Category		Title
NFR	2.B.7	Soda ash production
SNAP	040619	Soda ash production and use
ISIC		
Version	Guidebook 2019	

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Contents

1 Overview

The present chapter presents a simple emission estimation method (Tier 1 only) for the production of soda ash. Information has been taken from external sources, including the 2006 IPCC Guidelines for National Greenhouse Gas Inventories (IPCC, 2006) and the Best Available Technique Reference (BREF) document for large volume solid inorganic chemicals (European Commission, 2007).

2 Description of sources

2.1 Process description

Soda ash is used in a variety of applications, including glass production, soaps and detergents, flue gas desulphurisation, chemicals, pulp and paper and other common consumer products. Soda ash production and consumption (including sodium carbonate, Na_2CO_3) results in the release of pollutants. The main pollutant is carbon dioxide (CO_2) and it is good practice to report this pollutant in compliance with the IPCC Guidelines for National Greenhouse Gas Inventories (IPCC, 2006). On average, 200–300 kg CO_2 are vented into the atmosphere per tonne of soda ash produced.

A more detailed description of the soda ash industry is available in the BREF document on large solid inorganic chemicals (European Commission, 2007). This description includes an extensive process description, present consumption and emission levels as well as information on Best Available Techniques for this source.

2.2 Techniques

This document does not distinguish technologies in the soda ash industry. For more information, please refer to the BREF document (European Commission, 2007).

2.3 Emissions and controls

Carbon monoxide (CO) is virtually inert through the process. All CO must therefore be vented to the atmosphere either at the kilns or through the carbonation tower after gas scrubbers. The amount of CO released depends on the conversion of CO into CO_2 (Boudouart reaction) during the limestone calcinations step.

During the oxidation of nitrogen in the kiln, NO_x and SO_x are emitted. The formation of NO_x is limited due to the moderate temperature of the combustion (approximately 1 100 °C). The formation of SO_x depends on the sulphur in the compounds and in the fuel. Emissions of NO_x and SO_x must be reported under source category 1.A.2.c and the use of the combustion-related factors in 1.A.2.c will account for the majority of the emissions.

In addition, dust is emitted from soda ash production in limited quantities, arising from handling and also from limestone conversion in kilns. It is common to use bag filters or wet scrubbers, which significantly reduce the levels of dust emitted to the atmosphere.

Measurements made in some plants indicate that more than 75 % of the dust emissions are relatively large particles (> 10 µm) and that the contribution of PM10 is relatively low.

3 Methods

3.1 Choice of method

The present chapter only sets out a Tier 1 default approach to estimate the emissions from the production and use of soda ash.

3.2 Tier 1 default approach

The present subsection provides default emission factors for this source category. Since it is only a minor source of emissions and not a key category, only Tier 1 default emission factors are provided.

3.2.1 Algorithm

The Tier 1 approach uses the general equation:

$$E_{pollutant} = AR_{production} \times EF_{pollutant} \qquad (1)$$

where:

$E_{pollutant}$ = the emission of the specified pollutant

$AR_{production}$ = the activity rate for the soda ash production/use

$EF_{pollutant}$ = the emission factor for this pollutant

The Tier 1 emission factors assume an 'averaged' or typical technology and abatement implementation in the country and integrate all sub-processes.

3.2.2 Default emission factors

The default emission factors for soda ash production are given in

Table 3.1 below. These are taken from the section on soda ash in the IPPC BREF document for large volume solid inorganic chemicals (European Commission, 2007).

Emission factors in the BREF documents are mostly given in ranges. The range is interpreted as the 95 % confidence interval, while the geometric mean of this range is chosen as the value for the emission factor in the table below.

Table 3.1 Tier 1 emission factors for source category 2.B.7 Soda ash production

Tier 1 default emission factors					
	Code	Name			
NFR Source Category	2.B.7	Soda ash production			
Fuel	NA				
Not applicable	NOx, NMVOC, SOx, Pb, Cd, Hg, As, Cr, Cu, Ni, Se, Zn, PCB, PCDD/F, Benzo(a)pyrene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Indeno(1,2,3-cd)pyrene, HCB				
Not estimated	PM10, PM2.5, BC				
Pollutant	**Value**	**Unit**	**95% confidence interval**		**Reference**
			Lower	**Upper**	
CO	9	kg/Mg soda ash produced	4	20	European Commission (2007)
NH3	0.9	kg/Mg soda ash produced	0.6	1.5	European Commission (2007)
TSP	0.1	kg/Mg soda ash produced	0.1	0.15	European Commission (2007)

Guidance on estimating emissions of NO_x and SO_x is given in source category 1.A.2.c (combustion emissions from chemicals manufacturing). Emissions of BC are considered to be insignificant.

3.2.3 Activity data

A lot of information on production statistics (for various source categories) is available from national statistics or United Nations statistical yearbooks.

Further guidance might also be provided in the 2006 IPCC Guidelines for National Greenhouse Gas Inventories (IPCC, 2006).

3.3 Tier 2 technology-specific approach

Not available for this source.

3.4 Tier 3 emission modelling and use of facility data

Not available for this source.

4 Data quality

4.1 Completeness

No specific issues.

4.2 Avoiding double counting with other sectors

No specific issues.

4.3 Verification

4.3.1 Best Available Technique (BAT) emission factors

The present subsection presents Best Available Technique emission factors derived from the BREF document for this industry, available at: http://eippcb.jrc.es/pages/FActivities.htm. The present subsection provides associated emission levels (AELs) with the use of BAT as defined in the BREF document. These are applicable to soda ash plants in the EU-25 based on the Solvay process.

Table 4.1 BAT associated emission factors for source category 2.B.7 Soda ash production

	Code	Name		
NFR Source Category	2.B.7	Soda ash production		
Fuel	NA	not applicable		
SNAP (if applicable)	040619	Soda ash production and use		
Technologies/practices	Solvay process			
Abatement				
Pollutant	**Value**	**Unit**	**95% confidence interval**	
			Lower	**Upper**
TSP (dry gas streams)	10	mg / Nm3	5	20
TSP (wet gas streams)	35	mg / Nm3	25	50

4.4 Developing a consistent time series and recalculation

No specific issues.

4.5 Uncertainty assessment

No specific issues.

4.5.1 Emission factor uncertainties

No specific issues.

4.5.2 Activity data uncertainties

No specific issues.

4.6 Inventory quality assurance/quality control (QA/QC)

No specific issues.

4.7 Gridding

No specific issues.

4.8 Reporting and documentation

No specific issues.

5 Glossary

$AR_{production}$	the activity rate for the soda ash production or use
$E_{pollutant}$	the emission of the specified pollutant
$EF_{pollutant}$	the emission factor for this pollutant

6 References

European Commission, 2007. *Integrated Pollution Prevention and Control (IPPC), Reference Document on Best Available Techniques (BREF) in Large Volume Inorganic Chemicals – Solids and others industry, August 2007*, (https://eippcb.jrc.ec.europa.eu/reference/), accessed 23 July 2019.

IPCC, 2006. 2006 IPCC Guidelines for National Greenhouse Gas Inventories. Eggleston, H.S., Buendia, L., Miwa, K., Ngara, T. and Tanabe, K. (eds), National Greenhouse Gas Inventories Programme. IGES, Japan.

7 Point of enquiry

Enquiries concerning this chapter should be directed to the relevant leader(s) of the Task Force on Emission Inventories and Projection's expert panel on combustion and industry. Please refer to the TFEIP website (www.tfeip-secretariat.org) for the contact details of the current expert panel leaders.