

# National Report by Germany 2017

Enhanced Black Carbon and Methane Emissions  
Reductions – Arctic Council Framework for Action

**NATIONAL REPORT BY  
GERMANY –  
DECEMBER 2017**

## Framework for Enhanced Black Carbon and Methane Reductions

# **Report to the Arctic Council by Germany on policies to reduce emissions of black carbon and methane**

### General remark

The reduction of Black Carbon and Methane Emissions in the Arctic is of critical importance to tackle Climate change in this rapid changing region. Therefore Germany welcomes and supports the Arctic Councils' initiatives on Black Carbon and Methane Emissions Reduction. As an Observer State we support multilateral cooperation on Arctic issues.

This report contains the most actual data on emissions and emission projections which are consistent with the data that will be submitted early next year to the European Commission and the United Nations Framework Convention on Climate Change and the United Nations Convention on Long-range Transboundary Air Pollution.

# Summary of current black carbon emissions reported to CLRTAP

## Emissions Inventories for the years 2000 up to 2016

The emissions of black carbon (BC) are submitted voluntarily in the framework of the Convention on Transboundary Air Pollution on Long Distances (CLRTAP) under the Economic Commission for Europe of the United Nations (UNECE). The calculation of the BC inventories is annually performed by the single national entity for emission inventories at the Umweltbundesamt.

The detailed reported data are available at:

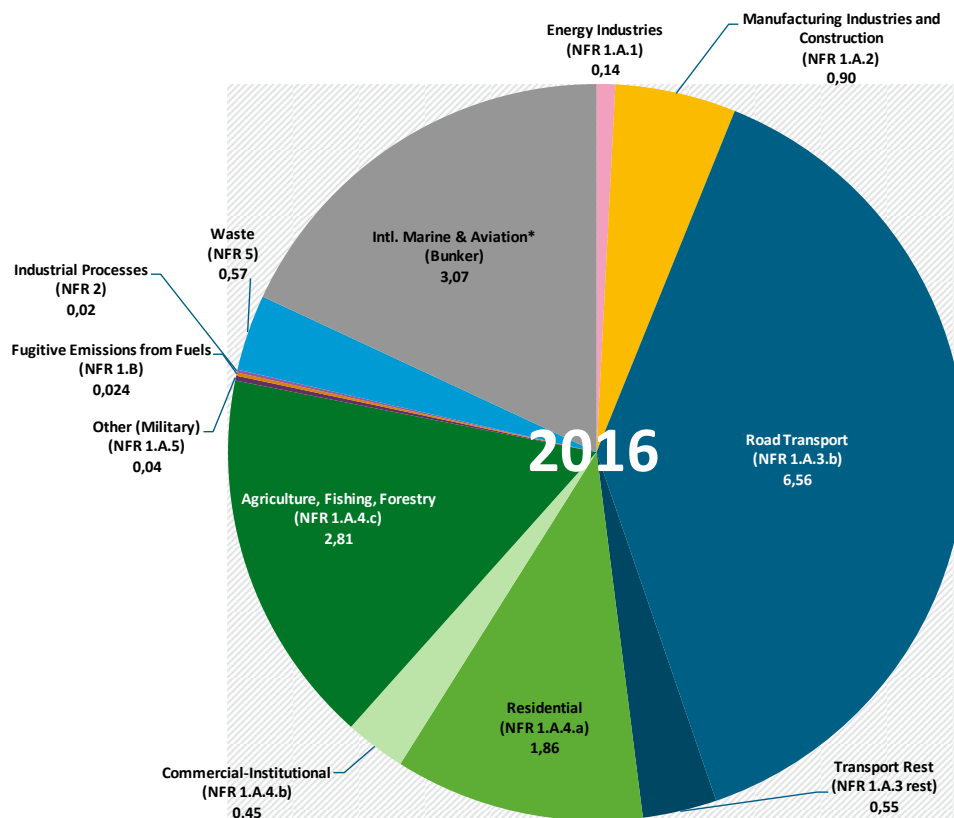
[http://www.ceip.at/ms/ceip\\_home1/ceip\\_home/status\\_reporting/](http://www.ceip.at/ms/ceip_home1/ceip_home/status_reporting/)

Germany reports Black Carbon (BC) emissions for all years from 2000 onward. The main sources are transport as well as mobile and stationary combustion. Germany uses the EMEP/EEA 2016 Guidebook to estimate BC emissions, augmented by some country specific emission factors, i.e. split factors for the BC portion of PM<sub>2.5</sub>, in particular in road transport. The following figure provides an overview on the sources and their respective contribution to the German national total.

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### Black Carbon Emissions in Germany

by detailed source category



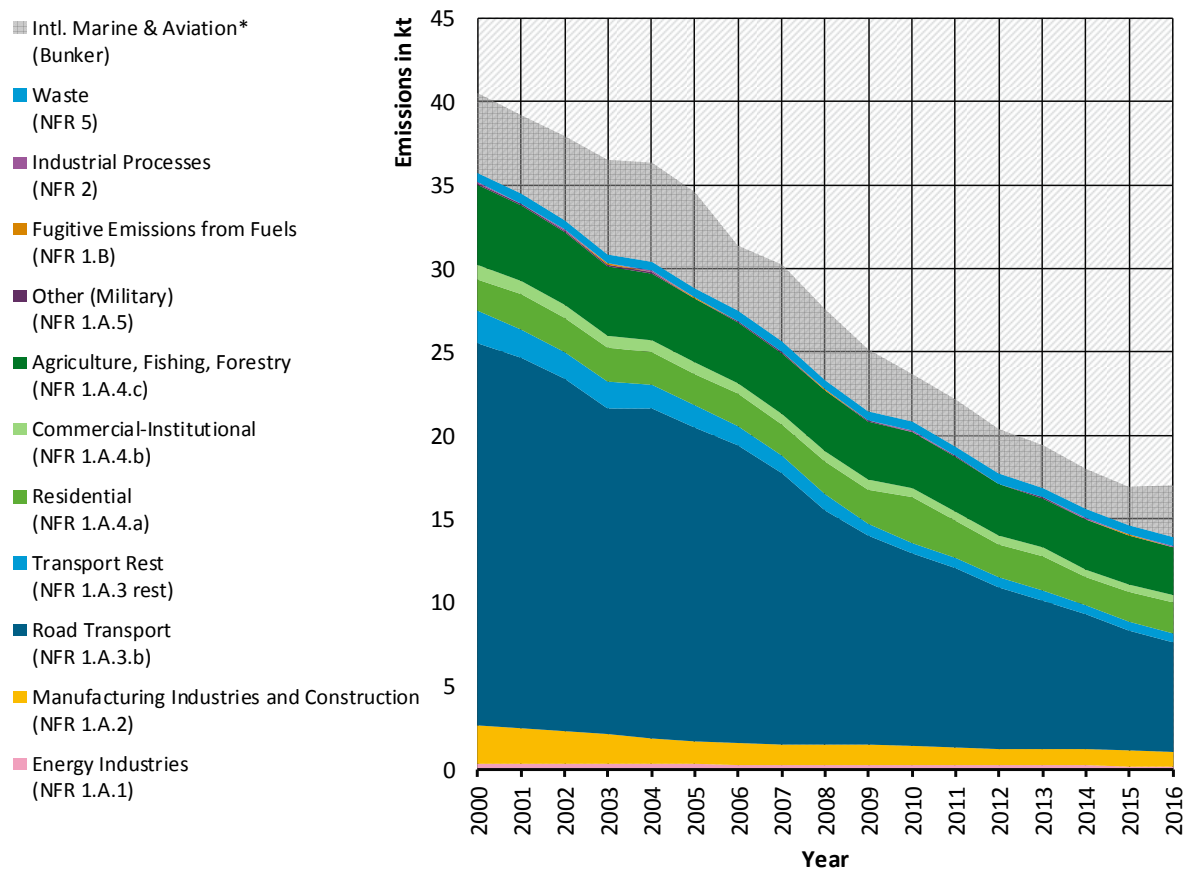
\* International Marine & Transport is not included in the National Totals

Quelle: German Environment Agency: Inventory Database (work-in progress, 12.12.2017)

Total Black Carbon emissions dropped by 61, 1% between 2000 and 2016. The main drivers are the transport emissions with 70% of total 2000 emissions, and a 71% reduction between 2000 and 2016. Over the whole time series, 90% of the transport emissions come from Road Transport. The overlying trend towards more diesel cars in the German car fleet slowed the decrease in emission over this period. 21% of the 2000 total emissions are from Other Sectors, mostly from residential stationary combustion and mobile sources therein, with a 32% reduction between 2000 and 2016.

## Black Carbon Emissions in Germany

by detailed source category



\* International Marine & Transport is not included in the National Totals

Quelle: German Environment Agency: Inventory Database (work-in progress, 12.12.2017)

In implementation of the recommendation from the last EGBCM meeting the following table provides the data in GNFR structure for 2010, 2013 and 2016.

<b>Black Carbon emissions (in kt) for selected years in GNFR format</b>			
	<b>2010</b>	<b>2013</b>	<b>2016</b>
A_PublicPower	0,08	0,09	0,08
B_Industry	0,27	0,20	0,16
C_OtherStationaryComb	3,19	2,53	2,29
D_Fugitive	0,02	0,02	0,02
E_Solvents	0,02	0,02	0,02
F_RoadTransport	11,61	8,90	6,56
G_Shipping	0,36	0,36	0,37
H_Aviation	0,04	0,04	0,04
I_Offroad	4,67	4,16	3,80
J_Waste	0,56	0,55	0,57
K_AgriLivestock	0,00	0,00	0,00
L_AgriOther	0,00	0,00	0,00
M_Other	0,00	0,00	0,00
<b>Total</b>	<b>20,81</b>	<b>16,87</b>	<b>13,90</b>

### Projection of Black Carbon emissions

Currently there is no projection available for the German Black Carbon emission. Therefore the Umweltbundesamt launched in 2017 a project to analyses and improve the existing projections for fine particle emissions and based on these results to develop scenarios and projections for Black Carbon emissions. The results will be available by end 2018 and will be included in the next German report.

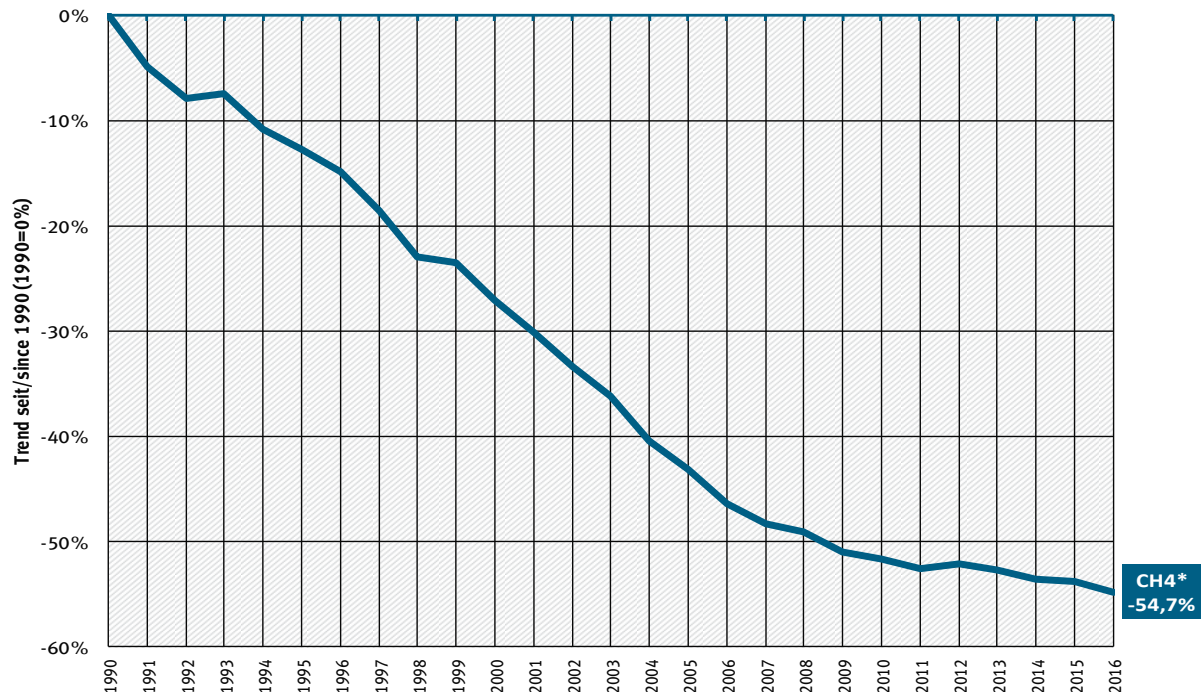
# Summary of current methane emissions to UNFCCC

## Emissions Inventories for the years 1990 up to 2016

Methane emissions are caused mainly by animal husbandry in agriculture, waste landfilling and distribution of liquid and gaseous fuels; energy-related and process-related emissions, and emissions from wastewater treatment, play an almost negligible role. Methane emissions have been reduced by 53.8 % since 1990. This trend has been primarily the result of environmental policy measures (waste separation, with intensified recycling and increasing energy recovery from waste) that has decreased landfilling of organic waste. A second important factor is that use of pit gas from coal mining, for energy recovery, has increased, while overall production of such gas has decreased (via closure of hard-coal mines). Emissions in this area have decreased by nearly 76 % since 1990. Yet another reason for the emissions reductions is that livestock populations in the new Federal Lander have been reduced, with reductions occurring especially in the first half of the 1990s. Repairs and modernisations of outdated gas-distribution networks in that part of Germany, along with improvements in fuel distribution, have brought about further reductions of total emissions.

### Jährliche Treibhausgas-Emissionen in Deutschland / Annual greenhouse gas emissions in Germany

Prozentuale Entwicklung von Methan / Trend of CH<sub>4</sub> emissions, in percent



\* Ohne LULUCF  
\* without LULUCF

Quelle/Source: Umweltbundesamt: Nationales Treibhausgasinventar 2018, v 0.2

The reported data in CRF-structure will be available under:

[http://unfccc.int/national\\_reports/annex\\_i\\_ghg\\_inventories/national\\_inventories\\_submissions/items/10116.php](http://unfccc.int/national_reports/annex_i_ghg_inventories/national_inventories_submissions/items/10116.php)<sup>1</sup>

<b>Emission trends for Germany since 1990, CH<sub>4</sub> in kt</b>											
Emission source categories	1990	1995	2000	2005	2010	2011	2012	2013	2014	2015	2016
<b>Total Emissions/Removals</b>	<b>4.844</b>	<b>4.232</b>	<b>3.542</b>	<b>2.769</b>	<b>2.360</b>	<b>2.315</b>	<b>2.340</b>	<b>2.313</b>	<b>2.267</b>	<b>2.259</b>	<b>2.211</b>
<b>1. Energy</b>	<b>1.609</b>	<b>1.224</b>	<b>1.003</b>	<b>616</b>	<b>480</b>	<b>476</b>	<b>529</b>	<b>512</b>	<b>479</b>	<b>502</b>	<b>491</b>
<b>A. Fuel Combustion</b>	<b>253</b>	<b>103</b>	<b>84</b>	<b>88</b>	<b>142</b>	<b>146</b>	<b>163</b>	<b>169</b>	<b>168</b>	<b>177</b>	<b>189</b>
1. Energy Industries	11	16	19	36	73	80	90	103	107	112	122
2. Manufacturing Industries and Construction	10	9	9	10	11	11	11	11	11	11	11
3. Transport	53	30	19	12	7	7	6	6	6	6	6
<i>thereof Road transportation</i>	53	29	19	11	7	6	6	6	6	5	5
4. Other Sectors	167	48	36	31	51	47	56	49	44	48	50
<i>thereof Commercial / Institutional</i>	58	11	4	2	2	3	2	1	1	1	1
<i>thereof Residential</i>	99	35	30	27	43	38	33	34	28	31	33
5. Other (military)	11	1	0	0	0	0	0	0	0	0	0
<b>B. Fugitive Emissions from Fuels</b>	<b>1.356</b>	<b>1.121</b>	<b>919</b>	<b>528</b>	<b>337</b>	<b>330</b>	<b>366</b>	<b>343</b>	<b>311</b>	<b>325</b>	<b>302</b>
1. Solid Fuels	1.022	774	664	305	137	130	164	143	112	124	99
2. Oil and Natural Gas	334	347	255	223	200	201	202	200	199	201	203
<b>2. Industry</b>	<b>14</b>	<b>18</b>	<b>23</b>	<b>24</b>	<b>21</b>	<b>21</b>	<b>21</b>	<b>20</b>	<b>21</b>	<b>21</b>	<b>21</b>
A. Mineral Industry											
B. Chemical Industry	13	17	21	22	20	19	19	19	19	19	20
C. Metal Industry	1	0	0	0	0	0	0	0	0	0	0
D. Non-Energy Products from Fuels											
E. Electronics Industry											
F. Product Uses as Substitutes for ODS											
G. Other Product Manufacture and Use	0	0	1	1	1	1	1	1	1	1	1
<b>3. Agriculture</b>	<b>1.709</b>	<b>1.465</b>	<b>1.372</b>	<b>1.282</b>	<b>1.272</b>	<b>1.263</b>	<b>1.267</b>	<b>1.289</b>	<b>1.298</b>	<b>1.292</b>	<b>1.278</b>
A. Enteric Fermentation	1.387	1.174	1.084	997	986	974	974	989	995	990	978
B. Manure Management	323	292	287	275	254	250	252	250	252	248	246
D. Agricultural Soils											
G. Liming											
H. Urea Application											
I. Other Carbon-containing Fertilizers											
J. Other	0	0	1	10	32	40	42	50	52	54	54
<b>4. Land Use, Land Use Change and Forestry</b>	<b>35</b>	<b>35</b>	<b>35</b>	<b>35</b>	<b>35</b>	<b>35</b>	<b>35</b>	<b>35</b>	<b>35</b>	<b>35</b>	<b>35</b>
A. Forest Land	1	1	1	1	1	1	1	1	1	1	1
B. Cropland	8	8	8	8	9	10	10	10	10	10	10
C. Grassland	24	24	23	23	21	21	21	21	21	21	20
D. Wetlands	2	2	2	2	2	2	2	2	2	2	2
E. Settlements	1	1	1	1	1	2	2	2	2	2	2
G. Harvested Wood Products											
<b>5. Waste</b>	<b>1.477</b>	<b>1.490</b>	<b>1.109</b>	<b>812</b>	<b>552</b>	<b>520</b>	<b>489</b>	<b>458</b>	<b>434</b>	<b>409</b>	<b>386</b>
A. Solid Waste Disposal	1.370	1.435	1.060	762	504	470	438	408	382	358	335
B. Biological Treatment of Solid Waste	1	7	15	19	22	24	26	25	28	28	28
D. Wastewater Treatment and Discharge	106	48	34	30	27	26	25	24	24	23	23
E. Other	NO	0	0	0	0	0	0	0	0	0	0
<b>Memo Items</b>	<b>32</b>	<b>32</b>	<b>32</b>	<b>31</b>	<b>31</b>	<b>31</b>	<b>31</b>	<b>31</b>	<b>31</b>	<b>31</b>	<b>31</b>
<b>International Bunkers</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
Aviation	0	0	0	0	0	0	0	0	0	0	0
Marine	0	0	0	0	0	0	0	0	0	0	0
<b>CO<sub>2</sub> Emissions from Biomass</b>											
KP 3.3 & 3.4 Reporting	32	32	32	31	31	31	31	31	31	31	31

<sup>1</sup> This link navigates to the 2017 submission because the page for the submission 2018 hasn't been created yet.



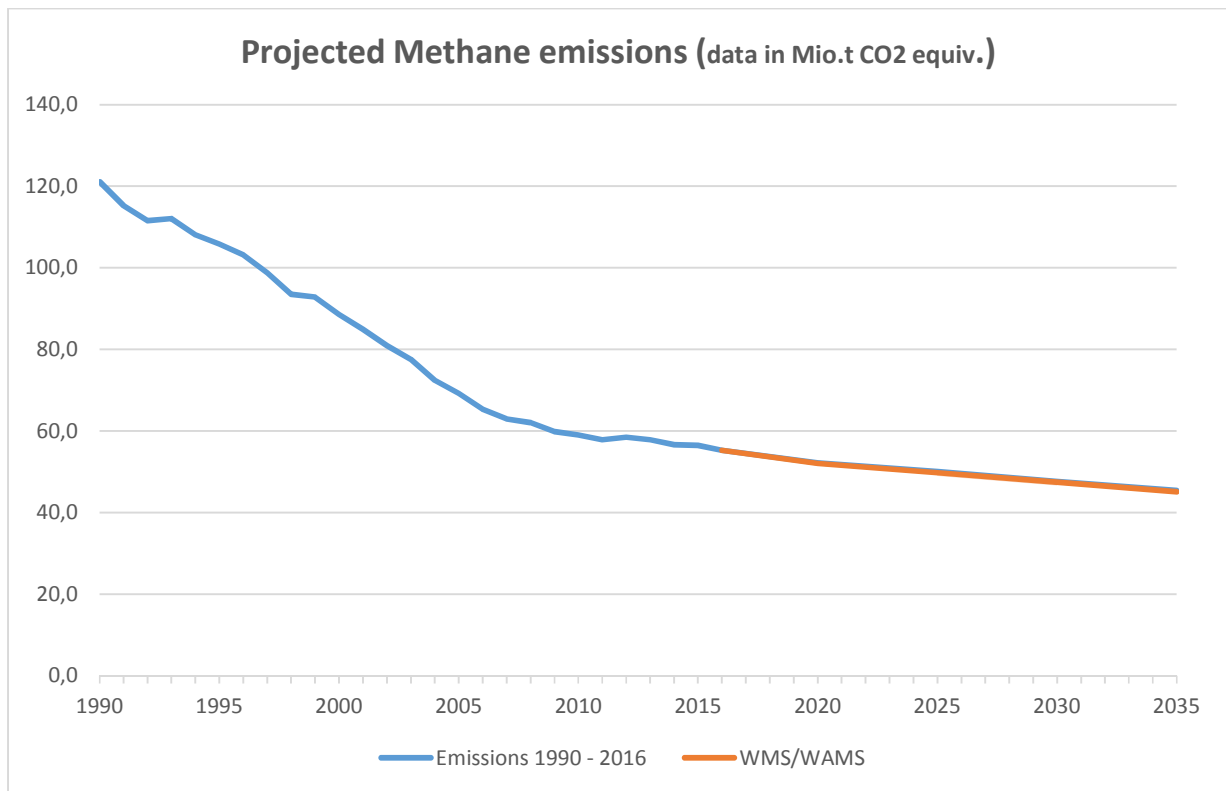
## Projection of Methane emissions

Projections have been developed in accordance with the UNFCCC reporting requirements in a “with measure scenario” (WMS) and in a “with additional measures scenario” (WAMS). The detailed descriptions on methods and models used as well as on the underlying parameter and data are contained in “2017 Projections Report for Germany pursuant to Regulation (EU) No. 525/2013”. This report is available under: [http://cdr.eionet.europa.eu/de/eu/mmr/art04-13-14\\_lcds\\_pams\\_projections/projections/envwqc4\\_g/](http://cdr.eionet.europa.eu/de/eu/mmr/art04-13-14_lcds_pams_projections/projections/envwqc4_g/)

Both in detail described scenarios results only in very small differences and modifications in the time series for the predicted Methane emissions. The reduction in 2035 compared to 1990 will be between 62, 5 % (WMS) and 62, 8 % (WAMS).

<b>Methane Projections WMS (data in Mio. t CO2 Äquiv)</b>								
Category	1990	2005	2010	2014	2020	2025	2030	2035
electricity production	0,3	1,0	2,0	2,4	3,6	3,4	2,6	1,8
other energy	0,1	0,1	0,0	0,2	0,3	0,2	0,2	0,1
Industrial combustion	0,2	0,1	0,1	0,1	0,1	0,1	0,1	0,1
commercial/institutional	2,0	0,1	0,2	0,4	0,1	0,0	0,0	0,0
residential	1,4	0,6	1,0	0,6	0,8	0,8	0,8	0,7
transport	1,3	0,3	0,2	0,2	0,2	0,1	0,1	0,1
fugitive emissions	33,9	13,2	8,4	7,9	5,3	5,3	5,3	5,2
industrial processes	0,3	0,6	0,5	0,5	0,6	0,6	0,6	0,6
agricultur	42,7	32,1	31,8	32,5	32,5	32,5	32,0	31,8
waste management	37,0	20,4	13,8	10,7	7,8	6,2	5,0	4,2
LULUCF	0,9	0,9	0,9	0,9	0,9	0,9	0,9	0,8
<b>National Total</b>	<b>121,1</b>	<b>69,2</b>	<b>59,0</b>	<b>56,7</b>	<b>52,2</b>	<b>50,1</b>	<b>47,6</b>	<b>45,4</b>

<b>Methane Projections WAMS (data in Mio. t CO2 Äquiv)</b>								
Category	1990	2005	2010	2014	2020	2025	2030	2035
electricity production	0,3	1,0	2,0	2,4	3,6	3,5	2,8	1,9
other energy	0,1	0,1	0,0	0,2	0,3	0,2	0,2	0,1
Industrial combustion	0,2	0,1	0,1	0,1	0,1	0,1	0,1	0,1
commercial/institutional	2,0	0,1	0,2	0,4	0,1	0,0	0,0	0,0
residential	1,4	0,6	1,0	0,6	0,8	0,8	0,8	0,7
transport	1,3	0,3	0,2	0,2	0,2	0,1	0,1	0,1
fugitive emissions	33,9	13,2	8,4	7,9	5,3	5,3	5,3	5,2
industrial processes	0,3	0,6	0,5	0,5	0,6	0,6	0,6	0,6
agricultur	42,7	32,1	31,8	32,5	32,5	32,5	32,0	31,8
waste management	37,0	20,4	13,8	10,7	7,7	5,8	4,7	3,8
LULUCF	0,9	0,9	0,9	0,9	0,9	0,9	0,9	0,8
<b>National Total</b>	<b>121,1</b>	<b>69,2</b>	<b>59,0</b>	<b>56,7</b>	<b>52,1</b>	<b>49,8</b>	<b>47,5</b>	<b>45,1</b>



## Summary of National Actions, National Action Plans, or Mitigation Strategies by sector

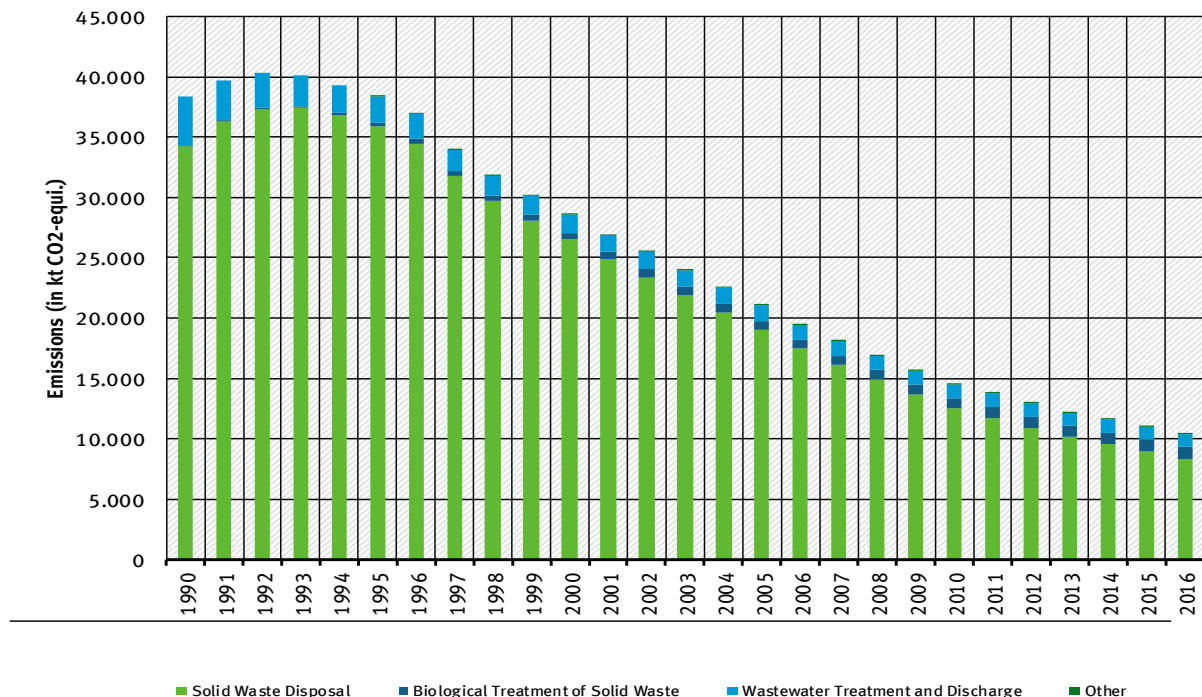
Germany reports about the national climate change mitigation policies and measures under the EU Monitoring Mechanism Regulation (EU No 525/2013). This information is available at: [http://cdr.eionet.europa.eu/de/eu/mmr/art04-13-14\\_lcds\\_pams\\_projections/projections/envwqc4\\_g/](http://cdr.eionet.europa.eu/de/eu/mmr/art04-13-14_lcds_pams_projections/projections/envwqc4_g/). In addition actions and foreseen plans are in detail described in the reports under UNFCCC requirements. The most recent report will be the 7th National Communication which will be submitted by end of 2017. The report will be available under: [http://unfccc.int/national\\_reports/annex\\_i\\_natcom/submitted\\_natcom/items/10138.php](http://unfccc.int/national_reports/annex_i_natcom/submitted_natcom/items/10138.php)

## Highlights of best practices or lessons learned for key sectors

### Reducing Methane emissions from managed disposal in landfills – landfilling of municipal waste:

Annual greenhouse gas emission in Germany, from Waste & Waste Water

by sub-category



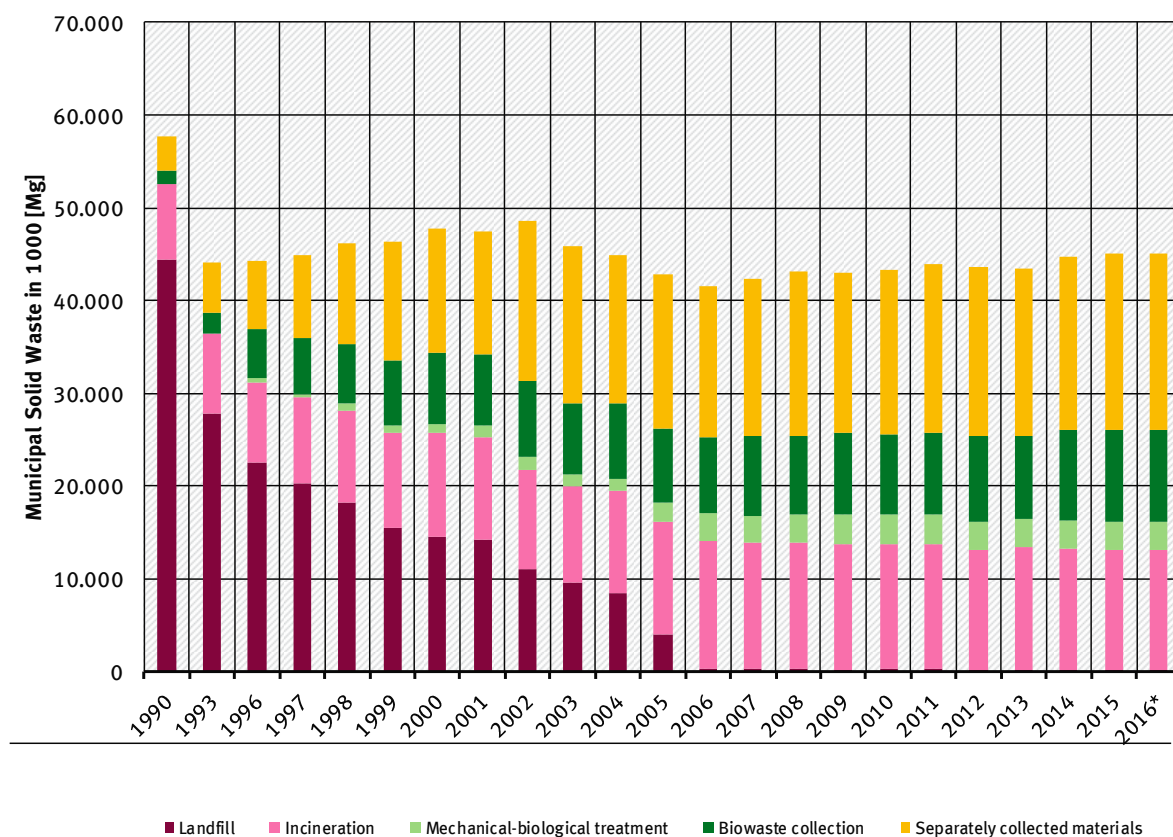
Quelle: Umweltbundesamt: Nationales Treibhausgasinventar 2017, interne Arbeitsfassung v0.3

In the period since 1990 a number of legal provisions have been issued pertaining to Germany's waste-management sector, and a number of relevant organizational measures have been initiated. These moves have had a strong impact on trends in emissions from waste-landfilling. Relevant developments have included intensified collection of biodegradable waste from households and the commercial sector, intensified collection of other recyclable materials, such as glass, paper/cardboard, metals and plastics; separate collection of packaging; and recycling of packaging. In addition, incineration of settlement waste has been expanded, and mechanical biological treatment of residual waste has been introduced. As a result of such measures, amounts of landfilled settlement waste decreased very sharply from 1990 to 2006, and they have been stabilizing at a low level since 2006 (Figure below). As the figure shows, over half of settlement waste produced in Germany today is collected separately and gleaned for recyclable materials (separate collection of recyclable materials and biodegradable waste).

In 2004, about 330 landfills for settlement waste were in operation in Germany. By that year, strict legal regulations were already in place that require such landfills to have equipment for collecting and treating landfill gas. Those regulations have extensively reduced methane emissions from such facilities. In June 2005, in keeping with new, stricter requirements under the Ordinance on Environmentally Compatible Storage of Waste from Human Settlements (Abfallablagungsverordnung) and the Landfill Ordinance (Deponieverordnung), over half of all landfills were closed. As a result, only about 150 landfills for settlement waste are now still in operation. Pursuant to regulations in force since June 2005, landfilling of biodegradable waste is no longer permitted. Consequently, since June 2005 it has no longer been possible to landfill waste with the potential for significant methane formation. For conformance with pertinent requirements, settlement waste and other biodegradable waste must be pre-treated via thermal or mechanical biological processes. In waste landfilled after 2006, just a few waste components, with very small methane-formation potential (such as residues from treatment in MBT facilities; small wood fractions in construction rubble) have contributed to landfill-gas formation. As landfill-gas formation in older landfills drops off, methane emissions from landfills will again decrease extensively and will then, in the long term, stabilise at a very low level.

### Changes in pathways for management of settlement waste

1990 to 2014, with intermediate years



By reducing landfill methane emissions from 1.4 million kt CH<sub>4</sub> in 1990 to 0.4 million kt in 2016, Germany's waste-management sector has made an important contribution to climate protection. The lower methane emissions from the solid waste management amount to a decrease of 24 million tonnes of CO<sub>2</sub> equivalents per year and, thus, to a 2.2 % reduction of Germany's entire greenhouse-gas emissions. Experience gained by Germany's waste-management sector shows that reductions of landfilled quantities of biodegradable waste can provide significantly higher contributions to climate protection than can collection and treatment of landfill gas.

## Projects relevant for the Arctic

The German Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety is financing a research project from 2015-2017 to address greenhouse gas and Black Carbon (BC) emissions of maritime shipping. The preliminary results of a multi-instrument BC measurement campaign that were carried out as part of this project have been submitted to the International Maritime Organization's (IMO) Sub-Committee on Pollution Prevention and Response (Submissions PPR 4/9/4 and PPR 4/INF.9), with final results expected by end of 2017. The results will be submitted to PPR 5 and may guide the IMO in its work to identify the most appropriate BC measurement method(s) for international shipping and to investigate appropriate BC emission control measures.

## Other information if available (e.g., climate, health, environmental, economic effects of emissions and mitigation)

N/A