Sjøfartsdirektoratet
Norwegian Maritime Authority

Information on the NOx tax

1 Brief information on the NOx tax

The framework for the NOx tax is established through legislation and regulations issued by the Ministry of Finance.

Excise Duties Act: Excise Duties Act (Særavgiftsloven)
Regulations relating to excise duties: Regulations relating to excise duties

Persons liable to pay the tax must report the tax through Altinn on the Norwegian Tax Administration's website. Additional information on the NOx tax is available here: http://www.skatteetaten.no/noxavgift

2 Liability to pay the tax – cf. sections 3-19-1 to 3-19-3 of the Regulations relating to excise duties

Who is liable, and what is subject to the tax?

- A vessel with a total installed propulsion engine output exceeding 750 kW is liable to pay tax on NOx emissions.
- For vessels subject to the tax, tax is payable on total emissions from propulsion machinery and from other machinery, such as auxiliary engines and boiler(s).

Where does the tax liability apply?

The tax liability applies to:

- emissions from voyages within Norwegian territorial waters;
- emissions from domestic voyages, even where parts of the voyage take place outside Norwegian territorial waters; and
- for vessels registered in Norway, emissions in adjacent waters.

3 Exemptions from the tax – cf. sections 3-19-11 to 3-19-12 of the Regulations relating to excise duties

The following are exempt from the tax liability:

- Vessels engaged in direct voyages between a Norwegian port and a foreign port.

- Fishing vessels, in respect of emissions occurring in distant waters (more than 250 nautical miles from the Norwegian coast (the baseline)).

- Vessels that are party to the Nox Environmental Agreement for the period 2011–2017. The exemption applies from the date on which the undertaking becomes a party to the agreement. Further information on the NOx Environmental Agreement is available on the website of the Confederation of Norwegian Enterprise (NHO).

- Protected vessels (in accordance with special rules), including:

  - vessels transiting Norwegian territory under the right of innocent passage; and

  - vessels operating between ports in the Svalbard archipelago.

- Where documentation from the engine manufacturer or a classification society can be provided showing that the engine output has been derated to less than 750 kW, the tax liability ceases.

4 Calculation of the tax – cf. section 3-19-6 of the Regulations relating to excise duties

4.1 Assessment on the basis of measurement – section 3-19-6 (1)

There are currently no guidelines or international standards for equipment used to continuously measure NOx emissions from ships. Accordingly, the Norwegian Maritime Authority (NMA) will not approve such equipment for the reporting of NOx emissions until such guidelines or standards have been developed.

4.2 Tax based on a source-specific emission factor (NOx factor) – section 3-19-6 (2)

A source-specific emission factor may be calculated in two ways: either by using the engine's Engine International Air Pollution Prevention (EIAPP) certificate and NOx technical file, or by means of on-board measurements carried out by a qualified entity approved by the NMA.

In both cases, the quantity of fuel consumed, expressed in tonnes, multiplied by the NOx factor shall constitute the basis for assessment of the tax. An example is provided later in this document. A NOx factor shall be calculated for each individual emission source and used when determining the basis for assessment of the tax. The NMA may also determine an overall NOx emission factor for the vessel's main and auxiliary engines.

For main and auxiliary engines delivered after 1 January 2000, the NOx factor may be calculated on the basis of the specific NOx emission value stated in the EIAPP certificate and the specific fuel oil consumption (SFOC) specified in the engine's NOx technical file or in the engine test report. The fuel consumption shall be weighted in accordance with the applicable test cycle.

The undertaking or shipowner operating a vessel subject to the tax is responsible for calculating the NOx factor. The calculated NOx factor, together with the engine's EIAPP certificate and the associated NOx technical file, shall be submitted to the NMA for verification.

The NOx factor may also be calculated on the basis of measurements carried out on board by a qualified entity approved by the NMA. See section 6 regarding qualified entities.

Where a qualified entity has been used, verification by the NMA is not required. A NOx emission factor determined by a qualified entity may be used directly as the basis for assessment of the tax.

Calculation of the NOx factor and NOx emissions using a source-specific emission factor (NOx factor)

NOx factor *F*:

$$F\left(\frac{kg\ NO_x}{tonne\ fuel}\right) = \frac{Specific\ NO_x\ emissions\ \left(\frac{g}{kWh}\right) \cdot 1000}{Specific\ fuel\ consumption\ \left(\frac{g}{kWh}\right)}$$

NOx emissions:

$$NO_x\ emissions\ (kg\ NO_x) = F \cdot fuel\ consumption\ (tonnes)$$

4.2 Tax based on the emission calculation table – section 3-19-6 (3)

In cases where the NOx factor has not been calculated and verified by the NMA or by a qualified entity, NOx emissions shall be calculated in accordance with the table set out in section 3-19-9 of the Regulation relating to excise duties.

- For engines referred to in section 3-19-9 (1) of the Regulations relating to excise duties, the engine speed (rpm) shall be used as the basis for determining the emission quantity per tonne of fuel consumed.
- For boilers referred to in section 3-19-9 (2) of the Regulations relating to excise duties, the emission quantity shall be determined by the type of fuel used.
- For turbines referred to in section 3-19-9 (3) of the Regulations relating to excise duties, the emission quantity will be determined by the type of turbine and the type of fuel used.

5 Determination of source-specific emission factor (NOx factor) – cf. section 3-19-7 of the Regulations relating to excise duties

Where the emission factor is determined by a qualified entity, the measurements are to be carried out in accordance with the NOx Technical Code 2008m section 6.3 "*Simplified*

measurement method".

For main engines, the emission factor is calculated on the basis of the weighted values for the applicable test cycle. For auxiliary engines, the emission factor may be calculated either as a weighted value or by using the value obtained at 50% engine load. Fuel consumption may be taken from the fuel consumption curve or engine test-bed data.

For engines used exclusively as generator engines, the output may be read directly from the switchboard.

Where several engines of the same type are installed on a vessel, it is sufficient that measurements from the most recently maintained engine are used as the basis for calculating the NOx factor for each individual engine.

For vessels fitted with an SRC system to reduce NOx emissions, the completion report, including the response curve (urea consumption/% load) provided by the SCR supplier, must be included in the report. For undertakings wishing to report NOx emissions in accordance with the examples set out in sections 10.4 and 10.5, the urea consumption (l/h) and the specific fuel consumption (g/kWh) for each engine must be stated in the measurement report.

Where it is not possible to achieve all load points during the measurements, this should be explained in the measurement report. Possible combinations of load points and revised weighting factors must then be calculated in accordance with NOx Technical Code 2008 Appendix VIII section 6 *"Selection of load points and revised weighting factors".*

In cases where, in the absence of data from the engine manufacturer, the reference temperature of the charge-air cooler (TSC-ref) is not known, a standard value of 25°C must be used.

For ferries and other vessels operating on a regular scheduled service, measurements may be carried out during a normal voyage. In such cases, the measurements must cover a complete operating cycle. For a ferry, this means from the moment the first vehicle drives on board at quay A, through the voyage to quay B, back to quay A and until the last vehicle has driven off the ferry. An average value for the cycle may then be used as the NOx factor.

Where the undertaking or shipowner operating the vessel subject to the tax can document an operating profile other than the weighted profile (or 50% load for auxiliary engined), that profile may be used as the basis for calculating the emission factor. A load profile covering a longer period may serve as such documentation and shall be submitted to the NMA for approval.

6 Qualified entities

Qualified entities must be accredited in a accordance with NS-EN ISO/IEC 17025, using ISO 8178 as the reference standard.

Where a qualified entity implements a NOx reduction measure on an engine, the revised NOx

factor must be calculated or verified by an independent third party that is also accredited in accordance with NS-EN ISO/IEC 17025, using ISO 8178 as the reference standard.

A list of approved qualified entities is available on the website of the Norwegian Maritime Authority.

7 Reporting and calculation of the tax

The various emission sources (main engines, auxiliary engines and boilers) are assumed to have different emission characteristics and operating profiles, although they may use the same type of bunker fuel. Accurate calculation of the tax therefore requires that fuel consumption for each individual emission source be recorded and capable of being documented for the relevant tax period.

Where fuel consumption cannot be specified for each individual emission source, the NMA may determine a combined emission factor for the vessel.

8 NOx reduction measures implemented

8.1 Vessels liable to pay the tax that have already implemented NOx reduction measures must, where required, be able to document how the net tax on NOx emissions has been calculated.

9 Documentation relating to the periodic use of NOx reduction technology

For technologies and associated measures that reduce NOx emissions (typically water injection, water emulsification, intake air humidification, use of an engine's *emission mode* setting, exhaust gas treatment systems, etc.) from one or more engines, and which are used only periodically, the total operating time or total energy output of the engine(s), together with the period during which the NOx reduction technology was in use, must be documented. The documentation must be available for inspection.

Where NOx reduction technology relies on the use of chemicals (such as urea), documentation of chemical consumption must be available for inspection. Chemical purchases must be documented by recipients, which must be available for inspection.

10 Calculation examples

The calculation examples below are based on a NOx tax rate of NOK 21.17 per kg of NOx. This tax rate is established by a resolution of the Norwegian Parliament concerning excise duties payable to the State and may be amended annually. For the current tax rate, please contact the Norwegian Tax

Administration or visit skatteetaten.no.

10.1 Tax payable for an EIAPP-certified engine

	A. Specific weighted NOx emission value (g/kWh)	**B**. Specific weighted fuel consumption	**C**. NOx emission factor (kg NO_x/tonne of fuel)	**D**. Fuel consumption during the tax period (tonnes)	**E**. Emissions (kg NOx)	**F**. Tax payable (NOK)
Data source	EIAPP certificate	NOx Technical File		Logbook		
Formulae			***A*1000/B***		***C*D***	***E*21,17***
Main engine calculation	11.05	202	54.70	30	1,641	34740.97
Auxiliary engine calculation	8.20	172	47.67	1.9	90.58	1917.57
Boiler calculation			9.60	2.2	21.12	447.11
Total tax payable						37105.65

10.2 Tax payable for engine using the default emission table

	C. NO_x emission factor (kg NO_x/tonne of fuel)	**D**. Fuel consumption durng the tax period (tonnes)	**E**. Emissions (kg	**F**. Tax payable
Data source	Regulations relating to excise duties,	Logbook		
Formulae			***C*D***	***E*21,17***
Main engine calculation (rpm<200)	100	30	3,000	63510
Auxiliary engine calculation	50	1.9	95	2011.15
Boiler calculation (heavy fuel oil)	9.6	2.2	21.12	447.11
Total tax payable				65968.30

10.3 Tax payable for an engine fitted with an SCR system – assuming a urea consumption of 1.5 litres per kg of NOx removed

Data used for the calculation		**Calculation**	
A. Assumed specific urea consumption (litres per kg of	1.5	**F**. Total NOx generated during the period ***(B*D) (kg)***	18,200
B. NOx emission factor without the SCR system in operation (kg NOx/tonne of fuel)	65	**G**. Total NOx removed during the period ***(E/A) (kg)***	15,333
D. Total fuel consumption during the period (tonnes)	280	**H**. Total NOx emissions ***(F–G) (kg)***	2867
E. Total urea consumption during the period (litres)	23,000	**I**. Total tax payable ***(H*21,17) (NOK)***	60694.39

10.4 Tax payable for an engine fitted with an SCR system – urea consumption as a function of energy output

Data used for the calculation		**Calculation**	
A. Urea consumption factor weighted in accordance with E2/E3/D2 (litres/MWh)	10.4	**G.** Energy treated by the SRC system	1,211,538
B. NOx emission rate with the SRC system in operation (g	1.9	**H**. Energy not treated by the SRC system (kWh)	63,462
C. NOx emission rate with the SRC system out of operation (g	7.35	**I**. Emissions from treated energy (kg NOx) ***(G*B/1000)***	2,302
D. Toral energy output during the period (kWh)	1,275,000	**J**. Emissions from untreated energy (kg NOx) ***(H*C/1000)***	466
E. Total fuel consumption during the period (tonnes)	280	**K**. Total NOx emissions (kg) ***(I+J)***	2,768
F. Total urea consumption during the period (litres)	12,600	**L**. Total tax payable (NOK) ***(K*21,17)***	58,598.56

10.4 Tax payable for an engine fitted with an SCR system – urea consumption as a function of fuel consumption

Data used for the calculation		**Calculation**	
A. Urea consumption factor weighted in accordance with E2/E3/D2 (litres/time)	12.5	**G**. Urea consumption per tonne of fuel ***(A/B)***	17.9
B. Fuel consumption (tonnes/hour) weighted in accordance with E2/E3	0.7	**H**. Fuel consumption treated by the SRC system (tonnes)	200
C. NOx emission factor with the SCR system in operation (kg	8.3	**I.** Fuel consumption not treated by the SRC system (tonnes)	50
D. NOx emission factor with the SCR system out of operation (kg	45	**J**. Emissions from treated fuel consumption (kg	1,660
E. Total fuel consumption during the period (tonnes)	250	**K**. Emissions from untreated fuel	2,250
F. Total urea consumption during the period (litres)	3580	**L**. Total NOx emissions ***(J+K)***	3,910
		M. Total tax payable (NOK) ***(L*21,17)***	82774.7

The examples set out in sections 10., 10.4 and 10.5 may be regarded as alternative methods for calculating NOx emissions from vessels fitted with SRC systems.