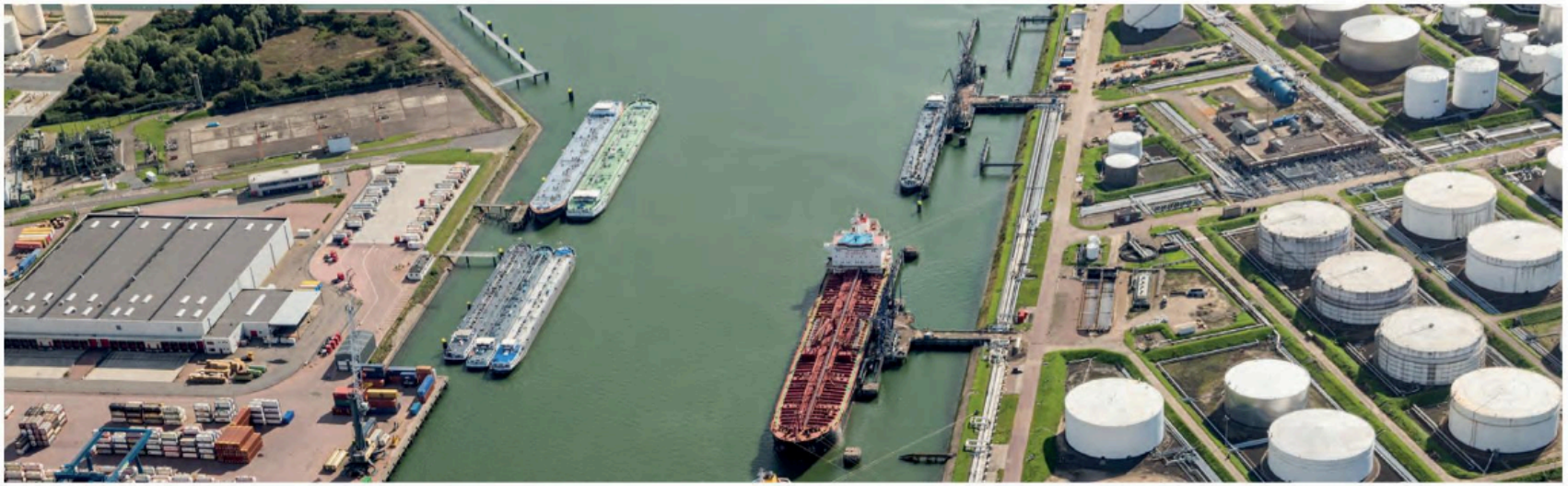

PERSPECTIVE FUEL SAFETY

Enabling a safe transition to new marine fuels

A recent study completed by the Harbour Master's Division of the Port of Amsterdam in collaboration with the classification society DNV has concluded that ports looking to alternative bunkering fuels will need to pay special attention to spatial safety when planning ahead for locating and building future bunkering infrastructure.

The report was commissioned in 2020 by the Port of Amsterdam and focuses on the spatial safety aspects of future fuels such as hydrogen, methanol, and ammonia.

Henri van der Weide, environmental policy adviser to the Port of Amsterdam commented, "Current legislation and competing space for urban and industrial use demand that ports look far ahead when considering the location, design, and implementation of future bunkering infrastructure for ships."

"As mentioned by IAPH in its recent submission to the IMO on reduction of greenhouse gas emissions from ships, the lower energy density of new marine fuels such as ammonia and hydrogen compared to fossil fuels is likely to result in more frequent refueling of ships as well as the development of more decentralized zero-carbon bunker fuel hubs," he added.

The Port of Amsterdam, therefore, decided to commission the joint study with DNV to look at expected new marine fuels of the future and assess the risks in granular detail for each one of them.

With considerable experience already in determining spatial safety risks for LNG bunkering operations, the risks of bunker scenarios with the new fuels with flow rates of 400 m^3 and 1,000 m^3 per hour were determined as follows:

- Spatial safety distance: this distance is determined by the probability of a single fatal accident per year occurring to one individual in a million at a specific location where that person is outside 24/7, 365 days per year.
- Focus areas: the area where people are located inside buildings, which are susceptible to accidents with hazardous substances, such as fire, explosion, and toxicity risk.

Spatial distances required

The study found that with the low- and high-flow rates, spatial safety distances needed for the new fuels are comparable to LNG bunker operations with one exception, that of pressurized ammonia.

The spatial safety distance for pressurized ammonia was well over double of any other fuel, including refrigerated ammonia.

Similarly, when looking at the focus areas, it became clear that for refrigerated and pressurized ammonia, despite having zero risk of fire or explosion, the maximum distance from bunker hose to the focus area boundary was up to between 1.4 and 2.6 km for toxicity. This exceeded by far any of the other focus area distance parameters for fire and explosion for all other alternative fuels such as hydrogen, methanol, and LNG, all of which fell within a 0–448 m range.

This is due to the generation of a large toxic cloud in the event of a hose rupture.

The report also concluded that the bunkering of gaseous hydrogen is unlikely to take off owing to the low energy density, which is only about half compared with the other fuels, and low bunkering flow rates.

Policy adviser to the Port of Amsterdam, Peter Alkema, who is also the chairperson of the IAPH Clean Marine Fuels working group, commented on this finding, "Specialists know gaseous hydrogen is not going to be a fuel for seagoing shipping. For inland shipping, and small crafts of port service providers gaseous H2 may very well be a good solution."

Alkema also said that overall, "the findings have helped us understand better what we have to do when considering a berth location for this new fuel bunkering, especially when port terminal infrastructure is predominantly located in the vicinity of urban or business office locations."

Pictured: Fuel bunkering facility in port.
Photo: Getty Images/VanderWolf-Images

"It will allow us to add spatial safety considerations to the many other parameters needed when a port considers whether to plan for a bunkering hub. We hope this report will help other ports in their ambition to advance the transition of the maritime industry towards cleaner fuels for decarbonization and air quality improvement," he added. Alkema, therefore, encouraged readers to download the report from the WPSP website (see link below).

In the case of the Port of Amsterdam, Van der Weide feels that, "Methanol will become an important fuel. Port of Amsterdam is a multifuel port, meaning that we do our utmost to facilitate the bunkering of any new clean fuel. The reports help us have a better understanding of where to mitigate the risks."

The Dutch ports of Amsterdam and Rotterdam are key contributors to the work of the IAPH Clean Marine Fuels working group, which is in the process of digitalizing its widely used cryogenic bunker fuel lists, bunker audit tools for candidate terminal operators, and alternative fuel terminal readiness guidance, beginning with LNG and being adapted for liquefied hydrogen, methanol, and ammonia. ■

Download a copy of the report here:
bit.ly/BunkeringSafety

ABOUT THE AUTHORS

HENRI VAN DER WEIDE, has been the environmental senior policy adviser within the Harbour Master's Division for the Port of Amsterdam since 2009. He also serves as the chair of the IAPH cruise project and has an active role in co-designing ESI 2.0.

PETER ALKEMA is a strategic policy adviser and project manager within the Harbour Master's Division of the Port of Amsterdam. Previously, he was an officer and captain in the merchant navy and offshore industry for over 20 years. Alkema also chairs the IAPH Clean Marine Fuels working group.

Photos top to bottom: Port of Amsterdam