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Fact sheet – Emissions

Environmental benefits of choosing to travel with Fjord Line´s LNG ferries compared to conventional ferries running on heavy fuel oil (HFO).



(Screenshot from Fjord Line annual report 2025).

CO2e emissions

Greenhouse gas emissions from ships are monitored and reported under the EU Monitoring, Reporting and Verification (MRV) Regulation (EU) 2015/757. From 2024, the regulation covers carbon dioxide (CO_2), methane (CH_4) and nitrous oxide (N_2O). The combined climate impact of these gases is expressed as carbon dioxide equivalents (CO_2e), using their respective global warming potentials.

Liquefied natural gas (LNG) consists primarily of methane. During combustion in a combustion engine, a small proportion of the methane may pass through the engine without being combusted. This is referred to as methane slip and contributes to the vessel's total CO_2e emissions.

The EU MRV default value for methane slip is 3.1% of LNG used (weight %) for the engine class "LNG Otto (dual-fuel medium-speed) engines", which includes Fjord Line's LNG dual-fuel Wärtsilä 34DF engines. Alternative values may be used where the applicable MRV requirements for determining and documenting actual methane slip are met.

Based on manufacturer technical information from Wärtsilä, methane slip from the Wärtsilä 34DF engine family is estimated at 2.1–2.8%, based on parent-engine test results and depending on software settings and load conditions.

Fjord Line has calculated the resulting Tank-to-Wake greenhouse gas emissions using DNV's Emissions Connect platform. The estimated CO_2e emissions from operating the vessels on LNG are shown below for different methane-slip levels, compared with conventional marine fuel. DNV is Fjord Line's classification society, and Fjord Line uses DNV's Emissions Connect platform for EU MRV emissions reporting and verification.

Methane slippage	Estimated Tank-to-Wake CO2e reduction compared to marine diesel
0%	24.1%
2.1%	9.8%
2.8%	5.0%
3.1%	3.0%

NOx emissions

NOx emissions can be reduced by up to 90% compared with HFO in LNG powered lean-burn engines (1), such as the Wärtsilä 34DF, a dual-fuel medium-speed engine operating on the lean-burn principle (2) and classified as "LNG Otto (dual fuel medium speed)" under the EU MRV Regulation (EU) 2015/757.

(1)
S. Brynolf, M. Magnusson, E. Fridell, K. Andersson,

Compliance possibilities for the future ECA regulations through the use of abatement technologies or change of fuels,

Transportation Research Part D: Transport and Environment, Volume 28, 2014, Pages 6-18, ISSN 1361-9209,

https://www.sciencedirect.com/science/article/abs/pii/S1361920913001454?via%3Dihub

(2):
Wärtsilä releases another ECA compliant dual-fuel engine to the US market

SOx emissions

LNG reduces SOx emissions by 99% compared with HFO with a 3.5% sulphur content. For low-sulphur HFO, such as the fuel used in emission control areas, the reduction is smaller. LNG contains no sulphur, so the small amount of SOx emitted when operating on LNG is associated primarily with the combustion of pilot fuel in dual-fuel engines, such as the Wärtsilä 34DF, and lubricating oil.

Reference:

Natural gas for ship propulsion in Denmark
Environmental Project No. 1338, 2010
Danish Environmental Protection Agency
Section 4.1, Table 4-1 and 4-2.
https://www2.mst.dk/udgiv/publications/2010/978-87-92668-85-1/html/indhold_eng.htm

Particulate matters

LNG combustion results in close to zero particulate matter (PM) emissions from the LNG itself. LNG contains virtually no sulphur and has almost no particulate-forming components, resulting in very low PM emissions compared with HFO.
The Danish Environmental Protection Agency estimates a 98% reduction in PM compared with HFO with a 3.5% sulphur content. The small amount of PM remaining when operating on LNG is primarily associated with pilot fuel in dual-fuel engines such as the such as the Wärtsilä 34DF and lubricating oil.

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