# 1.A.4.c iii - Agriculture/Forestry/Fishing: National Fishing

# Short description

In NFR sub-category 1.A.4.c iii fuel consumption and emissions of Germany's maritime fishing fleet are reported.

Method	AD	EF	Key Category Analysis						
T1, T2	NS, M	D, M, CS, T1, T2	no key category						

## Methodology

#### **Activity Data**

Primary fuel delivery data for national fishing is included in NEB lines 6 ('International Deep-Sea Bunkers') and 64 ('Coastal and Inland Navigation') for IMO-registered and unregistered ships respectively.

The actual annual amounts used are therefore calculated within (Deichnik (2020)), where ship movement data (AIS signal) allows for a bottom-up approach providing the needed differentiation.<sup>1)</sup>

Table 1: Annual fuel consumption, in terajoules

	1990	1995	2000	2005	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Diesel oil	305	240	238	226	227	213	209	214	227	284	298	293	356	322	359	265
Heavy fuel oil	33,3	26,0	26,0	24,4	24,5	23,0	22,6	16,8	13,8	NO						
Σ 1.Α.4.c iii	338	266	264	250	251	236	232	231	241	284	298	293	356	322	359	265

The strong increase after 2015 cannot be conclusively explained at the moment. However, even if the over-all fuel quantities delivered to the navigation sector would be somehow misallocated between the specific nautical acitivities, there would be no over- or under-estimation of over-all emissions.

#### **Emission factors**

The emission factors applied here, are derived from different sources and therefore are of very different quality.

For the main pollutants, country-specific implied values are used, that are based on tier3 EF included in the BSH model <sup>2</sup> which mainly relate on values from the EMEP/EEA guidebook 2019 <sup>3</sup>. These modelled IEFs take into account the ship specific information derived from AIS data as well as the mix of fuel-qualities applied depending on the type of ship and the current state of activity.

Table 2: Annual	country	/-specific	emission	factors,	in k	a/Tl
				-		

	1990	1995	2000	2005	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
DIESEL	DIESEL OIL															
NH₃	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32
NMVOC	50.2	50.2	50.2	50.2	50.2	50.2	50.2	49.5	46.4	45.6	45.2	46.4	46.3	46.3	46.6	45.5
NO <sub>x</sub>	1,139	1,139	1,139	1,139	1,139	1,139	1,139	1,139	1,172	1,172	1,174	1,164	1,172	1,170	1,171	1,181
SO <sub>x</sub>	466	419	233	186	69.8	65.2	55.5	53.6	50.8	37.2	37.2	37.2	37.2	37.2	37.2	37.2
BC <sup>2</sup>	83.7	75.3	41.8	33.5	12.5	11.7	11.7	12.3	12.3	12.5	12.7	12.4	12.2	12.0	11.6	11.5
PM 2.5	270	243	135	108	40.5	37.8	37.8	39.8	39.5	40.4	41.1	40.0	39.4	38.8	37.5	37.2
PM 10	289	260	144	115	43.3	40.4	40.4	42.6	42.3	43.2	43.9	42.8	42.1	41.5	40.1	39.8
TSP	289	260	144	115	43.3	40.4	40.4	42.6	42.3	43.2	43.9	42.8	42.1	41.5	40.1	39.8
СО	102	102	102	102	102	102	102	107	107	110	112	109	107	106	103	103
HEAVY	FUEL	OIL														

	1990	1995	2000	2005	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
NH <sub>3</sub>	0.33	0.33	0.33	0.33	0.33	0.33	NA									
NMVOC	36.4	36.4	36.4	36.4	36.4	36.4	NA									
NO <sub>x</sub>	1,258	1,258	1,258	1,258	1,258	1,258	NA									
SO <sub>x</sub>	1,319	1,332	1,323	1,336	496	496	NA									
BC <sup>2</sup>	64.9	65.5	65.1	65.7	24.4	24.4	NA									
PM <sub>2.5</sub>	541	546	542	548	203	203	NA									
PM 10	595	601	597	602	224	224	NA									
TSP	595	601	597	602	224	224	NA									
СО	200	200	200	200	200	200	NA									

<sup>1</sup> ratios PM<sub>2.5</sub> : PM<sub>10</sub> : TSP derived from the tier1 default EF as provided in <sup>4</sup>

 $^{2}$  estimated from f-BCs as provided in  $^{5)}$ : f-BC (HFO) = 0.12, f-BC (MDO/MGO) = 0.31, chapter: 1.A.3.d.i, 1.A.3.d.ii, 1.A.4.c.iii Navigation, Table 3-2 and Table A1 - BC fractions of PM emissions from relevant studies

**NOTE:** For the country-specific emission factors applied for particulate matter, no clear indication is available, whether or not condensables are included.

For information on the **emission factors for heavy-metal and POP exhaust emissions**, please refer to Appendix 2.3 - Heavy Metal (HM) exhaust emissions from mobile sources and Appendix 2.4 - Persistent Organic Pollutant (POP) exhaust emissions from mobile sources.

### **Trend discussion for Key Sources**

NFR 1.A.4.c iii - National Fishing is no key source.

## Recalculations

With both activity data and emission factors unaltered, no recalculations occur against last year's submission.



For **pollutant-specific information on recalculated emission estimates for Base Year and 2020**, please see the recalculation tables following chapter 8.1 - Recalculations.

# Uncertainties

Uncertainty estimates for emission factors were adopted from NFR 1.A.3.d i as a comparable emission source.

## **Planned improvements**

Besides a routine revision of the underlying BSH model, further focus will be put on the correct allocation of activity data to the different navigation activities covered in different NFR sub-sectors.

<sup>3), 4), 5)</sup> EMEP/EEA, 2019: EMEP/EEA air pollutant emission inventory guidebook – 2019; Chapter 1.A.3.d.i, 1.A.3.d.ii, 1.A.4.c.iii Navigation; URL:

https://www.eea.europa.eu/publications/emep-eea-guidebook-2019/part-b-sectoral-guidance-chapters/1-energy/1-a-combust ion/1-a-3-d-navigation