5.B.2 - Biological Treatment of Waste: Anaerobic Digestion at Biogas Facilities

Short description

Within NFR category **5.B.2**, ammonia (NH_3) emissions from the anaerobic digestion at biogas facilities are reported.

Category Code	Method					AD					EF				
5.B.2	CS					NS					CS				
Key Category	**SO_2**	**NO_x**	**NH_3**	**NMVOC**	**CO**	**BC**	**Pb**	**Hg**	**Cd**	**Diox**	**PAH**	**HCB**	**TSP**	**PM_{10}**	**$PM_{2.5}$**
5.B.2	-	-	-/-	-	-	-	-	-	-	-	-	-	-	-	-

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

Separately collected organic waste (biowaste) from e.g. households, public garden and park service, food industry, restaurants, canteens and from agriculture can be treated in two different ways:
aerobically (composting) and anaerobically (biogas production).

The aim of the treatment is the production of digestate, leading to the recycling of nutrients and organic matter.

The produced digestate is used as fertilizer or soil improver in agriculture or horticulture and also in private gardening. In Germany, about one third of the organic waste is treated in anaerobic digestion plants and ammonia (NH_3) is an important emission to air.

Method

Emissions from anaerobic digestion at biogas facilities are not a key source and of minor priority.

Activity data

Official statistical data (Statistisches Bundesamt, Fachserie 19, Reihe 1: Abfallentsorgung (Waste management), Table 2.1; [1]) are used for the estimation. The data are published on a yearly basis with an exception for the actual year of reporting. The activity data for the actual year of reporting are obtained, initially, by carrying the relevant data from the previous year forward, in unchanged form. In the following year, when the actual activity data for the given year becomes available, they replace the data that were carried forward. This procedure has only a very small impact on the total emissions in the relevant current report year.

Emission factors

The emission factors used for calculating NH_3 emissions are based on emission data from a research project [2].

Uncertainties

The AD from Statistisches Bundesamt have an uncertainty of ±2% whereas the uncertainty for the EF is -18/+920% (ibid.).

Recalculations

When preparing the current inventory data, statistical data are only available for the previous reporting year, as the Federal Statistical Office's waste statistics are one year behind schedule. The current reporting year must therefore be extrapolated on the basis of the previous year. The result of this approach is revised by the correct data in the following year. For this reason, annual recalculations are required for the previous year. Since the resulting recalculation is always extremely small, it is no longer reported here.

However, for the year 2010, an error has been noticed in the reported waste volume. This error is corrected in the current reporting. Instead of 3.416,300 kt of biowaste as reported in 2020, 3.416,944 kt were used in the anaerobic digestion plants. NH_3 emissions are thus corrected from 936,07 t to 936,24 t for 2010

Planned improvements

Currently no improvements are planned.

[1]
Statistisches Bundesamt, Fachserie FS 19, Reihe 1: Abfallentsorgung; Wiesbaden; URL: https://www.destatis.de/DE/Publikationen/Thematisch/UmweltstatistischeErhebungen/Abfallwirtschaft/Abfallentsorgung.html
[2]
Carsten Cuhls, Birte Mähl, Joachim Clemens; gewitra Ingenieurgesellschaft für Wissenstransfer mbH: Ermittlung der Emissionssituation bei der Verwertung von Bioabfällen; https://www.umweltbundesamt.de/publikationen/ermittlung-der-emissionssituation-bei-der; im Auftrag des Umweltbundesamtes, April 2015