted across our social media profiles, including but not limited to LinkedIn and X (Twitter). By leveraging these diverse

D6.7 | First dissemination activities report also reporting sister projects interaction and IMO/IACS activities

digital channels, the video will not only significantly enhance the online presence of our project but also foster comprehensive understanding, engagement, and support from a global audience.



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EVENTS, TECHNICAL CONFERENCES, WORKSHOPS

In the table below, a list containing all the events, conferences and workshops where ZHENIT Project team has participated in M1-M24 is presented. All these events have been a fantastic opportunity for disseminating the ZHENIT project as well as reach to potential end-users and industrial actors.

Table 4: ZHENIT Project Events

Type of event	Title	Date	Partner	Place
Trade fair	ACHEMA 2022	22-26 August 2022	ECT	Frankfurt, Germany
Organisation of a conference	Il futuro dell'IT: la digitalizzazione sostenibile	14 October 2022	SIGLA	Genoa, Italy
Exhibition	World Maritime Week 2023	21 March 2023	TECNALIA	Bilbao, Spain
Exhibition	Nor-Shipping	2 June 2023	RINA	Oslo, Norway
Exhibition	SeaFuture 2023	5-8 June 2023	SIGLA	La Spezia, Italy
Participation to a conference	Sustainable Places 23	14-16 June 2023	RINA	Madrid, Spain
Exhibition	Europort 2023	7-10 November 2022	TECNALIA/UPV	Rotterdam, Netherlands
Exhibition	ENLIT Europe 2023	28-30 November 2023	RINA	Paris, France

D6.7 | First dissemination activities report also reporting sister
projects interaction and IMO/IACS activities

PUBLICATIONS

In M1-M24 time framework ZHENIT partners presented the following papers to Scientific Journals and Conferences.

Table 5: ZHENIT Scientific Publications

Type of publication	Title	DOI	Partner	Target
Peer review publication	On-board waste heat recovery, upgrade and conversion: state-of-the-art review		UoB	Scientific community
Conference paper	Thermodynamic Investigation and Design of a Multi-Generation ORC-Ejector Cooling Cycle Heat Pump for Vessel Waste Heat Recovery	https://doi.org/10.52202/069564-0067	NTUA	Scientific community
Conference paper	Application of Flat Plate Latent Heat Thermal Energy Storage for Waste Heat Recovery and Energy Flexibility in Maritime Sector	https://doi.org/10.52202/069564-0211	UoB	Scientific community
Conference paper	Performance analysis of waste heat recovery system for 1 maritime applications to improve ship energy efficiency		UNIGE, RINA-C	Scientific community
Conference paper	Innovative Waste Heat Valorisation Technologies for Zero-Carbon Ships - A Review	https://doi.org/10.52202/069564-0250	UoB	Scientific community
Conference paper	Driving decarbonisation of shipping sector by waste heat recovery solutions: a techno- economic assessment on technology selection		UoB	Scientific community

D6.7 | First dissemination activities report also reporting sister
projects interaction and IMO/IACS activities

	Development of a latent heat thermal energy storage system for waste heat recovery on ships	https://zenodo.org/records/10245219	UoB	Scientific community
Conference paper	Eurotherm Seminar #116 Innovative solutions for thermal energy storage deployment	https://doi.org/10.21001/eurotherm.seminar.116.2023		Scientific community
Conference paper	Dynamic modelling of ORC system for vessel waste heat recovery	https://doi.org/10.52202/069564-0060	NTUA	Scientific community
Conference paper	Optimally integrated waste heat recovery through combined emerging thermal technologies: Modelling, optimization and assessment for onboard multi-energy systems	https://www.sciencedirect.com/science/article/pii/S0306261924006810	UoB	Scientific community

4 Activities performed with Sister Projects

ZHENIT project recognizes in the collaboration with relevant on-going EU funded projects, an added value to promote project results and innovation as well to share knowledge and capabilities.

ZHENIT will collaborate mostly with two EU Funded projects:

- **HEMOS** (Grant Agreement N. 101056909 - <https://hemosproject.eu/>): coordinated by AS LTH-BAAS, the project aims to decarbonize EU's fleet by improving ship's heat energy system through optimization of heat flow topology with dynamic calculation model, as well as including latest advancements in heat energized technologies.
- **ENGIMMONIA** (Grant Agreement N. 955413 - <https://www.engimmonia.eu/>): coordinated by RINA Consulting, project aims to develop an innovative technological and non-technological strategies to abate the greenhouse gas' emissions of the maritime shipping transport by promoting ammonia as an alternative fuel and demonstrating the impact of clean energy technologies already available for terrestrial applications. Due to the project topic (which are very close to each other) and the presence of project partners in both consortia (TECNALIA, CNR, ANEK), ZHENIT and ENGIMMONIA will mostly share guidelines and insights to perform their own R&D activities.

Both projects have been invited to participate in the upcoming General Assembly at M24, scheduled to take place at the end of May in Milan. This General Assembly will offer an exceptional opportunity for representatives from both projects to exchange insights, share knowledge, and engage in in-depth discussions. The event will also serve as a platform for collaborative brainstorming sessions aimed at planning future joint dissemination activities, such as a joint initiative within the e-learning task of ZHENIT, which is set to commence soon. As a part of this initiative, we plan to invite experts from both projects to speak in dedicated webinars, enhancing the reach and impact of our educational efforts.

During the General Assembly, participants will have the chance to explore synergies, identify common goals, and strategize on how to effectively promote and communicate the outcomes of their collaborative efforts. Additionally, the Assembly will facilitate extensive networking opportunities, fostering stronger partnerships and enhancing the overall impact of the projects. Attendees will also benefit from workshops, panel discussions, and breakout sessions, designed to deepen their understanding and encourage innovative thinking. By the end of the event, we aim to have a

D6.7 | First dissemination activities report also reporting sister projects interaction and IMO/IACS activities

comprehensive action plan that aligns with the strategic objectives of both projects and maximizes their potential for success.

Over the forthcoming months, we plan on looking for additional projects to engage in collaborative dissemination endeavors. This proactive approach underscores our commitment to expanding our outreach efforts and forging new partnerships in our dissemination initiatives.



Funded by the
European Union

This project has received funding from the European Union's Horizon Europe research and innovation programme under grant agreement No 101056801. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or the European Climate, Infrastructure and Environment Executive Agency (CINEA). Neither the European Union nor the granting authority can be held responsible for them.

5 Interaction with International Maritime Regulatory Committees (IMO/IACS)

5.1 IMO action to reduce GHG emissions

As part of the amendments to the Annex VI of the MARPOL Convention driven by the 2030 and 2050 deadlines for the drastic cut of air pollution from ships, in 2018, the International Maritime Organisation (IMO) adopted an INITIAL Strategy on the reduction of GHG emissions from ships, strengthening Energy Efficiency Design Index (EEDI) requirements and introducing other measures including operational efficiency measures, further ship speed reductions, measures to address CH₄ and Volatile Organic Compounds (VOC) emissions, alternative low-carbon and zero carbon fuels, as well as market-based measures MBM.

- These regulations apply to all ships of 400 GT and above
- This was the 1st legally binding climate change treaty adopted since the Kyoto Protocol
- This initial GHG Strategy was revised in July 2023

MARPOL Annex VI has over 100 Contracting States, representing 96.65% of world merchant shipping by tonnage.

The INITIAL IMO strategy on reduction of GHG emissions from ships included:

- Reduction of CO₂ emissions per transport work (carbon intensity), as an average across international shipping, by at least 40% by 2030, efforts towards 70% by 2050 compared to 2008;
- Reduction of the total annual GHG emissions from international shipping by at least 50% by 2050 compared to 2008;
- Efforts towards phasing them out, for achieving CO₂ emissions reduction consistent with the Paris Agreement.

D6.7 | First dissemination activities report also reporting sister projects interaction and IMO/IACS activities

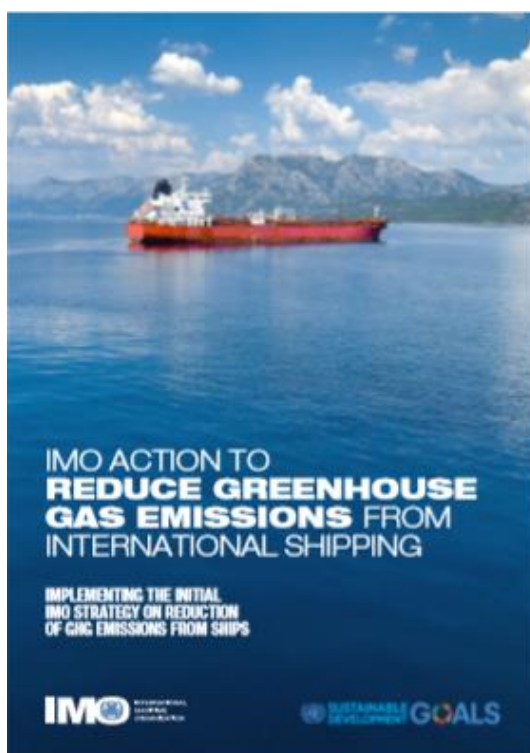


Figure 6: IMO action to reduce GHG emissions post

Such ambitious targets are not achievable with current technology only, and shipowners have to face difficult short-term decisions with long-term implications, requiring practical approach for future-proofing assets.

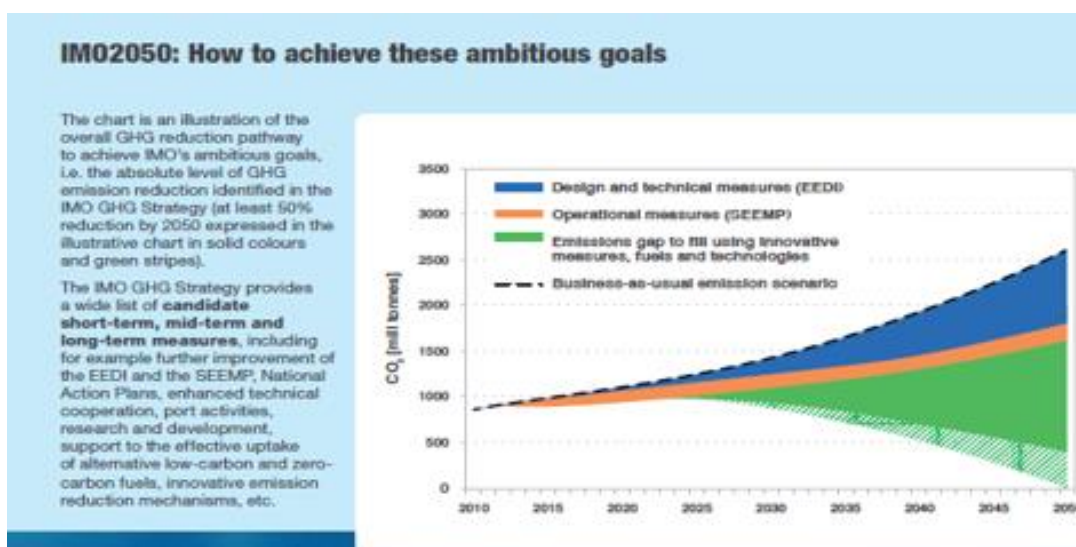


Figure 7: IMO 2050 goals

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In July 2023 the Initial IMO GHG Strategy was revised: Res. MEPC.377(80) includes new levels of ambition and enhanced targets to tackle harmful emissions:

- uptake of zero or near-zero GHG emission technologies, fuels and/or energy sources to represent at least 5%, striving for 10%, of the energy used by international shipping by 2030;
- peak GHG emissions from international shipping as soon as possible and to reach net-zero GHG emissions by or around (i.e., close) to 2050, considering different national circumstances, whilst pursuing efforts towards phasing them out as called for in the Vision consistent with the long-term temperature goal set out in Article 2 of the Paris Agreement, with the following checkpoints:
 1. reduction of the total annual GHG emissions from international shipping by at least 20% striving for 30% by 2030, compared to 2008; and
 2. reduction of the total annual GHG emissions from international shipping by at least 70% striving for 80% by 2040, compared to 2008.
- It is envisaged that a review of the 2023 IMO GHG Strategy will be finalized when the Marine Environment Committee meets in autumn 2028, with a view to adoption of the 2028 IMO Strategy on reduction of GHG emissions from ships.
- More detail about the Revised Strategy is available [here](#), and the text of the strategy can be download [here](#).

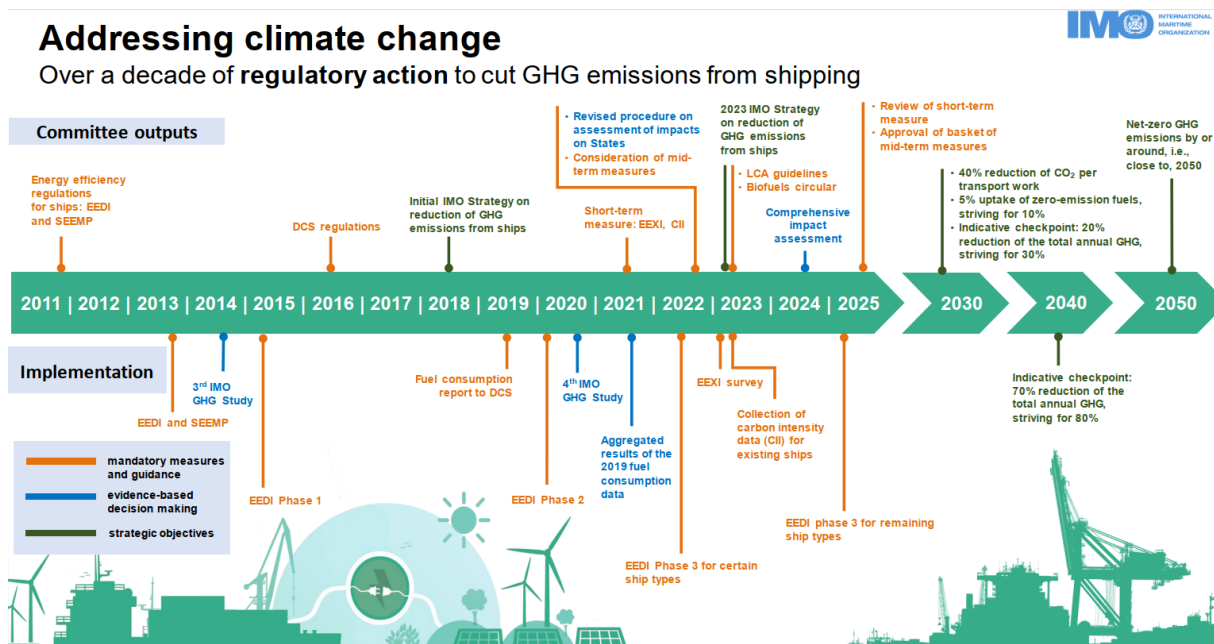


Figure 8: IMO action to reduce GHG emissions from shipping

D6.7 | First dissemination activities report also reporting sister projects interaction and IMO/IACS activities

It is recalled that MARPOL Annex VI adopted both design and operational efficiency indices that ships must comply with: Energy Efficiency Design Index (EEDI) and Energy Efficiency Existing Ship Index (EEXI) are the metrics used for the ship efficiency or emission assessment; they are based on design parameters of the vessel and refer respectively to new and existing ships. They measure CO₂ emissions per cargo ton and mile. EEXI applies to existing vessels above 400 Gross Tonnages (GT) and came into force in 2023.

In addition to these Indexes, the Carbon Intensity Indicator (CII) is an attempt to measure how efficiently a ship transports goods or passengers; it is expressed in grams of CO₂ emitted per cargo-carrying capacity and nautical mile. Its evaluation results in an annual rating, Vessels, based on their performance, will receive an environmental rating of A (major superior), B (minor superior), C (moderate), D (minor inferior) or E (inferior performance level). The rating thresholds will become increasingly stringent towards 2030. The CII is an operational efficiency index which applies to all cargo, Ro-Pax and cruise ships above 5,000 GT and came into effect in 2023 as well. Several IMO Member States and NGOs have already identified some shortcomings in this measuring system and it is expected that the CII formulation would require adjustments for some specific type of vessels.

It is recalled that existing ships are required to meet a specific mandatory Energy Efficiency Existing Ship Index (EEXI), which is based on a required reduction factor, expressed as a percentage relative to the Energy Efficiency Design Index (EEDI) baseline.

The attained EEXI shall result equal or less than the Required EEXI and is calculated as below:

$$\begin{aligned}
 & \left(\prod_{j=1}^M f_j \right) \left(\sum_{i=1}^{nME} P_{ME(i)} \cdot C_{FME(i)} \cdot SFC_{ME(i)} \right) + (P_{AE} \cdot C_{FAE} \cdot SFC_{AE}^{**}) + \left(\prod_{j=1}^M f_j \cdot \sum_{i=1}^{nPTI} P_{PTI(i)} \cdot \sum_{l=1}^{neff} f_{eff(l)} \cdot P_{AEff(l)} \right) C_{FAE} \cdot SFC_{AE} - \left(\sum_{i=1}^{neff} f_{eff(i)} \cdot P_{eff(i)} \cdot C_{FME} \cdot SFC_{ME}^{**} \right) \\
 & \quad \quad \quad f_i \cdot f_c \cdot Capacity \cdot f_w \cdot V_{ref}
 \end{aligned}$$

(C) Emission reduction through the auxiliary power reduction by generating electricity for normal maximum sea load (P_{AEff})

(B) Emission reduction through the propulsion power reduction (P_{eff})

(A) The combination of P_P and V_{ref} as reflected in the power curve (knot-kW curve)

Figure 9: EEXI formula

These important international regulations are directly relevant to the ZHENIT project, which is technologically focused on multiple disciplines, to tackle the complex problems of shipping decarbonization from different perspectives:

D6.7 | First dissemination activities report also reporting sister projects interaction and IMO/IACS activities

- Applied Thermodynamics
- Design and development of WHR technologies
- On-board propulsion and technical systems engineering
- Thermo-economics modeling
- Digital solutions
- Environomics Impact Assessment
- Maritime Regulatory Assessment

The submission of documents to IMO - including information documents - and/or the possibility to have an assigned time slot for a lunchtime or evening presentation to delegates (up to 175 Member States and 80 NGOs) during one of the official sessions of the Marine Environment Protection Committee (MEPC) in London must follow specific procedures..

MEPC by definition address any matter within the scope of the Organization concerned with prevention and control of pollution from ships, adopting and amending Conventions, Codes, regulations and measures to ensure their enforcement.

Currently in the biennial (and beyond) MEPC action plan:

Revision of MARPOL Annex IV and associated guidelines	2025
Further development of mechanisms needed to achieve the reduction of GHG emissions from international shipping	Annual
Promotion of technical cooperation and transfer of technology relating to the reduction of GHG emissions from ships	2025
Revision of guidelines concerning chapter 4 of MARPOL Annex VI	2025
EEDI reviews required under regulation 21.6 of MARPOL Annex VI	2025
Further technical and operational measures for enhancing the energy efficiency of international shipping	2025
Development of a safety regulatory framework to support the reduction of GHG emissions from ships using new technologies and alternative fuels	Continuous

D6.7 | First dissemination activities report also reporting sister projects interaction and IMO/IACS activities

Among many others, the following items are included in the forthcoming MEPC sessions on MARPOL Annex VI Prevention of air pollution from ships:

...

5 Air pollution prevention

The Committee will be invited to consider any submissions received under the agenda item and a working group is expected to be established to consider matters referred to it by the Committee.

6 Energy efficiency of ships

6.1 The Committee will be invited to consider, in particular, the following issues, together with any submissions received under the agenda item:

- .1 2022 Report of fuel oil consumption data submitted to the IMO Ship Fuel Oil Consumption Database and Report on annual carbon intensity and efficiency of the existing fleet;*
- .2 implementation and review of the short-term measures;*
- .3 matters related to the DCS, EEDI, EEXI and SEEMP; and*
- .4 proposals related to the development of guidance for marine bunkering vessels on carriage requirements for biofuels intended for use as marine fuels.*

6.2 The working group envisaged to be established under agenda item 5 (see above) may be requested to also consider matters relating to this agenda item.

7 Reduction of GHG emissions from ships

7.1 The Committee will be invited to consider, in particular, the following issues, together with any submissions received under the agenda item, taking into account the progress made at the sixteenth meeting of the Intersessional Working Group on Reduction of GHG Emissions from Ships, as appropriate:

- .1 proposals on candidate mid-term measures in the context of Phase III of the Work plan for the development of mid- and long-term measures;*
- .2 interim report of the Steering Committee on the conduct of the comprehensive impact assessment of the basket of candidate mid-term measures; and*
- .3 further development of the life cycle GHG intensity assessment (LCA) framework.*

...

The next MEPC 82 is scheduled to take place on Sep.30–Oct.4, 2024 followed by MEPC 83 on April 7 – 11, 2025.

It is theoretically possible to submit an INF paper to the MEPC, in accordance with the *Organization and method of work of the Maritime Safety Committee and the Marine Environment Protection Committee and their subsidiary bodies* (MSC-MEPC.1/Circ.5/Rev.5). Documents - including information documents - containing more than six pages of text (bulky documents²), are to be submitted in electronic format 13-weeks before the start date of the Committee. Non-bulky documents, including information

D6.7 | First dissemination activities report also reporting sister projects interaction and IMO/IACS activities

documents, (six pages or fewer) and bulky information documents submitted nine weeks before the start date.

In any case the submission of an INF paper to the MEPC presenting the results of a R&D project is to be strictly correlated to an ongoing agenda item of the Committee and must be presented by one or more Member States or NGOs. INF papers are not presented or discussed in plenary and it is up to the MEPC Chairman – if so supported by the Member States – to include the INF paper to the consideration of a dedicated WG. More often, the results of a R&D project are presented during lunchtime or evening sessions, but the timeslots are very few and, to have a chance of being included, they have to be booked many months before the theoretical submission deadline.

Just for prompt reference, but without any limitation towards other NGOs, the NGOs frequently providing advice / co-sponsoring / collaborating on various aspects of maritime activities include:

- The International Chamber of Shipping (ICS)
- The Institute of Marine Engineering, Science and Technology (IMarEST)
- The International Association of Independent Tanker Owners (INTERTANKO)
- The European Association of Internal Combustion Engine Manufacturers (EUROMOT)
- The Clean Shipping Coalition (CSC)
- The World Shipping Council (WSC)

The IMO website (www.imo.org), provides the complete list of international Non-Governmental Organizations (NGOs) that have been granted consultative status with the IMO are listed.

D6.7 | First dissemination activities report also reporting sister projects interaction and IMO/IACS activities

5.2 Working groups and partnerships

ZHENIT will specifically address the 2030 emission reduction targets, focusing on the maritime stakeholders' need for reliable solutions and demonstrating to the general audience immediate countermeasures to shipping emissions. This effort will showcase the maritime sector's commitment to combating climate change. Consequently, ZHENIT and WHR systems will be established as the initial "key measures/steps" towards further technological development, contributing to the achievement of the IMO's ambitious decarbonization objectives for 2050. In any case, it must be acknowledged that the IMO selects the possible contributions among those directly related to the development of the regulatory framework, or aiming at bridging gaps in the current provisions. If the R&D results are not specifically linked to international regulatory activities, other ways for communication and dissemination are to be preferred.

In this context, ZHENIT will capitalize outcomes and best practices, assessing their impact on EU shipping sector (particularly looking at 2030 targets) and replicability of technological innovations via a multi-level approach: environmental, social and economic, also thanks to interaction with other on-going EU initiatives and the support of project stakeholders.

Interaction with WATERBORNE TP working groups and with the EC / EMSA are also possible options , focusing on validation of the results and their range of application to the broader shipping sector. Such opportunities are to be evaluated in the project, also relying on an ample stakeholder engagement of WATERBORNE TP.



To provide the innovations needed to achieve the targets and show EU global leadership (also in pushing far more ambitious global regulatory standards) the co-programmed European Partnership “Zero Emission Waterborne Transport” (ZEWT), in cooperation with the EC is mobilising resources and leveraging private and public investments towards the central objective of demonstrating by 2030 the deployable solutions needed for all main types of waterborne transport to become “net zero emission” by 2050 at the latest.

D6.7 | First dissemination activities report also reporting sister projects interaction and IMO/IACS activities

ZHENIT focuses on “ready-to-go” solutions, recognizing WH-to-X system/hybrid propulsion/ICT potential of decarbonization as mostly untapped, but technologically ready, particularly looking at 2030 targets.



Figure 11: ZEW post

This interdisciplinary approach can be further enhanced thanks to a close collaboration with Stakeholders and end-users through:

- a specific Advisory Board composed by relevant institutions from the maritime and WHR sector;
- the collaboration with sisters projects (HEMOS, ENGIMMONIA, CHESTER, RETROFIT55 etc.), to leverage the applicability of solutions bridging the gap between the scientific community and end-users.

RINA is a founding member of IACS (International Association of Classification Societies) and operates on behalf of 122 flag authorities. In addition to the provision of classification and statutory certification delivers value added services to the shipping industry and are rated among the top performing classification societies. Technical competence, attention to quality and focus on innovation are the pillars that allow RINA to support shipping on the path to digital transformation and to achieve the CO2 emissions reduction objectives established by the IMO.

As a member of IACS, RINA actively participates in its internal activities, such as council meetings. IACS Council are crucial for Unified Requirements (UR) in support of battery power, hydrogen and carbon capture is well advanced while a UR on Ammonia as a fuel will be published imminently. Alongside IACS submissions to IMO, IACS is meeting its commitment to working closely with flags and industry in the shared drive to decarbonise, most recently through the signing of a Letter of Intent with Singapore and the establishment of a joint industry working group on safe decarbonisation.

D6.7 | First dissemination activities report also reporting sister projects interaction and IMO/IACS activities

IACS panels represent the top tier of the Association's issue-specific bodies, so establishing a Safe-Decarbonisation Panel (SDP) sends the clearest possible signal of IACS' determination to support industry through this multi-faceted, multi-decadal challenge. Giving decarbonisation the same focus as the traditional areas of Safety, Environment, Hull, Machinery, Survey & Cyber significantly enhances the association's ability to address safe decarbonisation concerns and support the protection of human life, property and the marine environment.

The definition of any IACS output and any communication strategy is the result of an agreement among all IACS members. Regulations and policy issues are also a part of the ZHENIT work plan, when assessing the "regulatory / classification readiness" of all ZHENIT innovations. Consequently, ZHENIT may consider promoting the project outcome in this context, in case of results affecting Class Rule compliance.

5.3 EU strategy

In parallel to IMO, the EU objective of climate neutrality by 2050 will also require innovations in shipping, including the supply and use of sustainable climate neutral marine fuels as well as the associated port storage and bunkering infrastructures.

Therefore, the waterborne transport industry faces the enormous task of implementing urgent actions to achieve these goals on time.

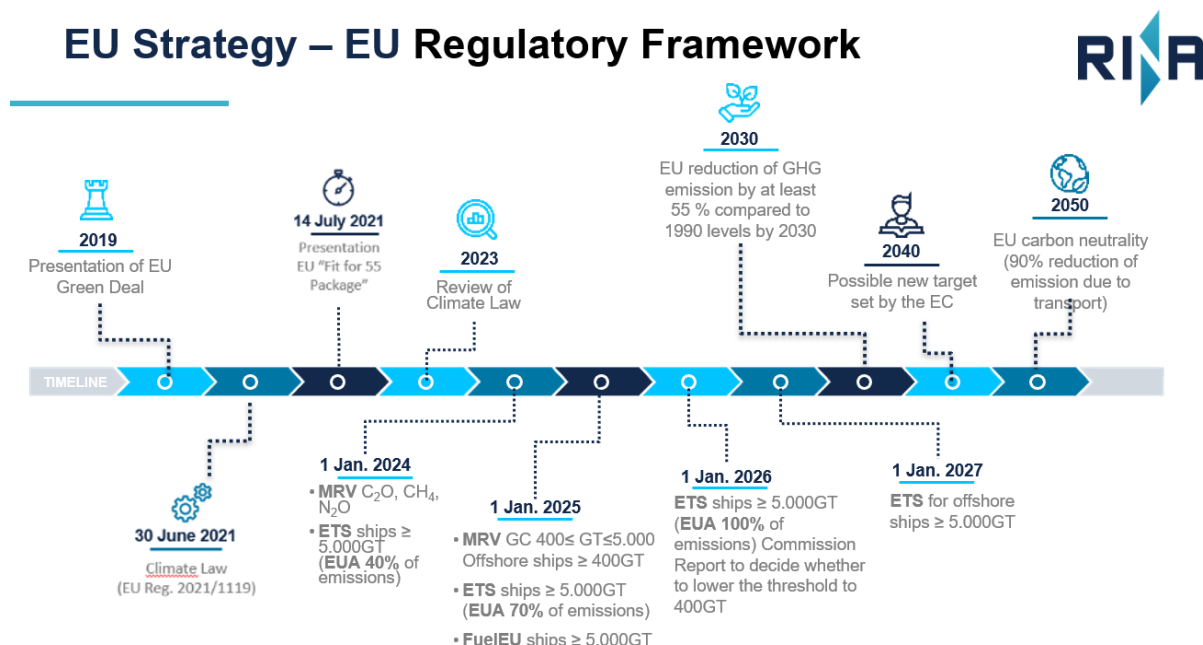


Figure 12: EU strategy and regulatory framework

D6.7 | First dissemination activities report also reporting sister projects interaction and IMO/IACS activities

In the context of the EU's digital strategy "A Europe Fit for the Digital Age" the waterborne transport sector will have to embrace wide-ranging digitalisation, resulting in new business patterns, smart ports, automation of shipping and cargo handling (which will provide higher efficiency and significantly safer operations), autonomous vessels, and new design and decision tools. Among ZHENIT outcomes, digital solutions (for both on-board monitoring/optimization and vessel design and WH audit) are crucial to pave the ground to project outcomes exploitation and marketability, also having a relevant impact (from 3 to 10% of PES/emission saving) on vessel decarbonization. Digital solutions/tools for WH audit (e.g. SO WHAT) currently investigated for terrestrial applications will be preliminary adapted to maritime sector also as enabling tool to further push project outcomes.

EU companies will be the first to benefit the effects of improved environmental performance, partially compensating the anticipated increase of alternative fuel costs, and operational expenses.

The **European Sustainable Shipping Forum (ESSF)** provides a platform for structural dialogue, exchange of technical knowledge, cooperation and coordination between the Commission, Member States' authorities and maritime transport stakeholders on issues pertaining to the sustainability and the competitiveness of EU maritime transport.



Figure 13: European Sustainable Shipping Forum (ESSF)

ZHENIT communication strategy will make sure that its activities reach various stakeholder groups and end-users thanks to a proper stakeholders oriented replication and e-learning campaign, promoting the project results in all the possible contexts.

6 Industrial stakeholder engagement

A number of industrial stakeholders have been informed about the project activities through the social media channels and informative material as better described in the previous chapters. A more direct involvement will be held in the forthcoming dissemination activities delivering dedicated conferences for ship operators and shipyards to raise interest in the commercial uptake of the technologies, also considering the evolution of the regulation reported within the previous chapter. Major shipyards such as Fincantieri will be directly targeted to show the stage of the research, the future development and discuss the applicability of the results in a wide range of naval applications. The testing activities, planned to be performed as part of the project, will have a more significant impact on the potential interaction with the operators and the industrial stakeholder, paving the way to a set of discussion about the outcomes of exploitation.

These events will not only serve as a platform for networking and knowledge sharing but will also be instrumental in identifying bottlenecks and challenges associated with scaling up the technology. Through these interactions, stakeholders can engage in detailed discussions to uncover specific technical, logistical issues that may hinder progress.

Moreover, these conferences and meetings will provide an opportunity to explore and identify the most promising commercial applications for WH-to-X technology, focusing on those with the highest potential for market penetration. By bringing together experts from various fields, these gatherings will foster a collaborative environment where innovative solutions can be proposed and evaluated. This collaborative approach will help in tailoring the technology to meet market demands more effectively and will accelerate the adoption of WH-to-X solutions across different industries.

Ultimately, the insights gained from these interactions will be invaluable in refining the technology, optimizing processes, and ensuring that WH-to-X solutions can be implemented on a larger scale. This concerted effort will pave the way for the successful commercialization of WH-to-X technology, driving its widespread adoption and contributing to the achievement of sustainability goals.

These forthcoming activities are intended to bridge the dissemination and exploitation activities with a wider look at the replicability analysis, also part of the project.

7 Conclusions

In summary, the ZHENIT project has made significant strides towards its goals of promoting Waste Heat Recovery (WHR) to aid in decarbonizing the shipping sector. Through the comprehensive execution of communication and dissemination activities outlined in Work Package 6, the project has effectively raised awareness and engaged stakeholders across various platforms. Key achievements include the development of a strong project visual identity, the successful use of social media channels, the creation of promotional materials, and the strategic engagement with sister projects and international maritime regulatory committees.

The project's efforts to engage with stakeholders and promote WHR technologies have been robust, with notable interactions with projects like HEMOS and ENGIMMONIA, which have facilitated knowledge exchange and collaborative planning. Additionally, the project's interactions with the International Maritime Organization (IMO) and other regulatory bodies have been crucial in addressing regulatory barriers and ensuring alignment with global decarbonization targets.

Looking ahead, the ZHENIT project will continue to build on its communication and dissemination strategies. The upcoming launch of a project newsletter and the creation of a promotional video will further enhance visibility and stakeholder engagement. The project will also seek to expand its collaboration with additional EU-funded projects, maximizing the impact and dissemination of its innovative WHR solutions.

The ZHENIT project's comprehensive approach to communication and dissemination, combined with its proactive stakeholder engagement and regulatory interactions, positions it well to continue driving forward the adoption of WHR technologies and contribute significantly to the decarbonization of the maritime industry.



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