RECOMMENDATIONS FOR THE DESIGN AND ASSESSMENT OF MARINE LIQUID AND GAS TERMINALS HANDLING GREEN FUELS AND FOSSIL-BASED CARGOES

PROPOSED CONTINUATION OF TECHNICAL WORKING GROUP

TERMS OF REFERENCE

1. Historical Background Definition of the Problem

In September 2016 PIANC WG 153 published the document "Recommendations for the Design and Assessment of Marine Oil & Petrochemical Terminals". In October 2022 PIANC WG153B published an updated document "Recommendations for the Design and Assessment of Marine Oil, Gas & Petrochemical Terminals" that added LNG, Floating LNG and additional mooring types to the scope of the document.

The global energy markets are now embracing an enormous effort to decarbonize in response to climate change concerns. Hydrogen, methanol, ammonia, liquified CO_2 and other "green fuels" projects are being developed worldwide and many of these commodities will require marine transportation for regional and global distribution. Some of these fuels will also be used for ship bunkering. There is an urgent need for industry guidance regarding the design of marine terminals for the unique requirements of these commodities.

Most of the content of the just-published WG 153B report has commonality with these green fuels terminals; however, additional guidance must be added to address the unique physical and safety aspects of these cargoes. For this reason it is recommended to add green fuels to the scope of the just-published document rather than publish a separate document solely devoted to green fuels terminals, which would be too repetitive with the current document. In addition, many of the WG members dealing with fossil fuel terminals are now actively engaged in this emerging green fuels market, so the working group can remain mostly intact while additional expertise is added.

The recently published report represents an ambitious effort to establish very comprehensive guidance. Most similar documents undergo a process of continuous improvement and evolution, often with a standing committee responsible for keeping the document up-to-date. While a permanent working group is not being proposed here, the intent is to keep this committee active through a revision/update of the recently published report. This will also allow for the WG 153C document to be updated to reflect feedback from the industry on the just published WG 153B report.

2. Objectives

The objectives for the update of Report No. 153B-2022 will be as follows:

- Add green fuels terminals to the scope of the document
- Update the document based on feedback received from users

Upon completion, the updated document will provide guidance to owners and designers of all types of liquid and gas marine terminals worldwide, to facilitate the protection of public health, safety and the environment.

3. Earlier Reports to be Reviewed

The primary reference will be Report No. 153B-2022. In addition, other standards and references from organizations such as API, OCIMF, SIGTTO, ISGOTT, PIANC, and Nautical Institute will be reviewed.

4. Scope of Work

Each green fuel anticipated to be distributed via waterborne transport has unique physical and safety attributes that must be considered in the design of marine terminals. Examples include a) phase shifting of LCO_2 that could result in ice formation during transfer operations, b) the hazardous nature of ammonia where a small release can result in serious injury or death, and c) the challenges associated with the small H_2 molecule that can lead to leakage.

Process engineering experts will be added to the Working Group to inform on these technical issues. The group will start with a fact-finding exercise to identify all major issues of concern. Solutions and mitigations will then be identified. Finally, the group will transition to the determination of how best to incorporate this information into the WG report.

Another task of the working group will be to review MarCom Report 172-2016, which deals with small-scale LNG terminals (including bunkering) to determine a) if it is still needed, b) if its contents can be merged into this updated report and c) if it should remain as a stand-alone report but be updated to incorporate green fuels issues.

The intent is to retain the chapter structure as per the current document, while adding new subsections to the chapters as appropriate.

5. Intended Product

Updated and improved Report No. 153C, incorporating green fuels terminals and other issues as identified above.

6. Working Group Membership

Structural, coastal, geotechnical, process, chemical, mechanical, fire protection, and electrical engineering expertise will be required. Most of this expertise is already represented on WG 153B, so the WG 153C members will remain mostly intact to the extent they are willing

to remain involved. Engineers with expertise in process and chemical engineering will be added to the WG.

A call for members will be issued through PIANC HQ to the national sections per PIANC protocols to recruit the new expertise to the WG and to replace any members who choose not to remain involved.

7. Target audience

The potential users of this document include developers, owners, or operators of marine liquid and gas terminals, lessors or lessees of third-party terminals, port authorities, and engineers involved in the planning, site selection, concept selection, design, inspection, and maintenance of such terminals including upgrades. The document is also intended for use by terminal equipment manufacturers and pipeline designers and suppliers, as well as specialised component manufacturers, such as fender systems and instrumentation.

It should also be emphasised that this document is intended for use by engineers and other competent professionals familiar with the evaluation, design, operation and/or inspection of marine terminals, and by owners/operators procuring such services or operating and maintaining marine terminals. It is meant to provide a uniform set of guidelines, but not to completely educate a novice.

8. Relevance

8.1. Relevance to Countries in Transition, etc.

The guideline will aid countries in transition since compliance with the standards will result in improved safety and environmental protection, taking advantage of the collective knowledge of the developed countries and major global stakeholders.

8.2. Climate Change and Adaptation

Climate Change needs to be considered in the planning and design of coastal infrastructure and civil engineering projects. The current document addresses this issue in conducting risk assessments during the establishment of site conditions and in the Basis of Design. The updated document will retain and enhance such guidance as appropriate.

8.3. Working with Nature

Working with Nature is not directly applicable to the proposed updated WG report.

8.4. UN Sustainable Development Goals

This proposed updated WG report will primarily address specific UN Sustainable Development Goals as follows:

- Goal 7: Affordable and Clean Energy
- Goal 12: Sustainable Cities and Communities
- Goal 13: Climate Action

9. References

PIANC MarCom Report No. 153B, Recommendations for the Design and Assessment of Marine Oil, Gas & Petrochemical Terminals.

PIANC MarCom Report No. 172-2016, Design of Small to Mid-Scale Marine LNG Terminals Including Bunkering.