



# Terms of Reference

## Guidelines for Sustainable Performance Indicators for Inland Waterways

### 1. Preamble

This WG has as main objective to tackle “sustainable performance indicators”, with a specific target on the **hazardous emissions and greenhouse gas production aspects** induced by the IW navigation. PIANC is aware that performance indicators should also relate to technical performance, economical performance, maintenance performance, etc. But these are not in the scope of this WG.

In addition, IW performance depends on:

- The characteristics the waterway (blockage coefficient of confined water, channel design, etc.)
- The shape of the ship hull for propulsion efficiency (hydrodynamics optimisation performed during early design stage of a vessel).

These are not in the scope of this WG. The WG targets alternate propulsion technology (e.g. LNG, electric, and others instead of typical fossil fuels) to get lower “environmental ship index” and drive to a more sustainable IW navigation.

### 2. Background

Inland navigation trade, until today, has been predominantly dependent on the use of fossil fuels. The use of fossil fuel in the energy conversion of assets in modern life meets increasing pressure to eliminate hazardous emissions and greenhouse gas production. Post-IPCC2015 regulations, national and regional climate measures and regulations, and developing IMO regulations in terms of CO<sub>2</sub>, NO<sub>x</sub> and SO<sub>x</sub> reflect this pressure. The environmental performance of the inland fleet is part of this development. The state of the art is, that a broad portfolio of new and alternative fuels (i.e. hydrogen or biofuels), innovative propulsion configurations (e.g. fuel cells) and innovative ship designs (i.e. air lubrication) are proposed or even built to address these environmental requirements. But as observed in the past for LNG propulsion, there are the concerns as to what comes first, the infrastructure development to support alternate propulsion or a sufficient number of vessels with these alternate propulsion systems to make the infrastructure development economically feasible/profitable. This gives rise to the need for collaborative and complementary design of both infrastructure and ships?

As a result, from a societal and economic perspective, there is great interest in assessing proper benchmarks to grade upgrades, modifications and innovations of inland ships and to assess the effect of design-, operational- and regulatory measures on the holistic environmental performance of ships, corridors and ports.

In maritime trade, there exists a global system (1) to evaluate and further rank the vessels based on their environmental performance and given/provided incentives for costs and priority.

- (1) Environmental Ship Index developed under the IAPH World Ports Climate initiative, now World Ports Sustainability Program  
<https://www.environmentalshipindex.org/Public/Home> )

In maritime trade, there exists a global system to evaluate and further rank the vessels based on their environmental performance and given/provided incentives for costs and priority. This system was developed by a consortium of European ports to encourage the owners of maritime vessels to opt for better designs that meet the current and expected future environmental standards of ports and transit canals. A similar yet different system is also applicable to evaluate the environmental performance of the ports/canals. While inland navigation trade is progressing towards an environmentally sustainable transport system, we observe that no such assessment framework has been established yet. As the inland trade is different from maritime trade, it has its own set of constraints, concerns and requirements. The aim of this working group (WG) will be to propose guidelines to develop Sustainable Performance Indicators for Inland Navigation. A common system for both navigation infrastructure and vessels is proposed to provide governments, ports, canals, waterway managers, supply chain operators, ship owners, ship operators, ship designers and shipbuilders with a tool to assess the environmental performance of their assets.

### **3. Objective**

The objective of the WG is to develop guidelines that can assist waterways managers/operators/governments/ship designers/shipbuilders, in classifying ports and vessels, based on their environmental and operational performance, and to develop sustainable design for both vessels and infrastructure. The first need of complementary design is to establish a common goal by having a feedback system from all concerned members of the trade.

The WG will collect from its members from these sectors feedback on the needs, concerns and requirements, so to develop a procedure to classify ports and rank the vessels. The WG will also suggest measures to modify/upgrade the design of infrastructure and vessels. The aim would be to suggest modification in infrastructure to address those constraints that cannot be achieved by modification of vessels. These guidelines will then help in classifying the ports and ranking the vessels. Based on these ranking/classification, ports/transit canals can develop their respective incentive programs.

The proposed guidelines must drive to resilient design/concept, as various parameters (i.e. cost of energy, rise of other technology, etc.) are uncertain and cannot be forecast for the long term.

Furthermore, the methods involved may develop a guidance instrument to evaluate the environmental emission performance of inland shipping in designated waterways and ports. This will include the evaluation of greenhouse gases (CO<sub>2</sub>) and hazardous emissions in air (SO<sub>x</sub>, NO<sub>x</sub>, particulate matters).

### **4. Scope**

The scope of the WG will include the following:

- A review of current practice, codes and standards (possibly including gap analysis);
- Review of the methodology proposed in the paper "Maritime environmental performance indicators for urban waterways in Amsterdam", Journal of Engineering for the Maritime Environment, September 2016);
- A comparison of emission improvements in different mode of transports;
- Methods for collation of available data on emissions, fuel consumption, passenger kilometres and cargo kilometres;

- Collation of emissions produced by inland ship propulsion systems and the risks involved;
- Environmental classification of a series of ships;
- Selection of waterways to be investigated;
- Proposals for existing and possible future use fuels and related technologies ;
- A feasible roadmap on how waterways and ports could prepare themselves for changes (e.g. provision of facilities for alternative fuels);
- A study/inventory of ongoing projects both in maritime and inland waterways. Also propose adoption of existing practices in maritime transport;
- Present inventory of environmental performance based incentives in transport sector and possibility of similar incentives in inland waterways (as for instance the Smart Freight Centre, a PIANC partner, who have extensive experience of carbon foot-printing methodologies and have been working to coordinate and standardise approaches for the wider freight sector);
- Inventory of global initiatives from various government and administrative bodies to promote rules and regulations to focus on environmental efficiency & performance of vessels (for instance the UN Sustainable Development Goals in helping to set the stage for developing appropriate metrics);
- Organise presentations and workshops in order to share knowledge and ideas, and to spread awareness. The results of the WG will also be presented in various conferences and distributed in the form of newsletters and/or (e)pamphlets.

## **5. Existing Documents to be Reviewed**

- PIANC WG Reports (WGs 107, 111, 129, 139, 188, 203);
- ESI system developed for European maritime ports (IAPH-WPSP),
- The paper "Maritime environmental performance indicators for urban waterways in Amsterdam", in *Journal of Engineering for the Maritime Environment*, September 2016 (this paper provides recognised guidance in this area).
- CE-publications, like: *Air Pollution and Energy Efficiency, Study of emission control and energy efficiency measures for ships in the port area* (IPPC Reports)

Documents to be reviewed, referenced and integrated where necessary should include:

- Published articles on the topic over the last 20 years (including IMO, EU and national articles)
- Recent project case studies / reports which have incorporated novel or 'best practice' ship impact assessment techniques
- Impact reports from media and other sources including the type of vessel and consequences of impact.

## **6. Intended Product**

The intended product is a set of guidelines to develop and define environmental performance indicators. The WG report is intended to be a guidance document containing discussion on approach and recommended best practice for vessel impact analysis, for waterway managers, for owners, operators, designers and builders of inland vessels. It will reference and be used in conjunction with relevant country-specific standards and research methods. It is intended to develop this as a globally referenced document for all members conducting environmental vessel impact assessments.

The WG report will assist in highlighting the needs and requirements in design of infrastructure development to complement the needs of the vessels and address the environmental concerns that cannot be addressed/included in vessel design.

## **7. Working Group Membership**

The WG should ideally include waterway managers, ship and port designers/development consultants, (governmental) legislation experts, operators and asset owners of ships, researchers, and national and international environmental offices/authorities. It is also proposed to have several members from EnviCom/PTGCC to provide support and guidance.

The WG will be managed closely by InCom with a co-chairmanship by EnviCom.

## **8. Relevance to Countries in Transition**

The report will be of value in protecting the interests of developed countries and countries in transition, and will particularly assist decision makers in the assessment of (developments in) the environmental performance of inland water corridors. The report will enable these countries to quantify the support of Inland Waterway usage in the context of the Reduction Measures related to International Paris Climate Conference (2015, update 2018).

## **9. Climate Change**

The objective of this WG is "work to hand-in-hand" and promotes the Working with Nature (WwN) initiative of PIANC, providing a tool that helps to incentivise and track reductions in greenhouse gas emissions.

The intended product of this WG will guide and assist all members of inland navigation trade to transition into an environmentally friendly transport system and will contribute to the shift to a 'net zero' position for the inland fleet