



STEERER

STRUCTURING TOWARDS ZERO EMISSION
WATERBORNE TRANSPORT

D 1.1. Terms of Reference for the Scientific Committee



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1. Introduction

1.1 The STEERER Project

STEERER (Structuring Towards Zero Emission Waterborne Transport) will coordinate the establishment and communication of a Strategic Research and Innovation Agenda¹ and an Implementation Plan **towards zero-emission waterborne transport, in cooperation with all key stakeholders needed to facilitate the transformation to clean waterborne transport.** In the definition of STEERER, as well as cutting greenhouse gas emissions, all harmful environmental emissions, water pollution and noise emissions have to be eliminated. STEERER's mission is to bring the various initiatives and sectors' stakeholders together to join forces for a combined effort with the maximum impact for the climate, people's health and Europe's economy.

STEERER is coordinated by the Waterborne Technology Platform (SEA EUROPE is responsible for its secretariat), counting with the participation of a total of seven partners from six EU countries.



Figure 1: STEERER's partners

In sum, STEERER aims to:

¹ The STEERER project will provide input to the Waterborne TP regarding the development and update of the Strategic Research and Innovation Agenda of the Candidate Co-Programmed Partnership on Zero-Emission Waterborne Transport in the framework of Horizon Europe (https://ec.europa.eu/info/sites/info/files/research_and_innovation/funding/documents/european_partnership_for_zero-emission_waterborne_transport.pdf).

- Jointly set emission targets towards 2050 (including targets for 2025 and 2030);
- Contributing to the update of the Strategic Research and Innovation Agenda of the Co-Programmed Partnership on Zero-Emission Waterborne Transport (cPP ZEWT)² in the framework of Horizon Europe, to be able to reach these targets in time;
- Develop an Implementation Plan to reach the targets in due course while staying competitive and offering a valid business case;
- Developing and implementing a communication campaign, aimed at broader awareness of the waterborne transport sector and its commitment towards zero-emission transport, to become a fully sustainable mode of transport;
- Monitoring and assessing the implementation of the Strategy defined and adapting where necessary, after the project's conclusion, by the Green Shipping Expert Group.

The consortium will function as a Secretariat, where the broader expertise is involved in the **Scientific Committee (SC)** and the Green Shipping Expert Group (GSEG) to be established by the project.

STEERER is funded by the European Commission research and innovation programme Horizon 2020, with an investment of 1,5 million euro over the course of 30 months, starting in December 2019. STEERER will play an important role in the preparation and execution of the candidate co-programmed Partnership on Zero-Emission Waterborne Transport to be established in the context of the new programme for Research and Innovation currently under negotiation: Horizon Europe.

² https://www.waterborne.eu/images/documents/201021_SRIA_Zero_Emission_Waterborne_Transport_spread.pdf

1.2 Context and Rationale

Amid growing global and European societal pressure to resolve issues related to **climate change**, **air pollution** and the **degradation of the world's oceans**, political and regulatory attention has been increasingly directed towards waterborne transport, due to this mode of transport's high environmental and climate impact³. A **number** of major developments are illustrative in this respect:

- **“The European Green Deal”** (December 2019⁴), to ensure that Europe will be the first climate-neutral continent, thereby making Europe a prosperous, modern, competitive and climate-neutral economy, as envisaged in the Commission Communication **“A Clean Planet for All: A European strategic long-term vision for a prosperous, modern, competitive and climate neutral economy”** (November 2018⁵);
- The **Paris Agreement Objectives** (COP21⁶) and the scientific findings from the **Intergovernmental Panel on Climate Change (IPCC)**⁷, which emphasises the need to limit global warming to 1,5°C above pre-industrial levels, and related global GHG emission pathways, in line with the Paris Agreement;
- The International Maritime Organisation's **(IMO) Initial IMO Strategy on the reduction of GHG emissions** from ships (April 2018⁸);
- The **EU and global sulphur cap**⁹ as of 1 January 2020;
- The Central Commission for Navigation of the Rhine's **(CCNR) Ministerial Mannheim declaration**¹⁰ (October 2018);
- The calls from the **European Council**¹¹ and **European Parliament**¹² to enhance the environmental track record of inland waterway transport;
- The calls from the **European Parliament**¹³ to reduce global emissions from shipping and its resolution **declaring a climate and environmental emergency**¹⁴ in Europe and globally;

³ https://en.wikipedia.org/wiki/Environmental_impact_of_shipping

⁴ https://ec.europa.eu/commission/presscorner/detail/en/ip_19_6691

⁵ <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52018DC0773&from=EN>

⁶ <https://unfccc.int/process-and-meetings/the-paris-agreement/the-paris-agreement>

⁷ <https://www.ipcc.ch/sr15/>

⁸ <http://www.imo.org/en/MediaCentre/PressBriefings/Pages/06GHGinitialstrategy.aspx>

⁹ https://ec.europa.eu/commission/presscorner/detail/en/IP_19_6837

¹⁰ https://www.ccr-zkr.org/files/documents/dmannheim/Mannheimer_Erklaerung_en.pdf

¹¹ <http://data.consilium.europa.eu/doc/document/ST-13745-2018-INIT/en/pdf>

¹² http://www.europarl.europa.eu/doceo/document/B-8-2019-0079_EN.html?redirect

¹³ <https://www.europarl.europa.eu/news/en/press-room/20191121IPR67110/the-european-parliament-declares-climate-emergency>

¹⁴ https://www.europarl.europa.eu/doceo/document/TA-9-2019-0078_EN.html

- The **Sustainable Development Goals** (SDG) of the United Nations Development Programme (UNDP), in particular SDG 9 (Industry, Innovation and Infrastructure)¹⁵, SDG 13 (Climate Action)¹⁶ and SDG 14 (Life Below Water)¹⁷.

The tell-tale signs and impacts of climate change – such as the rise in sea level, ice loss and extreme weather – increased during 2015-2019, which is set to be the warmest five-year period on record according to the World Meteorological Organization (WMO)¹⁸. There is an urgent need to accelerate action. Achieving a net zero-emission waterborne transport sector by 2050 at the latest, and at least 50% reduction of absolute emissions by 2030, entails a race against the clock, since the average age of a modern maritime vessel is **21** years¹⁹, although this is not uniform across vessel types. Therefore, the transition towards **zero-emission waterborne transport** will need to address **existing, as well as new-build** ships. In addition, it will not only require research and development regarding (the use of) alternative fuels, but will also have to take into account all means to radically improve the ship's energy efficiency and related emission efficiency (both retrofitting and new build). As well as making **seagoing ships** and **inland vessels** zero-emission, the transition towards zero-emission waterborne transport will also require changes to infrastructure, ship design, shipbuilding processes, maritime equipment production, ports, alternative fuel terminals and processing plants, the wider logistics chain and more energy-efficient operations. Measures will also need to be taken in different action areas such as **digitalisation** (e.g. to allow better energy monitoring and to increase energy efficiency) and the **education and training** of the current and future workforce in order to ensure that the implementation of new technologies and concepts is properly executed. To put this ambition and commitment into practice **whilst taking into account the timelines** set out in various regulations, there is a need to start the transition process now.

With regards to pollution (both to air and to water), the need to address these environmental problems is laid down in European and international regulations (adopted by the IMO for maritime transport) and/or in national, regional or local legislation. For inland navigation, the rules are set out by the European Union and, where applicable, are transposed into national legislation. The ambitions and targets for the EU are clear for climate change - with the global ambitions for

¹⁵ <https://www.un.org/sustainabledevelopment/infrastructure-industrialization/>

¹⁶ <https://www.un.org/sustainabledevelopment/climate-change/>

¹⁷ <https://www.un.org/sustainabledevelopment/oceans/>

¹⁸ <https://public.wmo.int/en/media/press-release/global-climate-2015-2019-climate-change-accelerates>

¹⁹ https://unctad.org/en/PublicationsLibrary/rmt2019_en.pdf

international shipping to be reviewed upwards in 2023 - and efforts are now focussed on how to achieve these objectives.

Besides the development of new technologies and concepts, there is a need for the development of coherent international and European regulatory frameworks, which will underpin climate change objectives, **ensure and facilitate the timely transition** to climate-neutral sustainable alternative fuels, technologies and concepts and, at the same time, ensure consistency between guidelines of different regulatory bodies or Member States. The regulatory framework should therefore support the modal shift as envisaged in the European Green Deal. Finally, the deployment of solutions should be stimulated by means of incentives.

However, to fulfil the ambitions of the waterborne transport sector, it is obvious that much **more research, development, innovation (RD&I) and investments** will be necessary in the coming years to address and respond effectively to the current and future **climate and environmental challenges**, while taking into account a **safe implementation** of technologies and concepts. At the same time, the emphasis on a **viable and evolving business case** is essential for the uptake of innovations.

STEERER will be contributing to the development and updating of the Strategic Research and Innovation Agenda of the cPP ZEWT to be able to reach the aforementioned target in time as well as developing an Implementation Plan to reach the targets in due course while staying competitive and offering a valid business case. It is thereby essential, that STEERER is in direct contact with, and provides input to, relevant related initiatives, and in particular collaborates with and supports the Co-Programmed Partnership on Zero-Emission Waterborne Transport in the framework of Horizon Europe.

1.3 Mandate

The Scientific Committee (SC) consists of experts nominated by carefully selected stakeholders. The SC plays an important role in consolidation of various inputs together with project partners (participants), the provision of scientific advice and in discussion with the STEERER consortium, propose an agenda and meeting documents for the Green Shipping Expert Group (GSEG). The SC will provide expert knowledge in the form of short one or two page briefings, including key questions, to facilitate the discussion within the GSEG, both regarding the state-of-play of technologies, concepts, knowledge gaps and challenges relevant for the transition towards zero-emission waterborne transport, as well as the elements of the Implementation Plan. The final decision regarding the agenda and meeting documents for the GSEG will be undertaken by the project consortium (partners).

2. Objectives, tasks, deliverables and timetable

2.1 Objectives/tasks

The main objective for the SC will be to provide expertise and facilitate discussions in preparation of the meetings of the GSEG. The list below describes the core objectives and tasks of the STEERER project, and the work to achieve these is undertaken by the consortium (the partners). The SC will provide advise and guidance as described in paragraph 1.3. The main objectives and tasks of STEERER, in relation to the discussions in the GSEG, are the following:

- 2.1.1 **Analysing the state-of-play** which will clearly describes the current situation by consolidating and presenting the existing findings of relevant projects and best practices, initiatives, existing decarbonisation strategies and visions for the (waterborne) transport sector;
- 2.1.2 **Aligned with the Objectives of the ZEWTP partnership, developing scenarios towards zero-emission waterborne transport with quantified targets for 2025, 2030 and 2050.** To help to identify the scenarios the main underlying causes (drivers) leading towards zero-emission waterborne transport will be defined:
 - Work will be undertaken on the basis of the broad range of pre existing studies, publications and scientific paper which will be fully referenced.
 - Creating a baseline scenario: A baseline scenario “no policy change” will serve as the basis against which the impacts of other scenarios will be measured and compared;
 - Compilation and screening of scenarios to be assessed: the scenarios will be closely linked to the drivers and the identified specific objectives needed to achieve the overall objective, zero-emission waterborne transport;
 - Definition of targets for various scenarios: Quantification of targets for 2025, 2030 and 2050, concerning GHGs, PMs, SOx, NOx, energy efficiency and defining potential decarbonisation pathways towards the elimination of harmful air pollution and GHG emissions.
 - Identification of the knowledge gaps linked to achievement of the proposed scenarios.

2.1.3 Defining areas of intervention and relevant actions to achieve the targets, incl. prioritisation of actions

To achieve the goal of emission free waterborne transport the detailed catalogue of actions will be developed for (at least) the intervention areas shown in figure 1.

- a. Use of Sustainable Alternative Fuels;
- b. Electrification;
- c. Energy-Efficiency;
- d. Design and Retrofitting;
- e. Digital Green;
- f. Ports.

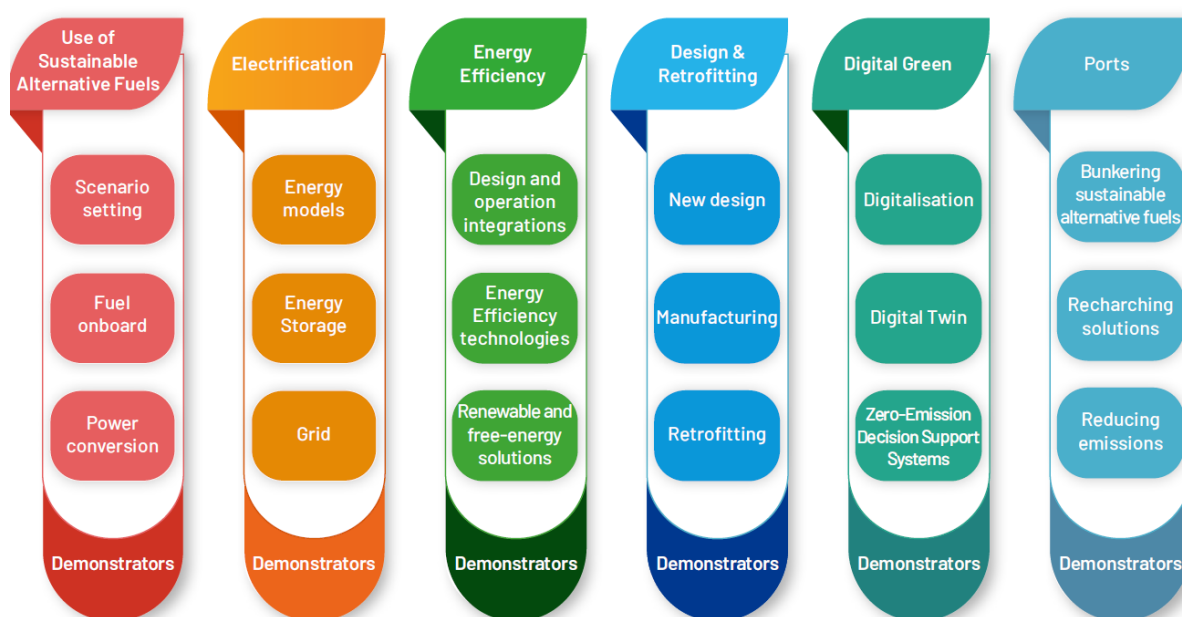


Figure 1: Areas of intervention

STEERER will map existing initiatives and research executed and ongoing in other projects in the waterborne transport sector. STEERER will consolidate and summarise results and initiatives and will develop conclusions.

2.1.4 Executing a SWOT Analysis

The execution of a SWOT analysis will provide key insights into strengths, weaknesses and opportunities and threats of the longlist of actions developed. Based on the overview of the different SWOT results, the commonalities will be identified and aggregated SWOT overviews will be prepared. The SWOT will address the most important priorities defined in the previous task.

- 2.1.5 **Elaborating public policy instruments and interventions and other appropriate mechanisms, incentives and business models to increase the take-up and deployment from R&I activities.** The outcomes of the SWOT analysis (in particular the identified gaps) will be the basis for the elaboration of a range of regulatory and non-regulatory instruments or combinations of instruments that may be used to reach the objectives of the intervention.
- 2.1.6 **Drafting input to the strategic RD&I Agenda of the cPP ZEWT including its revisions and developing an Implementation Plan, based on the outcomes of the previous tasks.** The implementation plan will list the various actions which are needed to implement the SRIA of the cPP ZEWT and will identify the main implementation challenges and the key stakeholders taking ownership to carry out the action (emerging from the work done in previous activities) including for example: (i) technical challenges, (ii) economic challenges entailing costs that need careful planning (risk of insufficient financial and human resources), (iii) legal challenges and requirements, (iv) timing challenges, etc. Suitable approaches and solutions will be presented to overcome the challenges and to cope with risks.
- 2.1.7 **Developing monitoring and evaluation arrangements.** STEERER will deliver a proposal on how the monitoring and evaluation of the implementation of the Strategic Research and Innovation Agenda (“STEERER Agenda”) and the Implementation Plan will be done.

The SC shall start its activities based on the extended description of the aforementioned tasks (see Annex 1) in the Grant Agreement of the STEERER project.

2.2 Deliverables and timetable

The seven tasks described in paragraph 2.1. are linked to the six main deliverables of the STEERER project. The timetable of these deliverables is included in the Grant Agreement of the STEERER project. Due to the COVID-19 pandemic, the first meeting of the GSEG has not been scheduled yet. For that reason, the timetable indicated below will be changed, and the members of the SC will be informed on the new time schedule as soon as possible.

Deliverable	Expected Month of Finalisation
D2.1 State of play of decarbonisation of waterborne transport - "technology application atlas"	February 2021
D2.5 STEERER Advice to 1 st ZEW Research agenda revision and its Implementation plan	August 2021
D2.2 Scenarios with quantified targets for 2025, 2030 and 2050 - "Common stakeholder target scenarios"	November 2021
D2.3 Areas of intervention and related actions - "implementation plan"	January 2022
D2.4 Public policy instruments and interventions and other appropriate mechanisms, incentives and business models to increase the take-up and deployment from R&I activities	April 2022
D2.7 STEERER Advice to 1 st ZEW Research agenda revision and its Implementation plan	August 2022
D.2.6 Monitoring and evaluation arrangements of the ZEW Agenda and its Implementation Plan, feed back to ZEW	September 2022

3. Operation of the Scientific Committee

3.1 Number, identification and selection of experts

The Scientific Committee will act as a sounding board to the STEERER Consortium during the project's duration (December 2019 – November 2022) supporting project partners in the consolidation of various inputs and in the preparation of agendas and meeting documents for the Green Shipping Expert Group.

The Scientific Committee will consist of senior experts (see Annex 2) from e.g. the following fields: maritime applied research & development institutes, shipyards and maritime equipment suppliers, refineries, ports, class societies, the Waterborne Technology Platform as well as a non-governmental environmental institute. The members of the SC have been selected, following their expression of interest to join the GSEG and/or the SC of the STEERER project.

The Scientific Committee will provide views and recommendations to support the decision making of the GSEG. The SC will also support the STEERER Consortium with regard to the specific expertise of the segment of waterborne transport they represent. Members of the Scientific Committee are experts in “their” field of expertise, know the challenges and opportunities and are able to contribute objectively to the elaboration of the Strategic Research and Innovation Agenda of the ZEWT partnership and its implementation plan from a technical/scientific point of view. They will assist to advocate targets, actions, interventions, etc. within their segment of expertise, from STEERER towards ZEWT and thus play an important role in preparing the discussion at the GSEG as well as reaching consensus.

An interconnected effort between the STEERER Consortium, the Scientific Committee, the Green Shipping Expert Group and the structures of the ZEWT partnership will lead to the STEERER's contributions to the Strategic Research and Innovation Agenda of ZEWT, its subsequent revisions as the programme progresses and its Implementation Plan and subsequent revisions as the programme progresses.

3.2 Working Method

The SC shall be chaired by the coordinator of the STEERER project. A representative of the SC shall be appointed Vice-chair. The Chair and Vice-Chair of the SC decide on its working methods, with a view to ensure an in-depth analysis of the selected topics and maximise to contribution of the SC and GSEG members.

The Chair shall prepare the reports of the SC, based on written contributions and in consultation with the participants and of relevant material and events identified by the SC and STEERER members. The Chair will select and organise contributions presented by experts, create PowerPoint presentations and draft summaries of the discussions held at meetings. Reports and contributions will be agreed on a majority basis by the members of the SC.

A periodic rotation for the roles of Vice-chair and Chair will be envisaged at a frequency to be agreed by the SC.

3.3 Meetings

The meetings of SC shall be held, on the premises of one of the STEERER members. Alternately, where appropriate, meetings may also be organised by audio conference, video conference or other means of communication. The SC shall meet at least four times per year.

The Chair and Vice-Chair of the SC will be in regular contact with the members to ensure progress and smooth running of the SC. Ad-hoc external experts and observers may be invited to attend the meetings to provide appropriate information and orientations.

3.4 Duration

The SC is due to start at the kick-off of the STEERER project and shall be dissolved as soon as the STEERER project is finished.

4. Annex 1 – Description of tasks

The current description below is an excerpt of the Grant Agreement of STEERER, and might change, taking into account recent developments. These changes will be agreed upon with the European Commission – DG RTD, and will be communicated with the members of the Scientific Committee.

A principal objective of STEERER will be to support the effective and continued implementation of the ZEWT cPP and coherence will be ensured with the activities of STEERER and objectives of the ZEWT partnership.

WP2 - Strategic Research and Innovation Agenda and Implementation Plan

Task 2.1 State-of-Play (the status quo)

Waterborne transport must become a clean and greener, as well as a safer and more secure, mode of transport. To that end, all harmful environmental emissions, water pollution and noise emissions have to be eliminated and zero-accidents and zero loss of life achieved. Furthermore, the realisation of the full potential of digitalisation will enhance data flows and lead to a higher degree of automation and autonomy. These developments will improve ship management and operations, safety and the energy-efficiency of waterborne transport, and will also lead to an increase in logistics and mobility flows .

In line with the call text, the focus of the project, thus the main area of interventions will address clean, green and energy-efficient waterborne transport. Aspects of the safe and secure and connected and automated waterborne transport will be addressed to the extent they have an implication on the transformation of waterborne transport towards cleaner, greener and more energy-efficient transport mode.

Task 2.1 State-of-Play (the status quo) will clearly describe the current situation by consolidating and presenting the existing findings of relevant projects and best practices, initiatives, existing decarbonisation strategies and visions for the (waterborne) transport sector. Statistical analysis, available from STEERER consortium members directly involved as well as external stakeholders & associations, scientific papers, public reports, national and other strategic plans will be used in assessment of scenarios. Statistical data will include for example tonnage, fuel consumption, kilometres travelled, operational data, age of fleet, standard refurbishment cycles and others. Focus will be, among others, on consolidation of existing findings and assessments (e.g. cost effectiveness, in case of alternative fuels considering a well-to-propeller viewpoint, etc.) of currently known technological and operational measures, barriers and opportunities, levels of uncertainty, recommendations on most sustainable pathways and knowledge gaps.

The state-of-play will briefly recall any relevant policy objectives of the European Union or International Maritime Organisation (IMO) or authorities responsible for inland waterway transport, as well as policy measures promoting implementation of zero-emission solutions. Additional global trend developments like population development, trade and transport

developments, economic growth forecasts, potential of renewable energy production in a sustainable manner, etc. will be consolidated to define the scenarios in the next step. The global development trends expected in regulatory frameworks (EC, IMO etc) will be considered such as further deployment of the emission control areas or the regional trends and specifics as regards the availability of renewable fuels (energy carriers).

Task 2.2 Scenarios with quantified targets for 2025, 2030 and 2050

The deployment of innovation in waterborne shipping services will be a dynamic process and will not affect the entire industry at the same time. To help to identify the scenarios the main underlying causes (drivers) leading towards zero-emission waterborne transport will be defined. Examples of such drivers are global, EU and national policies and regulatory frameworks, including standardisation; economic growth and related increase of transportation; nonregulatory alternatives like pressure of the stakeholders and in particular consumers towards greening of transportation; or other market triggered drivers like availability of alternative fuels infrastructure, (limits in sustainable) production and regional availability of the renewable alternative energy. Besides applicability of different zero-emission technologies depending on type of ship, sailing profile and area of operation, global level playing field and competitiveness aspects will be major criterion to conclude on feasible targets for the different market segments.

Task 2.2.1 Creating a baseline scenario

A baseline scenario “no policy change” will serve as the basis against which the impacts of other scenarios will be measured and compared. This scenario includes all relevant policies and measures which are assumed to continue in force. In addition, the initiatives that are proposed and clear but still not deployed, e.g. proposal for certain legislation still not adopted, will be included into the baseline. The baseline will include expected socio-economic developments (ageing, GDP growth, etc.) as well as important technological/societal developments. The baseline scenario will be quantified in terms of the projection of emissions from waterborne transport expected for the set time horizons 2025, 2030 and 2050, same time horizons as for the targets (e.g. carbon emissions are projected to increase XX% to XXXX million tonnes by 2035 to the 201X level).

Task 2.2.2 Compilation and screening of scenarios to be assessed

The scenarios will be closely linked to the drivers and the identified specific objectives needed to achieve the overall objective, zero-emission waterborne transport. The viability of scenarios and options will be judged based on, technical feasibility, coherence with the global, EU and national policies, effectiveness and efficiency, scalability, impact, supply implications, with consideration of legal implications. It will take into account the current market structure and level of international competition in certain markets (e.g. global deep-sea transport versus local operating ferries in cities) and the potential evolution of these markets.

Task 2.2.3 Definition of targets for various scenarios

Quantification of targets for 2025, 2030 and 2050, including GHG, PMs, SO_x, NO_x, transport efficiency and defining potential decarbonisation pathways, resulting in reduction of GHG, air pollutant emissions and energy consumption will be done. Due to specifics of different segments of waterborne transport leading most probably to different deployment pathways, the targets for defined time horizons will be defined considering different segments of waterborne transport, e.g. Rhine and Danube

ships, deep-sea and short sea shipping, workboats, offshore ships, local ferries, canal boats, cruise ships, and other ship types.

The market segmentation, scenarios and targets will be discussed and agreed with the Green Shipping Expert Group.

Task 2.3 Areas of intervention and relevant actions to achieve the targets, incl. prioritisation of actions

To achieve the goal of emission free waterborne transport the detailed catalogue of actions will be developed for (at least) following specific intervention areas as defined within the ZEWT partnership:

- (i) Use of Sustainable Alternative Fuels;
- (ii) Electrification;
- (iii) Energy-Efficiency;
- (iv) Design and Retrofitting;
- (v) Digital Green;
- (vi) Ports

The relevant actions to be undertaken by various stakeholders addressing intervention areas will be defined. Their clear definition will facilitate the assessment (and quantification) of impacts and will provide insights on the key elements for (political, commercial) choice (e.g. level of benefits and costs, distributional impacts, impact on SMEs, citizens, EU competitiveness, global level playing field, sustainability, etc.).

It is very unlikely that targets defined for the time horizons 2025, 2030 and 2050 will be solved by a single technology. Number of various factors such as the overall efficiency of the ship, the cost of different alternatives / approaches, the design for operational profiles, the comparison between new build and retrofit systems as well as the compliance with future global, European and national/regional regulations need to be taken into account when deciding about the different measures. Global level playing field, thus a genuine regulatory framework, is required to create a level playing field for businesses seeking to cut their emissions and move towards a zero-emission future.

Significant results on a longer time perspective can be achieved through progressive fuel switch towards those with a better emission's footprint. Therefore, STEERER will also look into the possible transition pathways, for example through use of the drop-in fuels or modular drivetrain approaches in order to gradually decrease emissions from transport. Studies, projects and (emerging) technologies addressing the availability and maturity of green fuels and energy carriers will be taken into account.

STEERER will map existing initiatives and research executed and ongoing in other projects in the waterborne transport sector. STEERER will consolidate and summarise results and initiatives and will develop conclusions. The discussion with experts and stakeholders in thematic and structured workshops will be one of the methods (besides the desk research) to carry out the consolidation and assessment and to draft conclusions. Besides the STEERER consortium, we will mobilise members of the Scientific Committee and the Green Shipping Expert Group to share results and to draft conclusions. Moreover, STEERER will reflect and integrate any synergies with all relevant programmes and actions at national, European and international level. If it turns out that detailed information is not available in the network, it will be identified and addressed as uncertainty to be taken into account (e.g. as gap in the SWOT assessment in Task 2.4 and Task 2.6 R&I Agenda).

Based on the consolidation, assessment and drafted conclusions and considering the outcomes of scenarios, prioritisation of actions will be done. The areas of interventions and related prioritised actions will be discussed and agreed with the Green Shipping Expert Group.

Task 2.4 SWOT Analysis

The execution of a SWOT analysis will provide key insights into strengths, weaknesses and opportunities and threats of the longlist of actions developed in Task 3.3. It will provide a clear insight in the internal and external factors that can have an impact on the different actions contributing to zero-emission pathways for the waterborne transport sector. Consistent with the scenarios and intervention areas, they will be differentiated to the segments of the waterborne transport sector. The SWOT analyses will therefore consist of detailed assessment, in which a range of SWOT overviews will be elaborated for the different submarkets and different actions as identified in the intervention areas (Task 3.3), while taking into account the different scenarios and their drivers (Task 2.2). Based on the overview of the different SWOT results, the commonalities will be identified and aggregated SWOT overviews will be prepared. The SWOT will address the most important priorities defined in the previous task. As much as possible the SWOT overviews will provide quantitative facts and assessments. A SWOT analysis methodology however has the limitation that, to a large extent, it will be of a qualitative nature. In order to ensure the overall support and approval, there is strong role for the Scientific Committee and the Green Shipping Expert Group to provide input and feedback. Here it is foreseen to target specific subgroups within the Green Shipping Expert group in order to have the proper coverage of input from stakeholders and experts for the different segments. Where needed additional interviews and consultations with members of the broader stakeholder group will be done. This will ensure

that results will have wide support providing a stable base for follow-up work to draw conclusions on policy instruments, research recommendations and interventions.

Task 2.5 Public policy instruments and interventions and other appropriate mechanisms, incentives and business models to increase the take-up and deployment from R&I activities

The outcomes of the SWOT analysis (in particular the identified gaps) will be the basis for the elaboration of a range of regulatory and non-regulatory instruments or combinations of instruments that may be used to reach the objectives of the intervention. In case of the public policy interventions recommended, these will be supported by arguments and evidence considering aspects like market failure, failing of regulations, biased behaviours or achieving social objectives. STEERER will carry out assessment of business models for identified most important priorities with the highest impact to facilitate the uptake of innovation in the waterborne sector in an economically viable way, thus ensuring competitiveness of the European waterborne transport sector. Further to this STEERER will, where appropriate, identify opportunities for innovative business models for investments in greening the fleet (e.g. pay-per-use), paving the way for CEF/EIB or other funding/financing sources applications.

The consolidated policy instruments, business models and incentives will be discussed and validated with the Green Shipping Expert Group.

Task 2.6 Strategic R&I Agenda (and Implementation Plan)

STEERER will support the regular revisions and update of the ZEWT partnership SRIA and its implementation plan. Based on the tasks previously described STEERER will draft contributions to the annual revision of the ZEWT SRIA, including detailed planning based on a rolling period of two years. In the same way, in coordination with the ZEWT partnership the implementation plan will list the various actions which are needed to implement the ZEWT SRIA and will identify the main implementation challenges and the key stakeholders taking ownership to carry out the action (emerging from the work done in previous activities) including for example: (i) technical challenges, (ii) economic challenges entailing costs that need careful planning (risk of insufficient financial and human resources), (iii) legal challenges and requirements, (iv) timing challenges, etc. Suitable approaches and solutions will be presented to overcome the challenges and to cope with risks.

Each year, as a deliverable, STEERER will provide proposals for the revision of the ZEWT SRIA and its implementation, for the following two years, for example in 2021 for 22-23, in 2022 for 23-24, etc

Strategic elements and actions of the Strategic Research and Innovation Agenda of the cPP ZEWT form the foundation for the Implementation Plan. The Implementation Plan will not only address the follow-up research and development actions (for example in Horizon Europe) but will also address required actions in the field of regulatory measures and financial solutions to ensure a business case and level playing field. The combination of (1) Strategic Research and

Innovation Agenda and (2) Implementation Plan is the result of the fact that there is a close link between both elements and a number of limitations at the same time.

STEERER will support the wider presentation and discussion of the ZEWT SRIA and Implementation Plan and the contributions from STEERER towards the revision of these plans, including towards the Green Shipping Expert Group.

Task 2.7 Monitoring and evaluation arrangements

STEERER will support the activities towards the monitoring of the ZEWT partnership. Monitoring is necessary to allow the stakeholders, the sector and policy makers, to check if implementation of actions is 'on track' and to generate factual information about implementation that can be used to evaluate whether it is achieving its objectives. Monitoring, as a continuous and systematic collection and processing of data about an intervention shall help identify actual implementation problems and set the mitigation measures.

The STEERER project will review the effectiveness of the monitoring and evaluation of the implementation of the Strategic Research and Innovation Agenda of the cPP ZEWT, its Implementation Plan, KPI's and evaluate their functioning, making recommendations towards the operation of the ZEWTcPP. In this respect it will assist the ZEWT cPP Secretariat in the assessment of the evolving project portfolio and implication for the partnerships strategic planning.

The long-term planning (2025, 2030 and 2050), presence of multiple actors involved in the waterborne transport sector as well as different pathways to deal with climate change (and zero-emission waterborne transport) or societal transformation pose important challenges to monitoring and evaluation. It is expected that the main role will be played by the Green Shipping Expert Group. For this purpose, beside the adaptive monitoring and evaluation arrangements, the updated and by the Green Shipping Expert Group endorsed Terms of Reference will be delivered as part of the WP4.

5. Annex 2 – Members of the Scientific Committee

The Scientific Committee consists of the following members:

- Salvador Furió, Fundació Valenciaport;
- Reddy Devalapalli, Lloyd's Register;
- Marco van Beek, Rabobank;
- Maria Boile, Centre for Research and Technologies Hellas;
- Dorte Kubel, MAN Energy Solutions;
- Marco Schembri, ECMAR;
- Mario Dogliani, Fondazione CS MARE;
- Joanne Ellis, SSPA Sweden;
- Pieter Huyskens, Damen Shipyards;
- Benjamin Friedhoff, Development Centre for Ship Technology and Transport Systems;