2.B.1 - Ammonia Production

Short description

Method	AD	EF	Key Category
T2	PS	D	*no key category*

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

Ammonia is produced on the basis of hydrogen and nitrogen, using the Haber-Bosch process. Hydrogen is produced from synthetic gas based on natural gas, via a highly integrated process, steam reforming, while nitrogen is produced via air dissociation. The various plant types for the production of ammonia cannot be divided into individual units and be compared as independent process parts, due to the highly integrated character of the procedure. In **steam reforming**, the following processes are distinguished: * ACP - Advanced Conventional Process - with a fired primary reformer and secondary reforming with excess air (stoichiometric H/N ratio) * RPR - Reduced Primary Reformer Process - under mild conditions in a fired primary reformer and secondary splitting with excess air (sub-stoichiometric H/N ratio) * HPR - Heat Exchange Primary Reformer Process – autothermic splitting with heat exchange using a steam reformer heated with process gas (heat exchange reformer) and a separate secondary reformer or a combined autothermic reformer using excess air or enriched air (sub-stoichiometric or stoichiometric H/N ratio).

The following procedure is also used: **Partial oxidation** – Gasification of fractions of heavy mineral oil or vacuum residues in production of synthetic gas. Most plants operate according to the steam-reforming principle, with naphtha or natural gas. Only 3 % of European plants use the partial oxidation procedure.

The production decrease of more than 15 % in the first year after German reunification was the result of a market shake-up, over 2/3 of which was borne by the new German Länder. The production level then remained nearly constant in the succeeding years until 1994. The reasons for the re-increase as of 1995, to the 1990 level, are not understood; the re-increase may be due to a change in statistical survey methods, however. After 1990, production levels fluctuated only slightly. Since then, the rate of ammonia production has been stable.

Methodology

There were five plants in Germany which produced ammonia, using both processes. But since the mid of 2014 there are only four left. Both processes are still used, the Steam-Reforming-Process and the partial oxidation.

Activity data

As the CO,,2,, emissions from ammonia production are a key category, activity data are collected plant-specifically: The AD are delivered based on a cooperation aggrement with the ammonia producers and the IVA (Industrieverband Agrar). The plant specific data are made anonymous by the IVA and then are send to the UBA.

Emission factor

For NO,,x,, and NH,,3,,, the default emission factors of the CORINAIR Guidebooks of 1 kg/t NH,,3,, for NO,,x,, and respectively 0.01kg/t NH,,3,, for NH,,3,, are used (EEA, 2013) [1)].

Recalculations

With **activity data** and **emission factors** remaining unrevised, no recalculations have been carried out compared to last year's submission.

Planned improvements

At the moment, no category-specific improvements are planned.

For pollutant-specific information on recalculated emission estimates for Base Year and 2018, please see the pollutant

specific recalculation tables following chapter 8.1 - Recalculations.

[1)] EEA, 2013: EMEP EEA Emission Inventory Guidebook 2013, Aug 2013: page 15, table 3.2: Tier 1 emission factors for source category 2.B.1 Ammonia production