Work Group #4: Sustainable Marine Fuels

Deliverable 3.1 Report Review Template

1. Report title	Methanol Safe Handling Manual 4th Edition
2. Publication date	2020
3. Author	Methanol Institute
4. Client (organization and type of organization, specifying private/commercial/public; research institute/interest group etc.)	n/a
5. Context of study (e.g. project in the context of which report is published or titles of other reports if part of a series)	n/a
6. Length (pages)	263 pp.
7. Link (or where to get if not available online)	https://sustainableworldports.org/wp-content/uploads/Methanol-Institute_2017_Methanol-safe-handling-manual-report.pdf
8. Sector coverage	The scope of this study is the maritime shipping sector.
9. Main aim of the study	The aim of the manual is to provide information to promote the safe handling of methanol, by methanol distributors.
10. Methodology	The manual can be seen as a literature review, but also largely reflects the expert knowledge of the authors.

11. Topic(s) and indication of the level of detail For example: • System Description - *A description of the full marine energy system.* • System Components - *A description of all the components.* • Infrastructure requirements for new fuels • Applicability - *which of the new fuels are expected to replace existing fuels?*	The following topics are discussed in detail: • Methanol life cycle – *a full description of the methanol value chain* • Uses of methanol – *a discussion of the uses of methanol; amongst others maritime shipping* • Transportation and storage – *a description of how methanol is transported and stored* • Health and Safety – *a general discussion of methanol safety and health effects* • Process safety – *a detailed discussion of the process safety* • Fire safety – *a detailed discussion of fire characteristics and fire safety* • Emergency response – *a detailed discussion of emergency prevention and response* • Incidents and safeguards – *a detailed discussion of past incidents and safeguards* • Environmental protection – *a detailed description of environmental aspects related to methanol*
12. What are the main conclusions from the report?	The report does not explicitly make conclusions, since the main aim is to provide detailed information.
13. What fuel/energy type(s) are discussed in the report and in what level of detail? For example: • Fuel description e.g. type, energy density, specific energy density, flash point, boiling point, fire point, flammability limits, hazards	The report fully focusses on methanol, which is covered in extreme detail. Amongst others, the following specifics are provided: • Physical properties (appendix B) • Chemical properties (appendix B) • Structure and properties (appendix B) • Combustion and ignition properties (appendix B) • Thermodynamic properties (appendix B) • Regulations, codes, standards and guidelines (appendix C) • Hazardous material and health & safety information (appendix C) Throughout the text much more specific information about methanol is stated.
14. What environmental aspects does the report consider? E.g. Air quality emissions, climate change emissions (GHG + BC),	The report considers air quality emissions, climate change emissions, groundwater effects, impacts to drinking water, biological effects and waste treatment and disposal.

other (for example terrestrial or underwater noise, water quality, emergency releases, fugitive emissions, odour, water resources, mining)	
15. Does the report consider exhaust emissions only, or life-cycle, or both (or some other range of emissions)?	This is not specified in the report, since no emission numbers are stated. The emissions are only discussed qualitatively.
16. If determined in the report, what are the emission rates/factors by pollutant? NOx, SOx, PM10, PM2.5, ultra fine PM, VOC, NH3, GHGs, Black carbon, and any others e.g. that may be unique to the fuel/energy.	This is not discussed in the report.
17. Does the report discuss barriers and opportunities for ships to use the fuel(s)/energy? Does the report identify the maturity level of the fuel on a regional or global scale with respect to use by vessels?	The report mentions barriers and opportunities for ships to use the fuel with respect to costs, engine performance, biodegradability and technical readiness. With respect to the technological readiness, the report mentions an example of a ship already fueled on methanol.
18. Does the report discuss barriers and opportunities for ports to provide the fuel(s)/energy? Does the report identify the maturity level of the fuel on a regional or global scale with respect to provision by ports?	The report mentions barriers and opportunities for ports to provide the fuel with respect to availability, required changes in infrastructure, costs and technological readiness. With respect to technological readiness, the report mentions that methanol has been produced and handled safely for over 100 years.
19. Does the report include capital and operating cost estimates for the ship and/or land-side?	This is not specified in the report.
20. When are the fuel(s)/energy expected to be at a demonstration stage vs. commercialization?	The report mentions an example of a ship already being fueled by methanol. No scale for technological readiness is stated. Also, the report states that the technological readiness for the production and handling of methanol is high.

For example: • Technology Readiness Level of the system - *Estimated maturity of the system technology* • On Board Safety Readiness Level of the system - *Estimated maturity of the risk mitigations on board (on a scale of 1-9)* • External Safety Readiness Level of the system - *Estimated maturity of the risk mitigations for bunker operations (on a scale of 1-9)*	The safety of methanol production and storage is extensively discussed. Safety readiness with respect to the use on ships as a fuel is not covered specifically.
21. Are the fuels suitable for short and/or long (trans-oceanic) voyages?	This is not specified in the report.
22. Does the report identify/discuss potential issues around community acceptance for this fuel, or potential social/community impacts associated with the system?	Chapter 11 is dedicated to risk communication. In this chapter different techniques for communicating the risks to communities are discussed. No specific community acceptance issues related to methanol are specified.