# 2.L(a) - Handling of Bulk Products

## Short description

Under category *2.L(a) - Handling of Bulk Products* dust emissions from bulk material handling (loading and unloading) including agricultural bulk materials offsite the fields are reported. Emissions from quarrying and mining of minerals and from point source emissions are excluded.

## Methodology

For 1990 to 1996, only simplified estimates without a differentiation of handled materials and products exist. For all following years, emissions are calculated using a tier1 method taking into account detailed data on handled materials and products.

### Activity data

Official statistics are of limited use in determining handling of bulk products. There are only transport statistics available providing the amounts of several transported materials.

During a research project carried out by (Müller-BBM) [1], activity data was derived from primary statistical data from the Federal Statistical Office for Germany (Satistisches Bundesamt, Destatis) and the Federal Motor Transport Authority (Kraftfahrt-Bundesamt, KBA). Here, data on goods transported by railways and ships is gathered by Destatis whereas data for road transport is collected by the KBA.

Here, for all years until 2009, the collection of data for transported goods followed the official **NST/R** (1968) **nomenclature and regulation** (Eurostat, 2015a) [2].

As of 2010, statistical data following the newly implemented **NST-2007** [3], [4] **nomenclature and regulation** from Destatis and KBA is applied instead.

Table 1: Overview of primary activity data sources over time

| | |
|---|---|
| **1990-1996** | simplified estimates without differentiation of handled materials |
| **1997-2009** | statistical data following NST/R nomenclature |
| **as of 2010** | statistical data following NST-2007 nomenclature |

Here, NST/R allowed the distribution of a broad variety of goods and materials (e.g. barley, corn, oats, rice, rye, and wheat), whereas NST-2007 provides only a very condensed list of classes of goods (e.g. 'crops').

Due to these methodological breaks, activity data and emissions show inconsistencies (especially on the level of specific goods and materials) that cannot be eliminated at the moment. Nonetheless, on a aggregate level, these breaks are balanced out more or less automatically as the total amount of transported dry materials does not chnage too much with changing statistical approaches.

For estimating the amount of moved bulk materials as well as emissions from the loading and unloading of bulk materials, these primary activity data (PAD, including the amounts of imported and exported goods as well as goods transported within Germany) have to be calculated from the amounts of transported goods:

$$PAD_{material\ i} = PAD_{import} + PAD_{export} + 2 * PAD_{domestic\ handling}$$

with

1. $PAD_{import}$ = amount of imported good or material,
2. $PAD_{export}$ = amount of exported good or material and
3. $PAD_{domestic\ handling}$ = amount of good or material transported only within Germany

As the basic statistics provide only total amounts of imported, exported and domestically transported dry goods without any distinction into bulk and packed goods, the shares of bulk goods had to be estimated via expert judgement during the workshop mentioned above.

During this workshop, experts, for comparable kinds of dry bulk material, discussed specific shares displaying which part of the total amount of dry material $i$ loaded and/or unloaded within Germany might be transported as bulk material thus causing PM emissions.

So the activity data finally used for estimating specific particulate matter emissions for every bulk material is calculated as a specific share $s$ of the amount of this material $i$ loaded and/or unloaded within Germany:

$$AD_{bulk\ material\ i} = PAD_{bulk\ material\ i} * s_{bulk\ share}$$

Table 2: Amounts of dry, dusty bulk goods handled in Germany 2010-2021, in tonnes

| | transport mode | 2010 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 |
|---|---|---|---|---|---|---|---|---|---|
| **other herbal products** | inland vessel | 5,523,633 | 5,711,645 | 6,541,031 | 6,529,161 | 38,829,323 | 39,189,603 | 38,498,874 | 34,508,319 |
| | railways | 1,242,916 | 1,242,916 | 170,158 | 807,829 | 17,868 | 470,000 | 547,545 | 532,253 |
| | heavy-duty vehicle | 20,847,400 | 30,967,600 | 29,445,800 | 28,094,800 | 34,166,200 | 34,166,200 | 22,918,493 | 24,118,587 |
| | sea-going vessel | 4,052,384 | 6,083,248 | 5,690,857 | 6,321,278 | 6,052,546 | 6,376,068 | 7,164,149 | 6,953,293 |
| **raw mineral chemicals** | inland vessel | 6,794,922 | 11,213,581 | 11,750,342 | 12,044,542 | 2,556,501 | 2,366,579 | 2,573,770 | 2,696,029 |
| | railways | 9,827,059 | 9,827,059 | 10,158,766 | 9,139,348 | 10,472,017 | 9,273,000 | 9,627,577 | 9,885,631 |
| | heavy-duty vehicle | 78,928,400 | 89,219,400 | 83,315,200 | 84,937,600 | 82,363,000 | 82,363,000 | 10,043,513 | 11,351,314 |
| | sea-going vessel | 5,550,621 | 8,904,300 | 8,692,669 | 8,768,942 | 8,741,513 | 7,905,516 | 7,888,208 | 8,131,408 |
| **raw organic chemicals** | inland vessel | 6,299,350 | 6,310,746 | 6,636,096 | 6,417,766 | 171,884 | 57,126 | 114,803 | 175,726 |
| | railways | 16,287,803 | 16,287,803 | 19,006,897 | 17,965,252 | 17,716,320 | 21,094,000 | 18,661,643 | 18,339,593 |
| | heavy-duty vehicle | 11,345,600 | 5,875,200 | 5,293,800 | 5,192,200 | 4,570,800 | 4,570,800 | 0 | 828,916 |
| | sea-going vessel | 3,638,264 | 2,630,859 | 2,502,315 | 2,690,538 | 3,182,266 | 2,478,579 | 2,341,016 | 2,413,459 |
| **iron ore** | inland vessel | 25,728,177 | 23,048,502 | 21,885,592 | 23,312,725 | 24,389,450 | 25,203,179 | 25,755,504 | 25,193,580 |
| | railways | 38,565,334 | 38,565,334 | 37,513,305 | 37,215,277 | 39,012,340 | 37,708,000 | 37,434,377 | 37,586,847 |
| | heavy-duty vehicle | 203,800 | 1,502,000 | 1,166,000 | 0 | 0 | 0 | 1,764,223 | 534,846 |
| | sea-going vessel | 13,922,885 | 12,702,983 | 13,397,347 | 14,028,077 | 14,444,514 | 13,967,430 | 13,365,447 | 14,810,135 |
| **crops** | inland vessel | 9,816,233 | 9,348,956 | 9,693,828 | 11,180,006 | 11,452,177 | 11,243,918 | 10,046,500 | 9,546,963 |
| | railways | 2,982,548 | 2,982,548 | 2,446,615 | 1,994,499 | 2,688,008 | 4,583,000 | 3,545,040 | 3,759,205 |
| | heavy-duty vehicle | 65,464,800 | 65,723,600 | 63,027,200 | 63,948,600 | 70,614,200 | 70,614,200 | 58,304,413 | 61,639,154 |
| | sea-going vessel | 9,319,143 | 7,155,770 | 7,103,932 | 10,159,483 | 10,599,072 | 12,142,981 | 10,735,948 | 8,851,781 |
| **potatoes** | inland vessel | 1,383 | 1,620 | 30 | 1,034 | 0 | 0 | 0 | 1,056 |
| | railways | 17,135 | 17,135 | 38,819 | 38,425 | 9,898 | 0 | 0 | 4,581,528 |
| | heavy-duty vehicle | 10,627,000 | 10,136,400 | 10,056,600 | 11,717,000 | 9,956,800 | 9,956,800 | 4,683,480 | 5,039,904 |
| | sea-going vessel | 29,296,456 | 26,293,129 | 29,732,990 | 23,583,567 | 23,943,784 | 21,170,067 | 20,406,870 | 22,490,149 |
| **coal products** | inland vessel | 2,409,311 | 1,961,483 | 1,315,205 | 1,665,936 | 1,871,597 | 1,361,655 | 2,003,004 | 2,129,778 |
| | railways | 22,499,503 | 22,499,503 | 8,513,061 | 9,144,558 | 7,120,072 | 6,721,000 | 6,610,955 | 6,456,917 |
| | heavy-duty vehicle | 11,801,600 | 12,236,800 | 10,278,800 | 10,415,800 | 15,401,600 | 15,401,600 | 7,065,314 | 8,549,595 |
| | sea-going vessel | 802,164 | 398,570 | 59,335 | 53,695 | 72,473 | 48,778 | 43,760 | 135,197 |

| | transport mode | 2010 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 |
|---|---|---|---|---|---|---|---|---|---|
| **products from grinding & shelling mills** | inland vessel | 1,782,712 | 2,567,049 | 3,086,180 | 2,871,889 | 3,200,833 | 4,133,053 | 5,180,094 | 5,368,877 |
| | railways | 2,852 | 2,852 | 328,857 | 350,368 | 362,180 | 0 | 465,039 | 381,098 |
| | heavy-duty vehicle | 97,539,400 | 106,391,800 | 104,354,000 | 101,813,400 | 99,568,200 | 99,568,200 | 75,685,582 | 69,634,714 |
| | sea-going vessel | 3,104,125 | 3,995,488 | 3,971,495 | 3,638,766 | 3,903,447 | 3,525,359 | 3,586,612 | 3,747,650 |
| **mineral fertilisers** | inland vessel | 760,174 | 390,276 | 304,450 | 279,444 | 271,253 | 305,202 | 281,603 | 255,398 |
| | railways | 4,122,535 | 4,122,535 | 3,890,715 | 3,684,926 | 3,578,700 | 3,424,000 | 3,619,997 | 3,581,858 |
| | heavy-duty vehicle | 7,923,200 | 6,028,800 | 2,236,000 | 2,532,400 | 4,322,000 | 4,322,000 | 1,338,908 | 1,006,750 |
| | sea-going vessel | 117,224 | 563,030 | 348,447 | 395,809 | 507,459 | 409,515 | 256,924 | 323,622 |
| **natural sands, gravel & stones** | inland vessel | 40,518,020 | 40,340,856 | 38,487,658 | 35,673,470 | 34,713,430 | 31,927,501 | 33,178,046 | 36,072,381 |
| | railways | 56,517,180 | 56,517,180 | 48,907,929 | 46,590,830 | 45,317,601 | 43,958,000 | 43,837,499 | 39,960,787 |
| | heavy-duty vehicle | 1,655,747,400 | 1,875,461,200 | 1,780,682,400 | 1,810,580,800 | 1,853,177,400 | 1,853,177,400 | 1,669,958,849 | 1,672,131,248 |
| | sea-going vessel | 8,739,096 | 11,121,374 | 11,421,774 | 9,822,506 | 9,947,768 | 9,739,769 | 10,353,589 | 13,515,063 |
| **non-iron ores** | inland vessel | 1,512,246 | 2,991,850 | 3,399,513 | 2,909,452 | 3,186,877 | 2,964,925 | 2,827,648 | 3,199,797 |
| | railways | 29,742 | 29,742 | 15,232 | 6,651 | 7,972 | 8,000 | 6,642 | 16,877 |
| | heavy-duty vehicle | 705,600 | 788,600 | 2,480,600 | 1,321,000 | 0 | 0 | 0 | 827,676 |
| | sea-going vessel | 2,687,815 | 3,186,505 | 3,474,240 | 3,065,484 | 3,204,390 | 2,850,350 | 3,870,273 | 4,368,429 |
| **raw coals** | inland vessel | 36,652,759 | 36,960,623 | 37,127,495 | 39,825,584 | 39,049 | 0 | 0 | 0 |
| | railways | 58,433,815 | 58,433,815 | 69,687,308 | 73,653,317 | 69,222,607 | 67,749,000 | 61,034,978 | 51,142,196 |
| | heavy-duty vehicle | 10,561,400 | 9,592,600 | 10,288,800 | 14,056,000 | 13,275,800 | 13,275,800 | 11,858,051 | 16,057,484 |
| | sea-going vessel | 13,299,295 | 14,640,469 | 13,878,763 | 14,194,693 | 14,065,658 | 16,476,145 | 14,401,269 | 15,919,606 |
| **secondary raw materials** | inland vessel | 15,691,876 | 15,455,505 | 15,346,780 | 15,565,961 | 12,209,667 | 11,521,886 | 11,212,165 | 12,089,358 |
| | railways | 25,614,264 | 25,614,264 | 24,816,767 | 24,034,064 | 23,099,944 | 22,113,000 | 21,261,312 | 22,147,649 |
| | heavy-duty vehicle | 422,570,000 | 465,981,000 | 452,569,000 | 464,878,800 | 490,299,000 | 490,299,000 | 161,493,436 | 171,462,235 |
| | sea-going vessel | 5,047,097 | 5,440,262 | 6,098,151 | 5,739,258 | 6,094,992 | 5,810,444 | 5,057,435 | 4,173,386 |
| **rock & saline salt** | inland vessel | 2,769,356 | 5,367,045 | 4,297,737 | 4,588,453 | 3,959,354 | 3,939,437 | 3,651,498 | 4,115,651 |
| | railways | 3,067,187 | 3,067,187 | 2,413,134 | 2,963,318 | 2,258,785 | 2,575,000 | 2,362,886 | 2,603,115 |
| | heavy-duty vehicle | 21,579,000 | 18,284,800 | 11,550,200 | 13,746,800 | 7,887,600 | 7,887,600 | 7,238,776 | 10,591,977 |
| | sea-going vessel | 567,059 | 1,340,830 | 1,062,136 | 912,141 | 761,849 | 919,251 | 888,593 | 812,124 |
| **nitrogen fertilisers** | inland vessel | 5,737,386 | 5,636,147 | 5,616,853 | 5,321,196 | 5,267,318 | 5,104,076 | 4,930,755 | 4,742,988 |
| | railways | 15,708,472 | 15,708,472 | 15,592,709 | 15,550,134 | 14,971,021 | 14,091,000 | 13,614,102 | 14,066,445 |
| | heavy-duty vehicle | 37,454,600 | 44,977,200 | 61,230,200 | 64,460,400 | 71,366,600 | 71,366,600 | 28,434,989 | 30,619,530 |
| | sea-going vessel | 5,309,443 | 5,821,309 | 5,953,434 | 6,489,522 | 6,378,323 | 6,509,499 | 7,011,855 | 7,392,865 |
| **white cement, lime, cement** | inland vessel | 3,273,975 | 3,324,316 | 3,120,120 | 3,046,615 | 2,408,113 | 2,479,720 | 2,532,347 | 2,776,593 |
| | railways | 17,849,146 | 17,849,146 | 17,115,456 | 18,418,916 | 19,947,465 | 21,867,000 | 19,270,679 | 18,928,775 |
| | heavy-duty vehicle | 69,407,200 | 81,743,800 | 71,895,800 | 76,202,600 | 86,441,400 | 86,441,400 | 76,251,684 | 77,289,169 |
| | sea-going vessel | 1,544,488 | 2,130,253 | 2,171,491 | 1,954,095 | 2,699,787 | 2,757,516 | 2,470,814 | 2,552,567 |

| | transport mode | 2010 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 |
|---|---|---|---|---|---|---|---|---|---|
| **sugar beet** | inland vessel | 0 | 5,003 | 0 | 1,035 | 6,362,106 | 6,366,439 | 6,426,328 | 6,396,070 |
| | railways | 123,598 | 123,598 | 96,747 | 29,869 | 46,870 | 24,000 | 64,094 | 37,555 |
| | heavy-duty vehicle | 26,946,200 | 27,903,200 | 31,496,200 | 20,903,200 | 36,601,000 | 36,601,000 | 22,159,060 | 32,853,554 |
| | sea-going vessel | 17 | 142 | 1,843 | 1,154 | 4,086 | 2,872 | 3,125 | 9,676 |

sources: annual data deliveries DESTATIS & KBA (for heavy-duty vehicles) to the inventory compiler

**Emission factors**

Emission factors are based on the methodology according VDI guidelines 3790. The values used here originate from a research project by (Müller-BBM, 2011) [5] taking into account information of an expert panel of industry and administration. For details see the [*https://www.umweltbundesamt.de/publikationen/konsistenzpruefung-verbesserungspotenzial project report] (German version only).

Within the study, PM emission factors are estimated for each material or good that might be transported as dry and unpacked bulk. These very specific EF are than assigned to the classes of materials/goods available from the different different statistics (NST/R, NST-2007) to form implied Ef for these class of bulk material.

As NST/R provided a wide variaty of goods and materials, whereas NST-2007 provides only a very condensed list of classes of goods, the very specific EF derived during the study and the joint expert workshop have been aggregated in order to match the classes of goods following NST-2007.

Table 2: specific EF for PM emissions from NST/R crop products, in [kg/t], as used for 2021 estimates

| | TSP | $PM_{10}$ | $PM_{2.5}$ |
|---|---|---|---|
| **Other herbal products** | 0.032000 | 0.016000 | 0.003200 |
| **Chemische Grundstoffe. mineralisch** | 0.041000 | 0.020500 | 0.004100 |
| **Raw organic chemicals** | 0.024000 | 0.012000 | 0.002400 |
| **Iron ore** | 0.057000 | 0.028500 | 0.005700 |
| **Crops** | 0.045000 | 0.022500 | 0.004500 |
| **Potatoes** | 0.007000 | 0.003500 | 0.000700 |
| **Coal products** | 0.019000 | 0.009500 | 0.001900 |
| **Products from grinding and shelling mills** | 0.003000 | 0.001500 | 0.000300 |
| **Mineral fertilisers** | 0.024000 | 0.012000 | 0.002400 |
| **Natural sands. gravel. and stones** | 0.027000 | 0.013500 | 0.002700 |
| **Non-iron ores** | 0.066000 | 0.033000 | 0.006600 |
| **Raw coals** | 0.016000 | 0.008000 | 0.001600 |
| **Secondary raw materials** | 0.027000 | 0.013500 | 0.002700 |
| **Rock & saline salt** | 0.068000 | 0.034000 | 0.006800 |
| **Nitrogen fertilisers** | 0.024000 | 0.012000 | 0.002400 |
| **White cement. lime. cement** | 0.005000 | 0.002500 | 0.000500 |
| **Sugar beet** | 0.000240 | 0.000120 | 0.000024 |

**Ratio TSP : $PM_{10}$ : $PM_{2.5}$**

The shares of $PM_{10}$ and $PM_{2.5}$ of the entire amounts of emitted TSP have been set to fixed values used for the entire time series.

Assumptions:

1. TSP = 100%,
2. 50% of TSP are =< 10 µm. Therefore, the EF($PM_{10}$) are assumed as 1/2 of the corresponding EF(TSP), and
3. 10% of TSP are =< 2.5 µm. Therefore, the EF($PM_{2.5}$) are assumed as 1/10 of the corresponding EF(TSP).

The ratios of TSP, $PM_{10}$, and $PM_{2.5}$ were also discussed in the research project mentioned above, but without generating any new data. Nonetheless, the ratios might be to low at the moment and will be checked furthermore.

# Recalculations

As for submission 2021 activity data for 2019 could not be derived from national statistics, amounts of goods transported for 2018 were applied for 2019, too. With the current submission, these data are replaced with original 2019 activity data, resulting in correspondingly revised emission estimates.

table: Revised amounts of bulk goods transported in 2019, in tonnes

|  | Submission 2021 | Submission 2022 | absolute change | relative change |
|---|---|---|---|---|
| **other herbal products** | 30,305,094 | 6,279,089 | -24,026,005 | -79% |
|  | 445,547 | 613,000 | 167,453 | 38% |
|  | 35,511,100 | 18,815,200 | -16,695,900 | -47% |
|  | 6,614,999 | 6,067,598 | -547,401 | -8% |
| **raw mineral chemicals** | 11,798,872 | 11,909,168 | 110,296 | 1% |
|  | 10,634,917 | 9,158,000 | -1,476,917 | -14% |
|  | 63,713,624 | 11,315,500 | -52,398,124 | -82% |
|  | 7,386,700 | 4,839,421 | -2,547,279 | -34% |
| **raw organic chemicals** | 6,667,823 | 6,528,823 | -139,000 | -2% |
|  | 0 | 17,607,000 | 17,607,000 |  |
|  | 12,601,908 | 0 | -12,601,908 | -100% |
|  | 2,463,615 | 2,623,994 | 160,379 | 7% |
| **iron ore** | 22,796,286 | 21,531,669 | -1,264,617 | -6% |
|  | 38,252,864 | 36,601,000 | -1,651,864 | -4% |
|  | 1,680,885 | 731,400 | -949,485 | -56% |
|  | 14,761,129 | 14,521,110 | -240,019 | -2% |
| **crops** | 7,715,977 | 8,128,252 | 412,275 | 5% |
|  | 2,985,786 | 3,169,000 | 183,214 | 6% |
|  | 58,957,570 | 56,315,100 | -2,642,470 | -4% |
|  | 7,672,262 | 7,985,888 | 313,626 | 4% |
| **potatoes** | 0 | 49,119 | 49,119 |  |
|  | 4,896,748 | 0 | -4,896,748 | -100% |
|  | 9,621,800 | 4,789,300 | -4,832,500 | -50% |
|  | 20,701,636 | 25,168,423 | 4,466,787 | 22% |
| **coal products** | 1,560,991 | 1,870,568 | 309,577 | 20% |
|  | 8,421,754 | 6,743,000 | -1,678,754 | -20% |
|  | 13,182,782 | 6,653,300 | -6,529,482 | -50% |
|  | 25,450 | 21,898 | -3,552 | -14% |
| **products from grinding and shelling mills** | 5,275,005 | 5,506,351 | 231,347 | 4% |
|  | 349,419 | 645,000 | 295,581 | 85% |
|  | 99,763,916 | 69,628,300 | -30,135,616 | -30% |
|  | 3,788,108 | 4,001,310 | 213,202 | 6% |
| **mineral fertilisers** | 197,705 | 202,054 | 4,349 | 2% |
|  | 3,224,654 | 2,756,000 | -468,654 | -15% |
|  | 1,814,964 | 1,423,800 | -391,164 | -22% |
|  | 311,822 | 392,516 | 80,694 | 26% |
| **natural sands, gravel and stones** | 35,475,139 | 38,522,204 | 3,047,065 | 9% |
|  | 41,345,431 | 43,057,000 | 1,711,569 | 4% |
|  | 1,838,142,737 | 1,639,276,500 | -198,866,237 | -11% |
|  | 12,463,686 | 13,506,136 | 1,042,450 | 8% |
| **non-iron ores** | 3,043,062 | 2,749,584 | -293,478 | -10% |
|  | 61,486 | 22,000 | -39,486 | -64% |
|  | 512,051 | 0 | -512,051 | -100% |
|  | 4,621,799 | 3,488,596 | -1,133,203 | -25% |

| | Submission 2021 | Submission 2022 | absolute change | relative change |
|---|---|---|---|---|
| **raw coals** | 19,571 | 26,136,332 | 26,116,761 | 133446% |
| | 48,277,288 | 41,538,000 | -6,739,288 | -14% |
| | 12,593,015 | 12,603,300 | 10,285 | 0% |
| | 16,187,881 | 12,695,386 | -3,492,495 | -22% |
| **secondary raw materials** | 15,101,718 | 16,441,457 | 1,339,739 | 9% |
| | 20,565,387 | 17,627,000 | -2,938,387 | -14% |
| | 502,448,809 | 175,973,100 | -326,475,709 | -65% |
| | 3,427,249 | 3,502,952 | 75,703 | 2% |
| **rock & saline salt** | 3,977,618 | 4,621,784 | 644,167 | 16% |
| | 3,017,352 | 2,673,000 | -344,352 | -11% |
| | 11,820,822 | 8,527,200 | -3,293,622 | -28% |
| | 1,116,411 | 961,803 | -154,608 | -14% |
| **nitrogen fertilisers** | 4,466,442 | 4,975,009 | 508,567 | 11% |
| | 12,318,493 | 11,774,000 | -544,493 | -4% |
| | 68,151,044 | 29,142,700 | -39,008,344 | -57% |
| | 7,239,705 | 7,385,920 | 146,215 | 2% |
| **white cement, lime, cement** | 2,978,726 | 2,896,408 | -82,318 | -3% |
| | 18,679,111 | 17,758,000 | -921,111 | -5% |
| | 99,899,785 | 82,985,300 | -16,914,485 | -17% |
| | 2,172,344 | 1,972,384 | -199,960 | -9% |
| **sugar beet** | 5,912,659 | 0 | -5,912,659 | -100% |
| | 0 | 2,000 | 2,000 | |
| | 31,023,482 | 32,540,800 | 1,517,318 | 5% |
| | 3,277 | 0 | -3,277 | -100% |

table: Revised particulate matter emissions from of bulk goods transported in 2019, in kilotonnes

| | $PM_{2.5}$ | $PM_{10}$ | TSP |
|---|---|---|---|
| **current submission** | 6,62 | 33,1 | 66,2 |
| **previous submission** | 8,52 | 42,6 | 85,2 |
| **absolute change** | -1,90 | -9,52 | -19,0 |
| **relative change** | -22,3% | -22,3% | -22,3% |

# Planned improvements

Although no specific improvement is planned, additional effort will be necessary to further minimise the inconsistencies in the activity data time series resulting from the different approaches applied.

---

[1,5] Müller-BBM, 2011: Dr. Matthias Bender, Ludger Gronewäller, Detlef Langer: Konsistenzprüfung und Verbesserungspotenzial der Schüttgutemissionsberechnung - Umweltforschungsplan des Bundesministeriums für Umwelt, Naturschutz und Reaktorsicherheit, Förderkennzeichen3708 49 107 2 - FB 00 1453 UBA; Müller- BBM GmbH, Im Auftrag des Umweltbundesamtes, Planegg/Dessau-Roßlau, Februar 2011 - URL:
https://www.umweltbundesamt.de/publikationen/konsistenzpruefung-verbesserungspotenzial
[2] Eurostat, 2015a: Standard Goods Classification for Transport Statistics/Revised (1967) NST/R - URL
[3] Eurostat, 2015b: Standard Goods Classification for Transport Statistics, 2007 - URL:
https://ec.europa.eu/eurostat/ramon/nomenclatures/index.cfm?TargetUrl=LST_NOM_DTL&StrNom=NST_2007&StrLanguageCode=EN&IntPcKey=&StrLayoutCode=HIERARCHIC
[4] Destatis, 2013: Statistisches Bundesamt, Verkehr, NST-2007: Einheitliches Güterverzeichnis für die Verkehrsstatistik – 2007 - URL:
https://www.destatis.de/DE/Themen/Branchen-Unternehmen/Transport-Verkehr/Gueterverkehr/Tabellen/nsz-2007.html