1.A.5.b iii - Military Navigation

Short description

In sub-category *1.A.5.b iii - Other, Mobile (including Military)* emissions from military navigation are reported.

Method	AD	EF	Key Category
T1, T2	NS, M	D, M, CS, T1, T3	see superordinate chapter

Method

Activity Data

Primary fuel data for national military waterborne activities is included in NEB lines 6 ('International Deep-Sea Bunkers') and 64 ('Coastal and Inland Navigation') for IMO and non-IMO ships respectively.

The annual shares used within NFR 1.A.5.b iii are therefore calculated within (Deichnik, K. (2019)), where ship movement data (AIS signal) allows for a bottom-up approach providing the needed differentiation.

Table 1: Annual fuel consumption, in terajoules

	= 1990	= 1995	= 2000	= 2005	= 2006	= 2007	= 2008	= 2009	= 2010	= 2011	= 2012	= 2013	= 2014	= 2015	= 2016	= 2017	= 2018
~ Diesel Oil	> 983	> 665	> 563	> 410	> 383	> 366	> 360	> 349	> 347	> 330	> 313	> 302	> 332	> 273	> 359	> 489	> 423
~ Biodiesel	> 0	> 0	> 0	> 9	> 11	> 16	> 18	> 24	> 22	> 21	> 20	> 18	> 19	> 14	> 11	> 11	> 11
~ Heavy Fuel Oil	> 0	> 0	> 0	> 0	> 0	> 0	> 0	> 0	> 0	> 0	> 0	> 0	> 0	> 0	> 0	> 0	> 0
Σ 1.A.5.b iii	~ 983	~ 665	~ 563	~ 419	~ 394	~ 382	~ 378	~ 373	~ 369	~ 351	~ 334	~ 319	~ 351	~ 286	~ 370	~ 500	~ 434

source: Deichnik, K. (2019): BSH model [1)]

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++ 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 (Deichnik, K. (2019)) [2)] which mainly relate on values from the EMEP/EEA guidebook 2019 [3)]. 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 for diesel fuels^^1^^, in kg/TJ

	= 1990	= 1995	= 2000	= 2005	= 2006	= 2007	= 2008	= 2009	= 2010	= 2011	= 2012	= 2013	= 2014	= 2015	= 2016	= 2017	= 2018
~ NH,,3,,	> 0.33	> 0.33	> 0.33	> 0.33	> 0.33	> 0.33	> 0.33	> 0.33	> 0.33	> 0.33	> 0.33	> 0.33	> 0.33	> 0.32	> 0.33	> 0.33	> 0.33
~ NMVOC	> 41.4	> 41.4	> 41.4	> 41.4	> 41.4	> 41.4	> 41.4	> 41.4	> 41.4	> 41.4	> 41.4	> 41.6	> 41.1	> 47.7	> 37.4	> 38.0	> 39.1
~ NO,,x,,	> 1,106	> 1,106	> 1,106	> 1,106	> 1,106	> 1,106	> 1,106	> 1,106	> 1,106	> 1,106	> 1,106	> 1,105	> 1,098	> 1,011	> 1,119	> 1,124	> 1,117
~ SO,,x,,	> 466	> 419	> 233	> 186	> 186	> 186	> 140	> 69.8	> 69.8	> 65.2	> 59.4	> 55.9	> 53.4	> 40.0	> 38.7	> 38.8	> 39.3

~ BC	> 109	> 98.3	> 54.6	> 43.7	> 43.7	> 43.7	> 32.8	> 16.4	> 16.4	> 15.3	> 15.3	> 15.3	> 16.1	> 19.6	> 16.3	> 15.2	> 15.8
~ PM,,2.5,,	> 352	> 317	> 176	> 141	> 141	> 141	> 106	> 52.9	> 52.9	> 49.3	> 49.3	> 49.3	> 51.9	> 63.2	> 52.6	> 49.0	> 51.0
~ PM,,10,,	> 377	> 339	> 189	> 151	> 151	> 151	> 113	> 56.6	> 56.6	> 52.8	> 52.8	> 52.7	> 55.5	> 67.7	> 56.3	> 52.4	> 54.6
~ TSP	> 377	> 339	> 189	> 151	> 151	> 151	> 113	> 56.6	> 56.6	> 52.8	> 52.8	> 52.7	> 55.5	> 67.7	> 56.3	> 52.4	> 54.6
~ CO	> 136	> 136	> 136	> 136	> 136	> 136	> 136	> 136	> 136	> 136	> 136	> 136	> 142	> 158	> 148	> 139	> 142
1																	
2																	
3																	

> **NOTE:** With respect to the emission factors applied for particulate matter, given the circumstances during test-bench measurements, condensables are most likely included at least partly.footnote During test-bench measurements, temperatures are likely to be significantly higher than under real-world conditions, thus reducing condensation. On the contrary, smaller dillution (higher number of primary particles acting as condensation germs) together with higher pressures increase the likeliness of condensation. So over-all condensables are very likely to occur but different to real-world conditions. footnote
>
> 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].

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+ Discussion of emission trends

> This sub-category is **not considered separately in the key category analysis**.

Due to the application of very several tier1 emission factors, most emission trends reported for this sub-category only reflect the trend in fuel deliveries. Therefore, the fuel-consumption dependend trends in emission estimates are only influenced by the annual fuel mix.

++ Selected main pollutants: NO,,x,,

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++ Sulphur dioxide and particulate matter

As fuel sulphur content underlies strict legislation, the trends of these directly related emissions reflect the outcome of ever lower fuel sulphur contents.

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+ Recalculations

The small changes in the **activity data** applied result solely from a revised biofuel share for biodiesel in 2017:

Table 4: Revised fuel consumption data 2017, in terajoules

	= **TOTAL**	= **Diesel Oil**	= **Biodiesel**
~ Submission 2020	> 500.2	> 489.3	> 10.9
~ Submission 2019	> 500.6	> 489.3	> 11.3
~ absolute change	> -0.40	> 0.00	> -0.40
~ relative change	> -0.08%	> 0.00%	> -3.57%

In contrast, all (annual) country-specific **emission factors** remain unaltered.

> For more pollutant-specific information on **recalculated emission estimates for Base Year and 2017**, please see the pollutant specific recalculation tables following chapter 8.1 - Recalculations].

+ Uncertainties

See superordinate chapter] on NFR 1.A.5.b.

+ Planned improvements

A **routine revision** of the underlying model is planned for the next annual submission.

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bibliography

: 1 : Deichnik (2019): Deichnik, K.: 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, 2019. : 2 : EMEP/EEA, 2019: EMEP/EEA air pollutant emission inventory guidebook 2019, Copenhagen, 2019. : 3 : Rentz et al., 2008: Nationaler Durchführungsplan unter dem Stockholmer Abkommen zu persistenten organischen Schadstoffen (POPs), im Auftrag des Umweltbundesamtes, FKZ 205 67 444, UBA Texte | 01/2008, January 2008 - URL: http://www.umweltbundesamt.de/en/publikationen/nationaler-durchfuehrungsplan-unter-stockholmer bibliography

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[1)] (bibcite 1)
[2)] (bibcite 1)
[3)] (bibcite 2)