2.B.2 - Nitric Acid Production

Short description

Method	AD	EF	Key Category
T2	PS	D	**L/T**: NO_x

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

During the production of nitric acid, nitrogen oxide occurs in a secondary reaction. In Germany, there are currently seven nitric acid production plants. HNO_3, production occurs in two process stages:

- Oxidation of NH_3 to NO and
- Conversion of NO to NO_2 and absorption in H_2O.

Details of the process are outlined below:
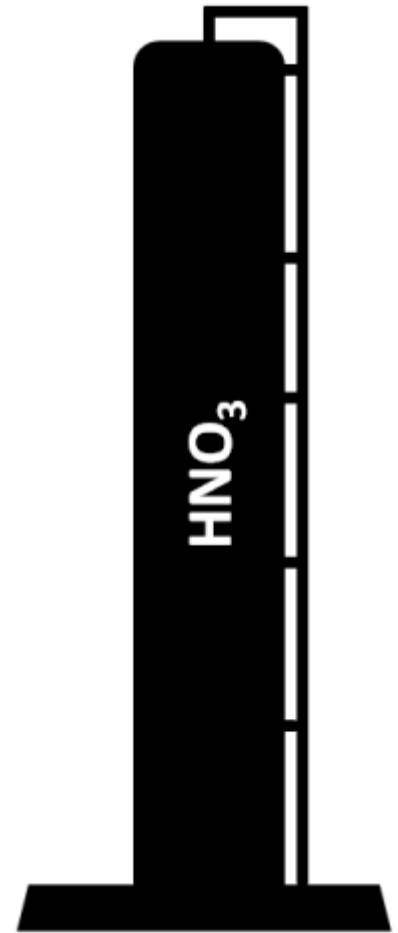
Catalytic oxidation of ammonia

A mixture of ammonia and air at a ratio of 1:9 is oxidised, in the presence of a platinum catalyst alloyed with rhodium and/or palladium, at a temperature of between 800 and 950 °C. The related reaction, according to the Oswald process, is as follows:

$4 NH_3 + 5 O_2 \rightarrow 4 NO + 6 H_2O$
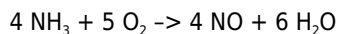
Simultaneously, nitrogen, nitrous oxide and water are formed by the following undesired secondary reactions:

$4 NH_3 + 3 O_2 \rightarrow 2 N_2 + 6 H_2O \quad 4 NH_3 + 4 O_2 \rightarrow 2 N_2O + 6 H_2O$
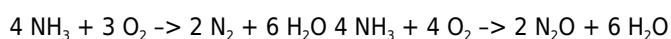
All three oxidation reactions are exothermic. Heat may be recovered to produce steam for the process and for export to other plants and/or to preheat the residual gas. The reaction water is condensed in a cooling condenser, during the cooling of the reaction gases, and is then conveyed into the absorption column.

Methodology

Activity data

As this source category is a key category for N_2O, plant specific activity data are applied here according to the IPCC guidelines.

These data are made available basically via a co-operation agreement with the nitric acid producers and the IVA (Industrieverband Agrar). As the data provided by the producers has to be treated as confidential, it is anonymised by the IVA before submitting it to the UBA. Here, one producer is delivering its data directly to the UBA. After checking these specific data, they are merged with the IVA.

According to the IVA, catalytic reduction is used as a reduction method in some of the plants.

Emission factors

For NO_x the default emission factor from the EEA Emission Inventory Guidebook of 10 kg/t NH_3[1] is used.

Recalculations

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

> 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.

Planned improvements

Germany is in contact with the IVA with the aim to get a Country-specific EF for the NOx emissions. It is expected that the Country-specific EF will be lower than the Default EF.

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[1] EEA, 2013: EMEP EEA Emission Inventory Guidebook 2013, Aug 2013: page 15, table 3.3 Tier 1 emission factor for source category 2.B.2 Nitric acid production