



Defining sustainability criteria for zero and low carbon marine fuels

White paper

February 2021

Defining sustainability criteria for zero and low carbon marine fuels

Introduction

The rapid decarbonisation of shipping is a key challenge that requires the industry to come together for the deployment of commercially viable deep sea zero emission vessels by 2030. Achieving this ambition demands the exploration of zero and low carbon fuels for development, testing, and scaling up to meet demand.

The zero and low carbon fuels currently under consideration for the decarbonisation of shipping are mostly being evaluated on price, availability and technical feasibility. However, we must also ensure that the fuels we are investing in, purchasing, and using to transport cargo are sustainable and avoid negative impacts.

The Sustainable Shipping Initiativeⁱ (SSI) has identified a set of sustainability principles for the zero and low carbon fuelsⁱⁱ under consideration as substitutes for the conventional fossil-based marine fuels. While recognising the importance sustainable fuels and technologies have in the decarbonisation of shipping, this paper specifically focuses marine fuels.

What do we mean by sustainability in the context of marine fuels?

IMO's 2013 definitionⁱⁱⁱ of the concept of a "sustainable maritime transport system" was built on and updated by UNCTAD^{iv} in 2019. When applied to the fuels used in maritime transport, these definitions serve as a starting point for identifying the sustainability issues and principles outlined in this white paper:

"While not intended as an exhaustive list, sustainability in maritime transport entails, among other features, the ability to provide transportation infrastructure and services that are safe, socially inclusive, accessible, reliable, affordable, fuel-efficient, environmentally friendly, low-carbon and resilient to shocks and disruptions including those caused by climate change and natural disasters."

Purpose

This paper seeks to contribute to the broader debate currently underway in the maritime sector on incentivising and enabling the uptake of sustainable, zero and low carbon marine fuels, and ensuring that the sustainability of a marine fuel over its entire lifecycle is considered alongside its price, availability and technical feasibility.

This paper does not seek to promote a specific type of fuel for decarbonisation, but rather to inform decision-making around the choice of fuel(s) to promote, invest in and use by providing accurate information around sustainability concerns.

Our objective is for the sustainability principles and corresponding criteria (under development by SSI) to serve as an informed basis for engagement with standards and certification bodies, facilitating the development of widely accepted standards and associated certification schemes for marine fuels.

Why is the sustainability of marine fuels important?

As the industry transitions to zero emission shipping, stakeholders across the shipping value chain are increasingly aware of the need to better understand the sustainability issues surrounding the zero and low carbon marine fuels under consideration.

Managing supply chain risks of marine fuels requires an understanding of the sustainability issues from a full lifecycle perspective – i.e. ‘well-to-wake’. Defining the sustainability principles and criteria for these fuels provides supply chain assurance and helps narrow down the choices for investment, purchase and consumption. To date these have not been captured in a single document.

Once the sustainability issues surrounding potential zero and low carbon marine fuels are better understood, the principles developed and the criteria defined, industry standards can be set and certification programmes can be put in place to assure their sustainability. This in turn will facilitate the selection of, and the demand for, sustainable marine fuels.

Approach

The sustainability issues and principles outlined in this paper have been developed through a stakeholder consultation process, bringing together SSI members and other industry stakeholders and gathering a diverse range of perspectives and inputs. An informal review of a selection of existing sustainability principles, standards and documents of relevance for shipping’s decarbonisation was conducted. Early drafts were shared with a small group of industry stakeholders^v including in the context of the Getting to Zero Coalition, of which SSI is a knowledge partner for the Fuels and Technologies Workstream.

This paper provides a starting point for broader stakeholder consultation and debate, which will feed into the development of specific sustainability criteria around the issues and principles outlined below, drawing on diverse expertise and perspectives throughout the industry and leading to the publication of a final report in late 2021.

In parallel, academic research conducted in partnership with the SSI and led by Copenhagen Business School (CBS) Maritime through the Green Shipping Project^{vi} will further test, challenge and/or validate SSI's work to date, providing a robust evidence base to support a final set of sustainability principles and criteria for relevant actors to take into consideration in their work, product and service offerings.

The SSI is neither a standard setting nor a certification body. The sustainability issues and principles outlined in this white paper do not contain specific thresholds, minimum requirements nor indicators; these would be developed by standards and certification bodies^{vii}.

What standards and certification schemes for marine fuels already exist?

While some sustainability standards and certification schemes currently exist and are successfully being used in the maritime sector for a limited group of fuels (for example, biomass-related standards^{viii}), other zero and low carbon fuels under consideration – such as renewable energy based electrofuels^{ix} – remain unaddressed.

Through this work SSI seeks to avoid duplication while ensuring harmonisation with existing sustainability-related standards and certification schemes.

Use of the sustainability principles and criteria

The development of sustainability principles and criteria as well as the subsequent standard-setting and certification process will contribute to the identification and mitigation of risks, increase trust and credibility among key stakeholder groups and reduce reputational risk.

Potential user groups for the sustainability principles and criteria include:

- Fuel producers/traders/brokers/suppliers
- Shipowners (as fuel purchasers)
- Shipping customers
- Local, regional and international regulators seeking assurance of zero and low carbon shipping
- Investors in zero and low carbon shipping

The table below outlines the sustainability issues and related principles developed by SSI in relation to the potential feedstocks and primary energy sources to produce marine fuels under consideration for zero and low carbon shipping. The principles are fuel-agnostic and intended for application for all the different feedstocks and production pathway combinations.

The principles will inform the definition of sustainability criteria for use in the setting of standards and development of certification schemes, that may vary according to these different feedstocks and production pathways, as well as market demand, and may be further elaborated and differentiated according to those variables.

SUSTAINABILITY ISSUE	PRINCIPLE
Lifecycle Greenhouse Gas (GHG^x) emissions and other climate forcing factors (including black carbon)	Zero and low carbon fuels for use in the maritime industry should generate significantly lower GHG emissions than marine fossil fuels on a lifecycle basis.
Carbon source	The carbon used in the production of zero and low carbon marine fuels should be disclosed and derived from a source with the lowest negative impacts according to the best available techniques and minimising lifecycle carbon emissions and intensity.
Hydrogen source	The hydrogen source used in zero and low carbon marine fuels should be disclosed and produced using the best available techniques to minimise carbon intensity.
Air quality	Lifecycle impacts of zero and low carbon marine fuels should avoid negative effects on air quality.
Water	Lifecycle impacts of zero and low carbon marine fuels should maintain or enhance water quality and availability, and respect water use rights.
Sustainable resource use	Lifecycle impacts of zero and low carbon marine fuels should ensure the sustainable use of resources.
Land use change	Lifecycle impacts of zero and low carbon marine fuels should optimise land use.
Ecological impacts	Lifecycle impacts of zero and low carbon marine fuels should avoid negative ecological impacts, maintaining or enhancing biodiversity, ecosystems, soil and conservation.
Social, labour and human rights	Lifecycle impacts of zero and low carbon marine fuels should respect social, labour and human rights.
Socio-economic development	Lifecycle impacts of zero and low carbon marine fuels should contribute to social and economic development in impacted communities.
Food security	Lifecycle impacts of zero and low carbon marine fuels should promote food security in food insecure communities.
Safety	Lifecycle impacts of the production processes, transport, storage and handling, use and disposal of zero and low carbon marine fuels should minimise safety risks to the workforce, communities as well as the natural environment.
Continuous improvement	Operations around the production, transport, storage, handling and use of zero and low carbon marine fuels should continuously improve through innovation and the use of technologies that adopt a proactive approach to enhancing their social and environmental performance.

Definitions^{xi}

- **Sustainability issue:** What needs to be considered over the whole lifecycle of marine fuels, ensuring the needs of current generations are met while not compromising those of future generations
 - **Principle:** Aspirational goal that provides guidance on sustainability issues of relevance
 - **Criteria:** Describes best practice and sets out the condition(s) to meet the principle
 - **Standard:** Provides minimum requirements based on the criteria, with which compliance may or may not be mandatory; developed by (third-party) standard-setting body
 - **Certification:** Assures sustainability by way of thresholds and indicators (which may be all) of the standards; conducted by (third-party) certification body
-

Endnotes

ⁱSSI is a multi-stakeholder collective that brings together ambitious and like-minded leaders across the shipping value chain, driving change through cross-sectoral collaboration to contribute to – and thrive in – a more sustainable maritime industry. www.sustainableshipping.org

ⁱⁱThe working definition for zero and low carbon fuels used for this piece of work aligns with terminology currently used by the Getting to Zero Coalition. It is inclusive of full lifecycle emissions with the “ultimate end objective of ‘getting to zero’”, while recognising that some fuels currently under consideration are low carbon and may play a role in the transition to the full decarbonisation of shipping. Fossil fuels serve as a comparator for zero and low carbon marine fuels. Carbon offsetting is not considered in this work. See: [Definition for zero carbon energy sources \(Getting to Zero Coalition, 2019\)](#)

ⁱⁱⁱSee: <https://sustainabledevelopment.un.org/content/documents/1163CONCEPT%20OF%20SUSTAINABLE%20MARITIME%20TRANSPORT%20SYSTEM.pdf>

^{iv}As UNCTAD notes, for shipping to do its part in the sustainable development agenda “requires that economic, social and environmental sustainability criteria be fully integrated and mainstreamed into relevant maritime transport planning processes, policies and investment decisions”. This white paper focuses on sustainability issues and principles for consideration of the sustainability of marine fuels, with commercial questions around price, profitability and competitiveness in the shipping industry covered by techno-economic frameworks in other industry forums. Economic dimensions related to the enhancing material welfare in society – including impacts on economic development – will be explored through research conducted in the context of SSI’s collaboration with CBS Maritime. See: Benamara H., Hoffmann J., Youssef F. (2019) Maritime Transport: The Sustainability Imperative. In: Psaraftis H. (eds) *Sustainable Shipping*. Springer, Cham. https://doi.org/10.1007/978-3-030-04330-8_1

^vIn addition to [SSI members](#), initial industry consultations include with the Ammonia Energy Association, CBS Maritime, Clean Cargo, Getting to Zero Coalition, Roundtable for Sustainable Biomaterials, UCL/UMAS.

^{vi}See: <https://www.sustainableshipping.org/news/new-collaboration-between-academia-and-industry-partners-defines-sustainability-criteria-for-marine-fuels/>

^{vii}Standards and certification bodies assessing marine fuels would likely conduct their work in coordination with an international organisation, as reflected by comparable experience in the aviation sector. See: [CORSIA Eligibility Framework and Requirements for Sustainability Certification Schemes \(ICAO, 2019\)](#)

^{viii}See: [The role of sustainable biofuels in the decarbonisation of shipping \(SSI, 2019\)](#)

^{ix}Defined here as a group of synthetic fuels derived from hydrogen, adapted from [Electrofuels for shipping: How synthetic fuels from renewable electricity could unlock sustainable investment in countries like Chile \(EDF, 2019\)](#)

^xGHG emissions include all GHGs covered by the UNFCCC/Kyoto Protocol, namely: carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), sulphur hexafluoride (SF₆); as well as nitrogen trifluoride (NF₃) (Getting to Zero Coalition, 2019)

^{xi}Working definitions adapted from ISO, ISEAL and RSB



E info@sustainablesshipping.org

W sustainablesshipping.org

T [@SustShipping](https://twitter.com/SustShipping)

About the Sustainable Shipping Initiative

The Sustainable Shipping Initiative (SSI) is a multi-stakeholder collective of ambitious and like-minded leaders, driving change through cross-sectoral collaboration to contribute to – and thrive in – a more sustainable maritime industry. Spanning the entire shipping value chain, SSI members are shipowners and charterers; shipyards, marine product, equipment and service providers; banks, ship finance and insurance providers; classification societies; and sustainability non-profits.

