DECARBONISATION OF THE INLAND NAVIGATION FLEET

TERMS OF REFERENCE

1. Historical Background Definition of the Problem

Decarbonising the inland waterway fleet has become a strategic priority in various regions around the world. While inland waterway transport offers a unique opportunity for sustainable and high-volume transportation, there are growing expectations regarding its carbon emissions, especially when compared to other land transport modes.

Addressing the issue of climate change is a political priority in accordance with the Paris Agreement (2015), which aims to slow the pace of climate change (maximum 2 °C increase) by reducing greenhouse gases (GHG) emissions. In Europe, the inland navigation Ministers of the Central Commission for the Navigation of the Rhine reaffirmed their commitment in Mannheim (2018) to substantially reduce greenhouse gas emissions and other pollutants by 2050. This long-term vision is likewise endorsed by the European Union in its Green deal (2019). Similarly, China has pledged to achieve its carbon emission peak by 2030 and reach carbon neutrality by 2060.

Based on today's knowledge, while innovations to reduce carbon emissions from existing vessels and newbuilds have increased in recent years, they still have a **slow deployment due several economical, technical, regulatory and geopolitical factors**. The experience gained with forerunners is of utmost importance to identify and address the possible obstacles to the deployment of relevant technologies. Furthermore, there **is no one-size-fits-all solution applicable to every vessel type and navigation profile**; as such, the decarbonisation will necessitate a range of technologies.

There is an opportunity to **share knowledge among regions facing similar challenges with their inland navigation fleets**, as each may gain different experiences using various technologies. Given the scientific research available at regional level but lacking at a global level, it is important to gather insights on the technologies applied to decarbonise inland navigation, along with findings on technical, economic, and regulatory barriers.

2. Objectives

This PIANC working group could:

a) Provide a worldwide overview of the technologies relevant for the decarbonisation of inland navigation fleet, with where possible assessment of the technology readiness level;
b) Perform a detailed assessment of some real-life use cases of vessels embarking decarbonisation technologies and for which real measurements have been carried out (at least one use case per region);
c) Identify the economical, technical and regulatory conditions to accelerate the deployment of these technologies

3. Earlier Reports to be Reviewed

- PIANC INCom TG 234: Infrastructure for the Decarbonisation of Inland Waterway Transport

See also references under part 9 (incl. CCNR and Synergetics studies).

4. Scope of Work

The PIANC report is expected to examine technologies applicable to IW vessels with the aim of reducing, and potentially eliminating, greenhouse gas emissions using a comprehensive "well-to-wake" (WTW) methodology. It should nevertheless be recognized that the development of the upstream chain is largely shaped by factors outside the inland navigation sector or the remit of inland navigation policymakers, such as fuel availability, production methods, origin, and the energy strategies of individual Member States. It aims at a worldwide overview of the technologies suited for inland waterway vessels with where possible assessment of the technology readiness level (TRL according to ISO 16290). It should focus on economical, technical and regulatory analysis in order to identify conditions to accelerate the deployment of these technologies. Such conditions might concern the research and development efforts, evolution of regulations, as well as fundings measures. Challenges related to the interface with the infrastructure will be addressed to a limited extend to prevent redundant work. Indeed, unless new findings are available, infrastructure aspects will rely on the results of the PIANC Report on "Infrastructure for the Decarbonisation of Inland Waterway Transport -TG234" published in august 2023.

For this report, "inland waterway vessel" is understood as a vessel intended solely or mainly for navigation on inland waterways (it excludes coastal or ocean-going vessels).

The PIANC report should NOT address:

- air pollutants (Nox, PM) and underwater pollution;
- availability of fuel / energy supply chains;
- social assessment of the technologies;
- regulatory aspects not directly linked with the vessel design (such as crew requirements) or those applicable to sea-going vessels (IMO rules).

The envisaged method relies on the following steps:

- Collection of research work and policy instruments addressing directly or indirectly the decarbonisation of inland waterway fleet;
- Develop a preliminary worldwide overview of the technologies relevant for decarbonisation of inland waterway fleet (multicriteria analysis including deployment status for retrofitting and newly built vessels, assessment by vessel type and operating profile);
- Identification and assessment real-life use cases of technologies (at least one in each region);
- Identification the economical, technical and regulatory conditions to accelerate the deployment of these technologies (including, where relevant, synergies with road, rail or maritime transports);

5. Intended Product

The intended product is a good practice document containing a structured assessment of technologies relevant for the decarbonisation of inland navigation fleet (by vessel type and operating profile). It should facilitate the sharing knowledge among regions that encounter comparable challenges with their inland navigation fleets, while also highlighting opportunities for potential synergies. For example, a better understanding of technical status and regulatory context could ease the uptake of standardised battery propulsion systems in different regions, such as Asia and Europe.

6. Working Group Membership

- Navigation commissions such as CCNR, Danube Commission, MRC, Mississipi, ..
- Researchers and academics active in this field, from universities, research centres, foundations etc.;
- Experts from administrations in charge of vessel certification, classification societies or similar;
- Experts from shipyards and technologies providers;
- Experts from inland waterways or port authorities
- …

7. Target Audience

The primary target audience for the working group's output includes professionals, decision-makers, and stakeholders involved in the decarbonisation of the inland waterway fleet. The output can help authorities in shaping policies to accelerate the decarbonisation.

8. Relevance

8.1. Relevance to Countries in Transition, etc.

The findings of the WG are relevant for any country (worldwide) that has interest in decarbonisation of the inland waterway fleet.

8.2. Climate Change and Adaptation

The findings of the WG aims at climate change mitigation and contributes to the "reduction of greenhouse gas emissions from vessels", as identified in PIANC Declaration on Climate Change.

8.3. Working with Nature

The WG topic is not directly linked with WWN concept, even closely related.

8.4. UN Sustainable Development Goals

This WG report could contribute to SDG goals 7 (affordable and clean energy), 9 (industry, innovation and infrastructure) and 13 (climate action).

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In addition, research projects are also relevant, such as : NEEDS, H2SHIPS, SYNERGETICS, RH2INE, RH2IWER, E-NRMM, PLATINA4Action