

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.¹⁾

Table 1: Annual fuel consumption, in terajoules

	1990	1995	2000	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Diesel oil	305	240	238	226	221	228	229	229	227	213	209	214	227	284	298	293	356	322	359
Heavy fuel oil	33,3	26,0	26,0	24,4	23,8	24,7	24,7	24,7	24,5	23,0	22,6	16,8	13,8	NO	NO	NO	NO	NO	NO
Σ 1.A.4.c iii	338	266	264	250	245	253	253	254	251	236	232	231	241	284	298	293	356	322	359

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 activities, 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 model²⁾ which mainly relate on values from the EMEP/EEA guidebook 2019³⁾. 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 kg/TJ

	1990	1995	2000	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
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	0,32	0,32	0,32
NM VOC	50,2	50,2	50,2	50,2	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
NO_x	1.139	1.139	1.139	1.139	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
SO_x	466	419	233	186	186	186	140	69,8	69,8	65,2	55,5	53,6	50,8	37,2	37,2	37,2	37,2	37,2	37,2
BC²	83,7	75,3	41,8	33,5	33,5	33,5	25,1	12,5	12,5	11,7	11,7	12,3	12,3	12,5	12,7	12,4	12,2	12,0	11,6
PM_{2.5}	270	243	135	108	108	108	81,0	40,5	40,5	37,8	37,8	39,8	39,5	40,4	41,1	40,0	39,4	38,8	37,5
PM₁₀	289	260	144	115	115	115	86,6	43,3	43,3	40,4	40,4	42,6	42,3	43,2	43,9	42,8	42,1	41,5	40,1

	1990	1995	2000	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
TSP	289	260	144	115	115	115	86,6	43,3	43,3	40,4	40,4	42,6	42,3	43,2	43,9	42,8	42,1	41,5	40,1
CO	102	102	102	102	102	102	102	102	102	102	102	107	107	110	112	109	107	106	103
HEAVY FUEL OIL																			
NH₃	0,33	0,33	0,33	0,33	0,33	0,33	0,33	0,33	0,33	0,33	NA	NA	NA	NA	NA	NA	NA	NA	NA
NMVO	33,2	33,2	33,2	33,2	33,2	33,2	33,2	33,2	33,2	33,2	NA	NA	NA	NA	NA	NA	NA	NA	NA
NO_x	1187	1187	1187	1187	1187	1187	1187	1187	1187	1187	NA	NA	NA	NA	NA	NA	NA	NA	NA
SO_x	1319	1332	1323	1336	744	742	742	744	496	496	NA	NA	NA	NA	NA	NA	NA	NA	NA
BC²	56,3	56,8	56,5	57,0	31,7	31,7	31,7	31,7	21,2	21,2	NA	NA	NA	NA	NA	NA	NA	NA	NA
PM_{2.5}	469	474	471	475	264	264	264	264	176	176	NA	NA	NA	NA	NA	NA	NA	NA	NA
PM₁₀	516	521	518	523	291	290	290	291	194	194	NA	NA	NA	NA	NA	NA	NA	NA	NA
TSP	516	521	518	523	291	290	290	291	194	194	NA	NA	NA	NA	NA	NA	NA	NA	NA
CO	182	182	182	182	182	182	182	182	182	182	NA	NA	NA	NA	NA	NA	NA	NA	NA

¹ ratios PM_{2.5} : PM₁₀ : TSP derived from the tier1 default EF as provided in ⁴⁾

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

Recalculations occur only due to the revised **activity data**. As, based on expert information, no biodiesel is used in NFR 1.A.4.c iii, these amounts estimated so far based on official blending shares have been removed and replaced by notation key 'NO'.

In contrast, the amounts of diesel oil and heavy fuel oil modelled based on ship movement data remain unaltered.

Table 3: Revised biodiesel consumption estimates, in terajoules

	1990	1995	2000	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
DIESEL OIL																		
Submission 2022	305	240	238	226	221	228	229	229	227	213	209	214	227	284	298	293	356	322
Submission 2021	711	549	531	488	474	486	484	482	473	442	431	429	472	555	1.117	1.208	2.529	512
absolute change	-407	-309	-294	-262	-253	-258	-255	-253	-246	-229	-222	-215	-245	-271	-819	-915	-2.174	-190
relative change	-57,2%	-56,3%	-55,2%	-53,7%	-53,4%	-53,1%	-52,8%	-52,4%	-52,1%	-51,8%	-51,4%	-50,1%	-51,9%	-48,8%	-73,3%	-75,7%	-85,9%	-37,1%
HEAVY FUEL OIL																		
Submission 2022	33,3	26,0	26,0	24,4	23,8	24,7	24,7	24,7	24,5	23,0	22,6	16,8	13,8	NO	NO	NO	NO	NO
Submission 2021	23,7	18,1	17,7	16,1	15,6	16,1	16,0	15,9	15,6	14,6	14,2	14,1	13,4	NO	NO	NO	NO	NO
absolute change	9,62	7,88	8,27	8,29	8,19	8,59	8,71	8,81	8,82	8,38	8,33	2,75	0,38	-	-	-	-	-
relative change	40,6%	43,4%	46,7%	51,4%	52,4%	53,3%	54,4%	55,4%	56,4%	57,4%	58,5%	19,5%	2,8%	-	-	-	-	-
TOTAL CONSUMPTION																		
Submission 2022	338	266	264	250	245	253	253	254	251	236	232	231	241	284	298	293	356	322
Submission 2021	735	567	549	504	489	503	500	498	489	456	445	443	485	555	1.117	1.208	2.529	512

	1990	1995	2000	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
absolute change	-397	-301	-285	-254	-245	-250	-247	-244	-238	-220	-213	-212	-244	-271	-819	-915	-2.174	-190
relative change	-54,0%	-53,1%	-51,9%	-50,4%	-50,0%	-49,7%	-49,3%	-49,0%	-48,6%	-48,3%	-47,9%	-47,9%	-50,3%	-48,8%	-73,3%	-75,7%	-85,9%	-37,1%

All **emission factors** remain unrevised.



For **pollutant-specific information on recalculated emission estimates for Base Year and 2019**, 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.

^{1), 2)} Deichnik (2020): Aktualisierung und Revision des Modells zur Berechnung der spezifischen Verbräuche und Emissionen des von Deutschland ausgehenden Seeverkehrs. from Bundesamts für Seeschifffahrt und Hydrographie (BSH); Hamburg, 2020.

^{3), 4), 5)} 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-combustion/1-a-3-d-navigation>