

1.A.3.d i (i) - International maritime navigation

Short description

Under NFR category **1.A.3.d i (i)**, emissions from international maritime navigation fuelling in and starting from German harbours are reported.

Method	AD	EF	Key Category
T1, T2, T3	NS, M	CS, M	<i>not included in key category analysis</i>

T = key source by Trend **L** = key source by Level

Methods	
D	Default
RA	Reference Approach
T1	Tier 1 / Simple Methodology *
T2	Tier 2*
T3	Tier 3 / Detailed Methodology *
C	CORINAIR
CS	Country Specific
M	Model

* as described in the EMEP/CORINAIR Emission Inventory Guidebook - 2007, in the group specific chapters.

AD - Data Source for Activity Data	
NS	National Statistics
RS	Regional Statistics
IS	International Statistics
PS	Plant Specific data
AS	Associations, business organisations
Q	specific questionnaires, surveys
EF - Emission Factors	
D	Default (EMEP Guidebook)
C	Confidential
CS	Country Specific
PS	Plant Specific data

The source category includes international deep sea fishery and international marine transport. Emissions from fuel consumption for international transports of ocean-going ships are not reported as part of total national inventories.

~ NH ₃	> 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	> 0.33	> 0.32	> 0.32	> 0.32				
~ NMVOC	> 48.7	> 48.7	> 48.7	> 48.7	> 48.7	> 48.7	> 48.7	> 48.7	> 48.7	> 48.7	> 48.7	> 48.4	> 48.0	> 44.8	> 44.7	> 45.0	> 45.2				
~ NO _x	> 1,070	> 1,070	> 1,070	> 1,070	> 1,070	> 1,070	> 1,070	> 1,069	> 1,069	> 1,069	> 1,069	> 1,073	> 1,077	> 1,151	> 1,132	> 1,157	> 1,128				
~ SO _x	> 465.5	> 419.0	> 232.8	> 186.2	> 186.2	> 186.2	> 139.7	> 69.8	> 69.8	> 65.2	> 54.5	> 52.6	> 50.5	> 40.7	> 40.6	> 40.7	> 40.8				
~ PM _{2.5}	1		> 352.4	> 318.0	> 176.5	> 141.2	> 141.3	> 141.3	> 105.9	> 53.0	> 53.0	> 49.6	> 49.5	> 49.1	> 49.1	> 52.7	> 54.5	> 54.5	> 53.1		
~ PM ₁₀	> 377.1	> 340.3	> 188.9	> 151.0	> 151.2	> 151.2	> 113.3	> 56.7	> 56.7	> 53.0	> 53.0	> 52.5	> 52.6	> 56.4	> 58.3	> 58.3	> 56.9				
~ TSP	> 377.1	> 340.3	> 188.9	> 151.0	> 151.2	> 151.2	> 113.3	> 56.7	> 56.7	> 53.0	> 53.0	> 52.5	> 52.6	> 56.4	> 58.3	> 58.3	> 56.9				
~ BC	2		> 109.2	> 98.6	> 54.7	> 43.8	> 43.8	> 43.8	> 32.8	> 16.4	> 16.4	> 15.4	> 15.3	> 15.2	> 15.2	> 16.3	> 16.9	> 16.9	> 16.5		
~ CO	> 127	> 128	> 128	> 128	> 128	> 128	> 128	> 128	> 128	> 128	> 128	> 127	> 128	> 134	> 139	> 138	> 136				
< Heavy fuel oil																					
~ NH ₃	> 0.34	> 0.34	> 0.34	> 0.34	> 0.34	> 0.34	> 0.34	> 0.34	> 0.34	> 0.34	> 0.34	> 0.34	> 0.35	> 0.33	> 0.33	> 0.34	> 0.35				
~ NMVOC	> 36.6	> 36.6	> 36.6	> 36.6	> 36.6	> 36.6	> 36.6	> 36.6	> 36.6	> 36.6	> 36.6	> 37.6	> 37.8	> 30.0	> 36.8	> 30.4	> 28.3				
~ NO _x	> 1,379	> 1,378	> 1,378	> 1,378	> 1,378	> 1,378	> 1,378	> 1,378	> 1,378	> 1,377	> 1,379	> 1,382	> 1,393	> 1,348	> 1,245	> 1,360	> 1,503				
~ SO _x	> 1,319	> 1,332	> 1,323	> 1,336	> 744	> 742	> 742	> 744	> 496	> 496	> 496	> 496	> 506	> 47.5	> 49.3	> 46.4	> 49.8				
~ PM _{2.5}	1		> 479	> 483	> 480	> 485	> 270	> 269	> 269	> 270	> 180	> 180	> 180	> 184	> 187	> 151	> 205	> 153	> 123		
~ PM ₁₀	> 526	> 532	> 528	> 533	> 297	> 296	> 296	> 297	> 198	> 198	> 198	> 203	> 206	> 166	> 226	> 168	> 135				
~ TSP	> 526	> 532	> 528	> 533	> 297	> 296	> 296	> 297	> 198	> 198	> 198	> 203	> 206	> 166	> 226	> 168	> 135				
~ BC	2		> 57.4	> 58.0	> 57.6	> 58.2	> 32.4	> 32.3	> 32.3	> 32.4	> 21.6	> 21.6	> 21.6	> 22.1	> 22.4	> 18.1	> 24.7	> 18.3	> 14.7		
~ CO	> 162	> 162	> 162	> 162	> 162	> 162	> 162	> 162	> 162	> 162	> 162	> 162	> 167	> 165	> 198	> 167	> 134				
1																					
2																					

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](#)].

+ [Trends of exhaust emissions from international navigation](#)

NFR 1.A.3.d i is not considered in the key category analysis.

Emission trends for unregulated pollutants (such as **NH₃**, **NO_x**, **NMVOC** and **CO**, all **HM** and **POPs**) with only slight changes in the annual over-all IEFs applied, follow the trends in fuel consumption and the shares of diesel and heavy fuel oil:

[gallery size="medium" : EM_1A3di_NH3.png : EM_1A3di_Cd.png gallery](#)

On the other hand, the emission trends for **SO_x**, and **PM**, both depending on the fuel's sulphur

content, follow not only the trends in fuel consumption but do also reflect fuel-sulphur legislation:

[gallery size="medium" : EM_1A3di_SO2.png : EM_1A3di_PM.png gallery](#)

+ Recalculations

Resulting from changes in the fuel consumption data computed within ⁴⁾ for *domestic* maritime navigation, the **activity data** for 2017 for *international* maritime navigation have been revised.

Table 3: Revised fuel consumption data 2017, in terajoules

=	= Diesel oil	= Heavy fuel oil	= over-all consumption
~ Submission 2020	> 22,924	> 58,781	> 81,828
~ Submission 2019	> 23,165	> 58,781	> 82,069
~ absolute change	> -241	> 0.00	> -241
~ relative change	> -1.04%	> 0.00%	> -0.29%

In contrast, all country-specific and default **emission factors applied remain unrevised** compared to last year's submission.

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

+ Uncertainties

Uncertainty estimates for **activity data** of mobile sources derive from research project FKZ 360 16 023: "Ermittlung der Unsicherheiten der mit den Modellen TREMOD und TREMOD-MM berechneten Luftschadstoffemissionen des landgebundenen Verkehrs in Deutschland" by Knörr et al. (2009) ⁵⁾.

+ Planned improvements

Besides routine maintenance and further development of the BSH model, no improvements are planned.

bibliography : 1 : AGEb, 2019: Working Group on Energy Balances (Arbeitsgemeinschaft Energiebilanzen (Hrsg.), AGEb): Energiebilanz für die Bundesrepublik Deutschland; URL: <http://www.ag-energiebilanzen.de/7-0-Bilanzen-1990-2017.html>, Köln & Berlin, 2019. : 2 : Deichnik, K. (2019): 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. : 3 : EMEP/EEA (2019): EMEP/EEA air pollutant emission inventory guidebook 2019, URL: <https://www.eea.europa.eu/publications/emep-eea-guidebook-2019>; Copenhagen, 2019. : 4 : 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> : 5 : Knörr et al. (2009): Knörr, W., Heldstab, J., & Kasser, F.: Ermittlung der Unsicherheiten der mit den Modellen TREMOD und TREMOD-MM berechneten Luftschadstoffemissionen des landgebundenen Verkehrs in Deutschland; final report; URL: <https://www.umweltbundesamt.de/sites/default/files/medien/461/publikationen/3937.pdf>, FKZ 360 16 023, Heidelberg & Zürich, 2009. **bibliography**

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- ¹⁾ (bibcite 1)
 - ²⁾ (bibcite 2)
 - ³⁾ (bibcite 2)
 - ⁴⁾ (bibcite 2)
 - ⁵⁾ (bibcite 5)