

EUROPEAN COMMISSION JOINT RESEARCH CENTRE Directorate B – Growth and Innovation Circular Economy and Industrial Leadership Unit (DG JRC.B.5) European IPPC Bureau

Seville, 14 July 2017

## **KICK-OFF MEETING**

## FOR THE DRAWING UP OF THE

## BEST AVAILABLE TECHNIQUES (BAT) REFERENCE DOCUMENT FOR COMMON WASTE GAS TREATMENT IN THE CHEMICAL SECTOR (the WGC BREF)

#### SEVILLE

#### 25 – 29 September 2017

## **BACKGROUND PAPER (BP)**

#### **INTRODUCTION**

The Industrial Emissions Directive (IED) (2010/75/EU), through its Chapters I and II, lays down a framework requiring Member States to issue operating permits for certain installations carrying out industrial activities described in its Annex I, including the chemical industry.

The Directive stipulates that permits must contain conditions based on **Best Available Techniques** (BAT) to achieve a high level of protection of the environment as a whole. The BAT conclusions of the BAT reference documents (BREFs) serve as the reference for the competent authorities when setting permit conditions for installations. BREFs are also used by industry when preparing applications for operating permits and by other parties interested in minimising the environmental impacts of industrial activities.

The technical working group (TWG) set up for the drawing up of the BAT reference document for Common Waste Gas Treatment in the Chemical Sector (WGC BREF) will hold its Kick-off Meeting (KoM) on 25 – 29 September 2017 in Seville, Spain. The KoM will determine/clarify the process for the drawing up of the WGC BREF, so that TWG members are aware of the specific tasks needed to deliver a high-quality BREF according to the agreed timetable.

This BP provides TWG members with an outline of the matters that are proposed to be addressed at the KoM. The BP also addresses some issues that were covered by the call for initial positions, but are not proposed for discussion at the KoM.

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## ACRONYMS USED IN THIS BACKGROUND PAPER

## **General acronyms – Definitions**

Acronym	Meaning		
BAT	Best Available Techniques (as defined in Article 3(10) of the IED)		
BAT-AEL	BAT-associated emission level (as defined in Article 3(13) of the IED)		
	BAT-associated environmental performance level (as described in Section 3.3 of		
BAT-AEPL	Commission Implementing Decision 2012/119/EU). BAT-AEPLs include BAT-		
	AELs		
BATIS	BAT Information System		
BREF	BAT reference document (as defined in Article 3(11) of the IED)		
DDEE	Commission Implementing Decision 2012/119/EU laying down rules concerning		
BREF	guidance on the collection of data and on the drawing up of, BAT reference		
Guidance	documents and on their quality assurance		
BP	Background Paper (i.e. this document)		
CAK BREF	BAT reference document for the Production of Chlor-alkali		
CLP	Classification Labelling and Packaging Regulation (EC) No 1272/2008		
CFCs	Chlorofluorocarbons		
CMR	Carcinogenic, mutagenic or toxic to reproduction		
	BAT reference document for Common Waste Water and Waste Gas		
CWW BREF	Treatment/Management Systems in the Chemical Sector		
D1	First draft		
LIDAR	Light detection and ranging or light identification, detection and ranging		
ECHA	European Chemicals Agency		
EDC	Ethylene dichloride		
EEA	European Environment Agency		
EFS BREF	BAT reference document on Emissions from Storage		
EFCTC	European Fluorocarbons Technical Committee		
EFTA	European Free Trade Association		
	European IPPC Bureau within Directorate B of the Commission's Joint Research		
EIPPCB	Centre		
ELV	Emission limit value		
EN	European Standard adopted by CEN (European Committee for Standardisation,		
EN	from its French name Comité Européen de Normalisation)		
E-PRTR	European Pollutant Release and Transfer Register		
ETS	Emission trading scheme		
EU	European Union		
FeMo	Ferromolybdenum		
HCB	Hexachlorobenzene		
HCFCs	Hydrochlorofluorocarbons		
HDPE	High-density polyethylene		
HFCs	Hydrofluorocarbons		
ICS BREF	BAT reference document on Industrial Cooling Systems		
IED	Industrial Emissions Directive (2010/75/EU)		
IP(s)	Initial position(s)		
	Integrated Pollution Prevention and Control Directive 2008/1/EC (repealed and		
IPPC Directive	replaced by the IED)		
IS BREF	BREF for Iron and Steel Production		
19.0	International Organisation for Standardisation. Also international standard adopted		
150	by this organisation		
I-TEQ	International toxic equivalent		
KEI(s)	Key environmental issue(s)		
KoM	Kick-off Meeting		
LCP BREF	BAT reference document for Large Combustion Plants		
LDPE	Low-density polyethylene		
LVIC-AAF	BAT reference document for the Manufacture of Large Volume Inorganic		
BREF	Chemicals – Ammonia, Acids and Fertilisers		
	BAT reference document for the Manufacture of Large Volume Inorganic		
LVIC-S BKEF	Chemicals – Solids and Others Industry		

LVOC BREF	BAT reference document for the Large Volume Organic Chemical Industry
MCP Directive	Medium Combustion Plants Directive (2015/2193/EU)
MDA	Methylene diphenyl diamine
MDI	Methylene diphenyl diisocyanate
MS	Member State(s)
NMVOC	Non-methane volatile organic compound
NO <sub>X</sub>	The sum of nitrogen monoxide (NO) and nitrogen dioxide (NO <sub>2</sub> ), expressed as NO <sub>2</sub>
OFC BREF	BAT reference document for the Manufacture of Organic Fine Chemicals
OGI	Optical gas imaging
OTNOC	Other than normal operating conditions
PAH	Polycyclic aromatic hydrocarbon
PBT	Persistent, bioaccumulating and toxic
PCB	Polychlorinated biphenyl
PCDD/F	Polychlorinated dibenzo-p-dioxin/furan
PFCs	Perfluorocarbons
PM	Particulate matter
PM.	Particulate matter which passes through a size-selective inlet with a 50 % efficiency
<b>r</b> 1 <b>v</b> 1 <sub>2.5</sub>	cut-off at 2.5 µm aerodynamic diameter as defined in Directive 2008/50/EC
PM.	Particulate matter which passes through a size-selective inlet with a 50 % efficiency
1 14110	cut-off at 10 µm aerodynamic diameter as defined in Directive 2008/50/EC
POL BREF	BAT reference document in the Production of Polymers
PVC	Polyvinyl chloride
REACH	Regulation (EC) No 1907/2006 concerning the Registration, Evaluation,
REACH	Authorisation and Restriction of Chemicals, administered by the ECHA
REF BREF	BAT reference document for the Refining of Mineral Oil and Gas
Reference	Example plant where a technique to consider in the determination of BAT (BAT
plant	candidate') is applied
ROM	JRC Reference Report on Monitoring of emissions to air and water from IED
	installations
SCR	Selective catalytic reduction
SNCR	Selective non-catalytic reduction
SOF	Solar occultation flux
SO <sub>X</sub>	The sum of sulphur dioxide (SO <sub>2</sub> ), sulphur trioxide (SO <sub>3</sub> ), and sulphuric acid aerosols, expressed as SO <sub>2</sub>
SIC BREF	BAT reference document for the Production of Speciality Inorganic Chemicals
SVHC	Substance of very high concern
TDA	Toluene diamine
TDI	Toluene diisocyanate
TN	Total nitrogen
TOC	Total organic carbon
TVOC	Total volatile organic carbon
TWG	Technical Working Group
UBA(DE)	Umweltbundesamt (German Federal Environment Agency)
VCM	Vinyl chloride monomer
VOC	Volatile organic compound (as defined in Article 3(45) of the IED)
vPvB	Very persistent, very bioaccumulating
WI BREF	BAT reference document on Waste Incineration
WCC DDEE	BAT reference document for Common Waste Gas Treatment in the Chemical
WGC BREF	Sector
WHO	World Health Organization
WHO-TEQ	WHO toxic equivalent

## **EU Member States and EFTA countries**

Acronym	Meaning
AT	Austria
BE	Belgium
CZ	Czech Republic
DE	Germany
DK	Denmark
ES	Spain
FI	Finland
FR	France
IE	Ireland
IT	Italy
NL	Netherlands
NO	Norway
PL	Poland
PT	Portugal
SE	Sweden
UK	United Kingdom

## Other stakeholders

Acronym/Name	Meaning
CEFIC	European Chemical Industry Council
ePURE	European Renewable Ethanol Association
EEB	European Environmental Bureau
EUROALLIAGES	Association of European Ferro-alloy producers
EUROFER	European Steel Association
EUROMETAUX	European Non-ferrous Metals Association
Fertilizers Europe	Association representing the major fertiliser manufacturers in Europe
FETSA	Federation of European Tank Storage Associations
ORGALIME	European Engineering Industries Association
VCI	Verband der Chemischen Industrie (German chemical industry association)

## 1 GENERAL INFORMATION

# 1.1 The WGC BREF and its relation to the Work Programme for the exchange of information

The current series of chemical BREFs is comprised of the following eight documents:

- Revised CAK BREF<sup>1</sup> published in 2014 under the IED;
- Revised CWW BREF<sup>2</sup> published in 2016 under the IED;
- LVOC BREF<sup>3</sup> published in 2003 under the IPPC Directive the review was finalised in June 2017 and its publication under the IED is expected in late 2017/early 2018;
- LVIC-AAF BREF<sup>4</sup> published in 2007 under the IPPC Directive;
- LVIC-S BREF<sup>5</sup> published in 2007 under the IPPC Directive;
- OFC BREF<sup>6</sup> published in 2006 under the IPPC Directive;
- POL BREF<sup>7</sup> published in 2007 under the IPPC Directive;
- SIC BREF<sup>8</sup> published in 2007 under the IPPC Directive.

The review of the chemical BREFs was already discussed on three occasions in the IED Article 13 forum (i.e. on 14 September 2014, 4 December 2014 and 19 October 2015). The outcome of these discussions and the way forward proposed by the Commission can be found in the Work Programme for the exchange of information under Article 13(3)(b) of the IED dated 29 January 2016<sup>9</sup>. The Work Programme and related documents are available on BATIS (Forum > Waste Gas Treatment in the Chemical Sector > 01 Preparatory work > 01 Chemical strategy and work programme).

In line with this, the drawing up of the WGC BREF will involve:

- collecting comprehensive and representative information and data on abatement techniques and emission levels across the whole chemical industry;
- collecting information and data from specific subsectors/products/processes that might require a dedicated approach (e.g. by relying on current BREFs and/or Member States' legislation);
- a thorough analysis of the information and data collected;

<sup>&</sup>lt;sup>1</sup> European Commission, Best Available Techniques (BAT) Reference Document for the Production of Chlor-alkali, 2014, http://eippcb.jrc.ec.europa.eu/reference/BREF/CAK\_BREF\_102014.pdf.

<sup>&</sup>lt;sup>2</sup> European Commission, Best Available Techniques (BAT) Reference Document for Common Waste Water and Waste Gas Treatment/Management Systems in the Chemical Sector, 2016,

http://eippcb.jrc.ec.europa.eu/reference/BREF/CWW\_Bref\_2016\_published.pdf.
 <sup>3</sup> European Commission, Best Available Techniques (BAT) Reference Document in the Large Volume Organic Chemical Industry, Final draft (February 2017),

http://eippcb.jrc.ec.europa.eu/reference/BREF/LVOC/LVOC\_Final\_Draft\_February\_2017\_website.pdf.

<sup>&</sup>lt;sup>4</sup> European Commission, Integrated Pollution Prevention and Control, Reference Document on Best Available Techniques for the Manufacture of Large Volume Inorganic Chemicals – Ammonia, Acids and Fertilisers, August 2007, <u>http://eippcb.jrc.ec.europa.eu/reference/BREF/lvic\_aaf.pdf</u>.

<sup>&</sup>lt;sup>5</sup> European Commission, Integrated Pollution Prevention and Control, Reference Document on Best Available Techniques for the Manufacture of Large Volume Inorganic Chemicals – Solids and other industry, August 2007, <u>http://eippcb.jrc.ec.europa.eu/reference/BREF/lvic-s\_bref\_0907.pdf</u>.

<sup>&</sup>lt;sup>6</sup> European Commission, Integrated Pollution Prevention and Control, Reference Document on Best Available Techniques for the Manufacture of Organic Fine Chemicals, August 2006, <u>http://eippcb.jrc.ec.europa.eu/reference/BREF/ofc\_bref\_0806.pdf</u>

<sup>&</sup>lt;sup>7</sup> European Commission, Reference Document on Best Available Techniques in the Production of Polymers, August 2007, http://eippcb.jrc.ec.europa.eu/reference/BREF/pol\_bref\_0807.pdf.

<sup>&</sup>lt;sup>8</sup> European Commission, Integrated Pollution Prevention and Control, Reference Document on Best Available Techniques for the Production of Speciality Inorganic Chemicals, August 2007, <u>http://eippcb.jrc.ec.europa.eu/reference/BREF/sic\_bref\_0907.pdf</u>

<sup>&</sup>lt;sup>9</sup> European Commission: Work programme for the exchange of information under Article 13(3)(b) of the IED for 2016 (and the outlook for the following years), 29 January 2016, <u>https://circabc.europa.eu/w/browse/33cff69c-bfd0-49e7-8f19-f75a9e062745</u>.

• the definition of generic BAT and BAT-AELs for emissions to air for the whole chemical industry, while identifying subsectors/products/processes that would require further specific consideration.

In principle, the WGC BREF concerns all chemical installations falling under the scope of the IED, i.e. the activities specified in Section 4 of Annex I to the IED. However, the scope of the WGC BREF regarding emissions to air may be restricted depending on the decisions taken by the TWG at the KoM.

As described in the Work Programme, the review of the five chemical BREFs that were published in 2006-2007 under the IPPC Directive (i.e. LVIC-AAF, LVIC-S, OFC, POL and SIC) will be postponed. Once the drawing up of the WGC BREF is at a sufficiently advanced stage, it will be decided which, if any, chemical subsectors/products/processes/subsectors would need to be addressed in other separate BREF(s), taking into consideration factors such as the number of installations in the EU and the magnitude of their emissions to the environment.

At this stage, the aim of the WGC BREF is to cover as many relevant sources of emissions to air as possible and manageable in order to avoid, or at least minimise, the need to review the remaining five existing chemical BREFs.

In their response to the call for initial positions, a number of TWG members requested more information on the future of these other five existing chemical BREFs. The EIPPCB proposes to set aside some time at the KoM to inform the TWG on the state of play regarding the work programme for the review of the chemical BREFs based on the previous discussions held at the level of the IED Article 13 forum. The decisions that the WGC TWG will take on the scope of the WGC BREF at the KoM will be taken into account by the European Commission when the issue of the future of the existing chemical BREFs is discussed at the next meeting of the IED Article 13 forum, which is expected to be later in 2017.

## 1.2 Process for the drawing up of the WGC BREF

The general timeline for the drawing up of a BREF is given in Section 1.2.4 of the BREF Guidance<sup>10</sup> and the approach to take was further agreed at the IED Article 13 forum meeting of 6 June 2013<sup>11</sup>. The WGC TWG will work using the following approach:

'Front-load' the exchange of information to achieve the best preparation for the Kick-off Meeting (KoM). The front-loading corresponds to Step 3 'Call for expression of initial positions' in

- Table 1.1.
- Adopt a more focused approach to the overall process for the drawing up of the WGC BREF by:
  - targeting the most important emission sources;
  - targeting a limited number of KEIs;
  - collecting sound and reliable data, followed by appropriate data processing;
  - focusing on BAT conclusions (and the associated BAT candidate chapter).
  - tackling difficult issues with working drafts.
- Strictly limit the possibilities for time slippages.

<sup>&</sup>lt;sup>10</sup> Commission Implementing Decision 2012/119/EU laying down rules concerning guidance on the collection of data and on the drawing up of BAT reference documents and on their quality assurance referred to in Directive 2010/75/EU of the European Parliament and of the Council on industrial emissions, Official Journal of the European Union, L 63, 3.3.2012, p. 1-39, http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX %3A32012D0119.

<sup>&</sup>lt;sup>11</sup> European Commission, Work programme for the exchange of information – overview, https://circabc.europa.eu/w/browse/33cff69c-bfd0-49e7-8f19-f75a9e062745

The timetable for the next steps for the drawing up of the WGC BREF will be discussed at the KoM. The steps completed and the main envisaged milestones and deadlines are summarised in Table 1.1.

Step	Milestone	Date
1	Start of preparation work by the EIPPCB (done)	July 2016
2	Activation of the TWG (done)	September 2016
3	Nominations of TWG members (done)	31 October 2016
4	Call for expression of initial positions (done)	20 January 2017
-	Call for expression of initial positions (done)	(deadline: 10/03/2017)
5	Kick-off Moating (KoM)	Week commencing 25
5	Kick-on Meeting (Kolvi)	September 2017
		To be agreed at the
6	Issue questionnaire for gathering plant-specific data	KoM
		Q1 2018 (tentatively)
	Submission of information in response to questionnaire	To be agreed at the
7		KoM
		Q2/Q3 2018
		(tentatively)
8	First formal draft of the WGC BREF (D1)	Q1 2019 (tentatively)
9	TWG comments on the first draft	Q2 2019 (tentatively)
10	Second formal draft of the WGC BREF (D2) (optional) (D2)	
11	TWG comments on the second draft (optional)	
12	Final TWG meeting	Q4 2019 (tentatively)
13	Final draft	Q2 2020 (tentatively)
14	Presentation to an IED Article 13 forum meeting	Q3 2020 (tentatively)
15	BAT conclusions vote at an IED Article 75 Committee	0.42020 (tentatively)
15	meeting	Q4 2020 (tentatively)
16	Publication of the BAT conclusions in the Official Journal of	012021 (tentatively)
10	the European Union	Q1 2021 (tentatively)
17	Publication of the BREF on the EIPPCB website	Q1 2021 (tentatively)

 Table 1.1:
 Completed and envisaged major milestones for the drawing up of the WGC BREF

## 1.3 Call for initial positions

The call for the expression of TWG members' initial positions (IPs) was issued by the EIPPCB on 20 January 2017, with a deadline for responses of 10 March 2017. It took into account the preliminary contributions of the TWG and contained a number of EIPPCB proposals for the issues to be covered by the WGC BREF, including:

- the scope;
- the BREF structure;
- the KEI candidates;
- the data collection;
- the selection of plants;
- the techniques to consider in the determination of BAT and emerging techniques.

Initial positions were submitted by 25 TWG members:

- 15 Member States and 1 EFTA country (i.e. AT, BE, CZ, DE, DK, ES, FI, FR, IE, IT, NL, NO, PL, PT, SE, UK);
- 8 industry organisations (i.e. CEFIC, ePURE, EUROALLIAGES, EUROFER, EUROMETAUX, Fertilizers Europe, FETSA, ORGALIME);

• 1 environmental NGO (EEB).

All IPs have been presented using the template 'Document 3', except the IPs of IE and FETSA. Some TWG members also provided a summary of their IPs.

As well as completing the template documents provided by the EIPPCB, additional information was submitted by:

- Belgium, who provided an overview of the common concerns of 10 Member States AT, BE, DE, DK, FI, FR, IT, NL, SE and UK; and
- CEFIC, who provided five additional documents setting out their views on KEIs, thresholds, abatement techniques, suggestions for site visits and other topics.

All information related to the TWG initial positions are available on BATIS (Forum > CommonWaste Gas Treatment in the Chemical Sector > 03 Call for initial positions > 02 TWG members initial positions for the drawing up of the WGC BREF).

## 1.4 Objectives of the Kick-off Meeting (KoM)

A description of the purpose of the KoM is given in Section 4.6.2.2 of the BREF Guidance.

As agreed at the IED Article 13 forum meeting of 6 June 2013, the KoM will decide particularly on the **scope** (see Section 2) and the **key environmental issues** (**KEIs**) (see Section 4) based on the stakeholders' input received via the call for initial positions. The KoM will adopt a focused approach to the overall WGC BREF elaboration process and to deriving BAT conclusions by ensuring that the scope of the WGC BREF is manageable and by limiting the number of KEIs.

Furthermore, the KoM will address and reach conclusions on the items listed below:

- the general timeline of the work see Section 1.2;
- the structure (and contents) of the WGC BREF see Section 3;
- the nature and extent of the data collection, including via questionnaire and addressing confidentiality issues see Section 5;
- the techniques to consider in the determination of BAT and emerging techniques see Section 6
- the specific tasks to be carried out by the TWG, especially indicating which TWG member will deliver specific information.

BATIS, the specific tool that the TWG will use to collect and exchange information (see Section 4.7.1 of the BREF Guidance), will be presented to the TWG as well as the procedures to submit information identified at the KoM.

During the KoM, there will be time to discuss the TWG members' initial positions. The discussions will necessarily be **kept general**, and discussions will not enter into deep technical debates. For example, positions on techniques and on whether a particular technique is BAT will <u>not</u> be discussed at this stage, because questions of this nature need to be informed by the upcoming data collection exercise. However, these initial positions will be looked at later together with the other information collected (e.g. data from the questionnaires, other contributions).

## **1.5 Structure and overview of this Background Paper**

The aim of this Background Paper (BP) is to assist TWG members in their preparation for the KoM and to create a common basis for the discussion during the meeting.

Individual issues in this Background Paper are presented as far as possible as follows:

## **Original EIPPCB proposal/request**

This cell contains the original EIPPCB proposal or request from the call for initial positions issued on 20 January 2017.

## **Summary of initial positions**

This cell contains a summary of the TWG members' initial positions. The full text of the individual positions is usually not provided. For more details on the individual initial positions (in particular the underlying rationale), please refer to BATIS where the initial positions of all the contributors can be found in full.

## EIPPCB assessment

This cell contains the EIPPCB's assessment of the positions and/or new information, and forms the basis for the revised proposal.

#### EIPPCB proposal

This cell contains the EIPPCB's proposal for the KoM to develop or resolve the issue. The proposal may be identical to the original EIPPCB proposal, a revised proposal or a new proposal. Additions are shown in green text and deletions using-strikethrough.

Unless indicated otherwise, the proposal will be brought for TWG discussion at the kick-off meeting. When there was broad support of the TWG for the original EIPPCB proposal which resulted in no or only minor amendments to the proposal, or there was broad agreement that an issue should be in or out of the WGC scope, then the issue concerned is not proposed for discussion to save discussion time and the proposal is considered adopted by the TWG. This is indicated in green text at the bottom of the cell. (e.g. in Section 2.2.1).

A number of supporting documents are referred to in this Background Paper. These documents are available on BATIS (Forum > Common Waste Gas Treatment in the Chemical Sector).

The order of the discussion items in this Background Paper will not necessarily be the order of the discussion at the KoM.

## **1.6 Before coming to the meeting**

## To enable meaningful discussions at the KoM, it is important that TWG members have read this Background Paper in advance of the meeting.

If you believe that issues other than those included in this Background Paper need to be discussed at the KoM, please address your request to the WGC BREF team (e-mail <u>JRC-IPTS-EIPPCB-WGC@ec.europa.eu</u>) before 4 September 2017. Such a request must also include a justification/rationale for each new issue proposed for discussion.

Similarly, if you consider that some of the issues addressed in this Background Paper and not proposed for discussion (e.g. see Section 2.2.1) should be brought to the discussion table, please also address your request to the WGC BREF team in the same way indicated before.

It is recommended that TWG members also read and familiarise themselves with the contents of the following documents and bring them to the meeting:

- The initial positions of TWG members posted in the BATIS forum for the WGC BREF.
- The BREF Guidance (Commission Implementing Decision 2012/119/EU). A copy may be obtained by clicking the link to the BREF Guidance at <u>http://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1474283772055&uri=CELEX:32012D0119</u>.
- The Industrial Emissions Directive 2010/75/EU (IED). A copy may be obtained by clicking the link to the IED at <u>http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32010L0075:EN:NOT</u>.

## 2 SCOPE

## 2.1 Overview

This section aims to steer the discussion on the scope of the WGC BREF.

The scope will be determined by considering:

- the decisions already taken at the level of the IED Article 13 forum level on the work programme for the review of the chemical BREFs;
- the anticipated interactions with the series of chemical BREFs and other BREFs (both 'horizontal' and 'vertical' ones);
- which of the activities listed in Annex I to the IED should be included/excluded; and
- whether any chemical subsectors, products or processes require further specific consideration (see Section 2.3).

A diagram has been produced to summarise the IPs on the scope, included in the BP as Annex 1 (see Section 7.1) and available on BATIS (Forum > Waste Gas Treatment in the Chemical Sector > 03 Call for initial positions > 03 Overview of TWG members initial positions).

The scope of the WGC BREF concerns the activities in Section 4 of Annex I to the IED:

'4. Chemical industry

For the purpose of this section, production within the meaning of the categories of activities contained in this section means the production on an industrial scale by chemical or biological processing of substances or groups of substances listed in points 4.1 to 4.6 ...'

## **Original EIPPCB proposal**

EIPPCB Proposal 1: to cover all chemical installations falling under the scope of the IED in the scope of the WGC BREF (unless specifically excluded by other proposals). However, depending on the decisions taken by the TWG on KEIs as well as on the quality and quantity of the data and information collected, the scope coverage might end up being more restricted.

#### Summary of initial positions

- 7 out of 21 IPs agreed with the proposal, 14 partly agreed and none disagreed.
- The main concerns of those who partly agreed were as follows:
  - The KoM should not make decisions on restricting the scope. Such decisions should only be made following an assessment of a comprehensive data and information collection (AT, EEB, IT).
  - The future of the existing vertical chemical BREFs should be clarified (BE, FI, FR, PT, UK).
- There were two alternative proposals:
  - The data and information collection should cover all pollutants and all chemical installations (AT, EEB, IT).
  - BAT from the existing series of chemical BREFs that are not covered by the WGC BREF should remain valid (BE).

## **EIPPCB** assessment

- The TWG broadly supported the first sentence of the proposal. Many of the responses were 'partly agree' rather than 'agree' because of concerns over the second sentence.
- Several TWG members expressed concerns over the second sentence, because they supported a comprehensive data and information collection covering all chemical activities and all pollutants with no emission thresholds. Those concerns are addressed in Section 4 when assessing the individual pollutants and threshold values.
- The original EIPPCB proposal provides flexibility, as it merely states that the scope coverage **might** end up being more restricted.
- As announced in the email of DG ENV dated 14 July 2017, the future of the other existing chemical BREFs will be discussed at the next IED Article 13 forum meeting.

## **EIPPCB** proposal

#### • Keep EIPPCB Proposal 1 unchanged:

EIPPCB Proposal 1: to cover all chemical installations falling under the scope of the IED in the scope of the WGC BREF (unless specifically excluded by other proposals). However, depending on the decisions taken by the TWG on KEIs as well as on the quality and quantity of the data and information collected, the scope coverage might end up being more restricted.

## 2.2 BAT on emissions to air in other relevant BREFs

## 2.2.1 CAK BREF

The review of the Production of Chlor-alkali (CAK) BREF was completed in 2013 and the published BREF can be found on the EIPPCB website<sup>1</sup>.

Original EIPPCB proposal
EIPPCB Proposal 2: to exclude CAK activities from the scope of the WGC BREF.
Summary of initial positions
• 15 out of 20 IPs agreed with the proposal 5 partly agreed and none disagreed
<ul> <li>The main concerns of those who partly agreed were as follows:</li> </ul>
- The scope of the CAK BREF does not cover all CAK activities and directly
associated activities. For example chlorine production by electrolysis of hydrochloric
acid; production of alcoholates, dithionites and alkali metals. Also, some CAK
activities may be associated with organic chemicals production (EEB, ORGALIME).
- The CAK BREF does not include diffuse emissions to air (SE).
- The future update of the chemical BREFs should be clarified (ePURE, NL).
• There were no alternative proposals, only comments.
EIPPCB assessment
• The TWG broadly supported the proposal.
• The chlor-alkali process is generally understood as the electrolysis of an aqueous solution
of sodium/potassium chloride to yield chlorine and sodium/potassium hydroxide.
• The electrolysis of hydrochloric acid yields chlorine, but no alkali. The production of
alcoholates and dithionites constitutes the production of organic compounds in which
sodium amaigam is in some cases used as an intermediate. The electrolysis of molten saits
• Nevertheless, the term 'CAK activities' used in EIDECP, Proposel 2 might not be
• Nevertheless, the term CAK activities used in EIFFCB Froposal 2 might not be unambiguous as there is no clear definition
• The CAK BREE covers the storage and handling of chlorine and hydrogen but there are no
BAT on the prevention or reduction of diffuse emissions and there are no recommendations
for future work on emissions to air. The EIPPCB therefore believes that the CAK BREF
has fully considered diffuse emissions from the activities that are within its scope. Other
diffuse emissions to air are addressed in Section 2.2.2.2 of this BP.
• As announced in the email of DG ENV dated 14 July 2017, the future of the other existing
chemical BREFs will be discussed at the next IED Article 13 forum meeting.
EIPPCB proposal
• Amend EIPPCB Proposal 2 as follows:
EIPPCB Proposal 2: to exclude those CAK-activities from the scope of the WGC BREF
that are included in the scope of the CAK BREF.
• This issue is not proposed for discussion at the KoM.

## 2.2.2 CWW BREF

## 2.2.2.1 Channelled emissions

The review of the Common Waste Water and Waste Gas Treatment/Management Systems in the Chemical Sector (CWW) BREF was completed in 2015 and the published BREF can be found on the EIPPCB website.<sup>1</sup> The CWW BREF provides a number of generic BAT conclusions concerning emissions to air that are relevant for the whole chemical industry, but no BAT-AELs for emissions to air.

## **Original EIPPCB proposal**

EIPPCB Proposal 3: to include channelled emissions to air in the scope of the WGC BREF except for those substances for which BAT-AELs have been set during the review of other chemical BREFs under the IED. This includes covering in the WGC scope emissions from individual and combined waste gas streams.

## Summary of initial positions

- 11 out of 21 IPs agreed with the proposal, 8 partly agreed and 2 disagreed.
- The main concerns of those who partly agreed were as follows:
  - The WGC BREF should provide clarity on how the BAT-AELs will apply to combined waste gas streams (DK). The same comment was made by BE, who agreed with the proposal.
  - There is a need to distinguish between combined waste gas streams from within the same process or from more than one process (UK).
  - Room ventilation should be excluded, as such off-gases are usually not channelled due to safety reasons. In those cases where the off-gases are channelled and treated, the resulting emission loads are often low (AT).
  - The review should be structured around the releases arising from subsectors/products/processes rather than just on the substances released (UK). The proposal does not define which BREFs are 'other chemical BREFs under the IED' (DK, IT, NL). The same comment was made by two TWG members who agreed with the proposal (EUROMETAUX, PL) and by two TWG members who disagreed with the proposal (ePURE, NL).
  - The proposal does not include diffuse emissions to air (SE).
  - The interaction between the different chemical BREFs should be clarified (PT).
- The main concern of those who disagreed was that the proposal is not clear, e.g. which BREF(s) cover flaring (ePURE, NL) or which BAT apply in the case of combined waste gas streams where some streams are covered by a pre-IED BREF and others by an IED BREF (NL).
- There were several alternative proposals, including minor changes of wording to address the concerns that were raised.

## EIPPCB assessment

- The TWG broadly supported the proposal.
- The second sentence of the proposal was included to clarify that the scope of the WGC BREF should be comprehensive and therefore include both individual and combined waste gas streams.
- Guidance on how BAT-AELs apply to combined streams may be an issue for implementation or may be considered at a later stage of the drawing up of the WGC BREF, but this does not seem necessary for the definition of the scope.
- Similarly, distinctions between different combined streams may need to be made at a later stage of the drawing up of the WGC BREF, but not for the definition of the scope.
- Emissions from room ventilation that are not channelled are considered diffuse emissions; diffuse emissions are addressed in Section 2.2.2.2. Channelled emissions from room ventilation might originate from the storage, transfer and handling of materials; this is addressed in Section 2.2.4. Channelled emissions from room ventilation might constitute minor emission sources; this is addressed by the EIPPCB Proposal 17 to specify emission thresholds for the data collection (see Section 4.3).

- The approach of the WGC BREF is to look at emissions to air from the chemical industry with a generic perspective, not product/process by product/process.
- The proposal could specify which BREFS are 'other chemical BREFs under the IED'.
- Diffuse emissions are addressed in Section 2.2.2.2.
- As announced in the email of DG ENV dated 14 July 2017, the future of the other existing chemical BREFs will be discussed at the next IED Article 13 forum meeting.
- Emissions from flaring were thoroughly assessed during the review of the CWW BREF, which contains two BAT conclusions for flaring and the EIPPCB believes that there are no major gaps.

## EIPPCB proposal

• Amend EIPPCB Proposal 3 as follows:

**EIPPCB** Proposal 3: to include channelled emissions to air in the scope of the WGC BREF except for those substances for which BAT-AELs have already been set during the review of other chemical BREFs under the IED-the CAK and LVOC BREFs. This includes covering in the WGC scope emissions from individual and combined waste gas streams.

## 2.2.2.2 Diffuse emissions to air

The CWW BREF covers diffuse VOC emissions to air, but not of substances other than VOCs.

## Original EIPPCB proposal

EIPPCB Proposal 4: to exclude the prevention/reduction of diffuse emissions to air from the scope of the WGC BREF.

## Summary of initial positions

- 7 out of 20 IPs agreed with the proposal, 4 partly agreed and 9 disagreed.
- The main concerns of those who partly agreed were as follows:
  - The decision on whether to include or exclude diffuse emissions should only be made following an assessment of a comprehensive data and information collection (IT);
  - Diffuse emissions from storage should be excluded (DE).
- The main concerns of those who disagreed were as follows:
  - The diffuse (VOC) emissions reported by some chemical plants, which are calculated using empirical formulae, may be significantly lower than the actual emissions (BE, SE).
  - The description of the BAT for the measurement of VOC emissions in the CWW BREF is insufficient and almost 10 years old, e.g. methods for tracing leakages are missing (AT, SE).
  - The CWW BREF only covers diffuse emissions of VOCs. Diffuse emissions of other substances (e.g. NH<sub>3</sub>, Cl<sub>2</sub>, HCl and dust) are an important part of total chemical plant emissions so they should be included in the WGC BREF (AT, BE, DK, EEB, FR, SE, UK). The same comment was made by two TWG members who partly supported the proposal (FI, IT) and one who agrees with the proposal (PT).
  - Covering diffuse emissions during the next review of the CWW or EFS BREFs would delay the regulation of these emissions by many years because the CWW BREF has just been published and the EFS BREF review is not in the Work Programme (AT, BE, DK, EEB, FR). This view was supported by one TWG member who partly supported the proposal (ES).
- There were several alternative proposals:
  - To collect information for the purpose of evaluating diffuse emissions to air, taking into account specificities within the individual chemical sectors/subsectors, e.g. process/plant/source types (IT).
  - To include diffuse emissions of VOCs and other substances in the scope of the WGC BREF (DK, EEB). DE proposed including all diffuse emissions except those from storage.
  - To include the prevention/reduction of diffuse emissions to air and to update the

## relevant sections of the CWW BREF for diffuse VOC emissions. (AT, FR, SE).

## **EIPPCB** assessment

- The TWG is divided in its opinion on the proposal.
- The CWW BREF covers diffuse VOC emissions to air in its Section 3.5.4. Moreover, BAT 19 addresses the prevention and reduction of diffuse VOC emissions while the associated monitoring is described in BAT 5.
- More specifically, state-of-the-art techniques for the monitoring of diffuse VOC emissions are described in the CWW BREF including sniffing according to EN 15446 and OGI (see Section 3.5.4.4 of the CWW BREF) as well as optical remote sensing methods such as LIDAR and SOF (see Section 3.5.4.5 of the CWW BREF). The ongoing work of CEN/TC 264 to develop a standard on OGI, LIDAR and SOF, triggered by a Commission mandate, has not yet resulted in a new standard (see the revised final draft of the ROM dated June 2017).
- While there may be potential for improving the descriptions of these monitoring techniques in the CWW BREF, setting related BAT could lead to contradictions between two BAT conclusions adopted under the IED for the same activity (i.e. CWW and WGC). Moreover, it would create legal uncertainty when certain BAT of the CWW BREF are revised while they are being implemented in the Member States at the same time.
- The revised final draft of the ROM was recently published and already contains more comprehensive and updated information on the monitoring of diffuse emissions. Since the monitoring of diffuse emissions is a horizontal issue relevant for several BREFs, the ROM is probably more appropriate to describe monitoring techniques.
- No evidence has been provided that diffuse emissions of dust and of inorganic compounds such as NH<sub>3</sub>, Cl<sub>2</sub> and HCl are significant. On the contrary, for some inorganic compounds (e.g. H<sub>2</sub>, NH<sub>3</sub>, Cl<sub>2</sub>), diffuse emissions are expected to be relatively minor because they are already tightly controlled due to health and safety provisions.
- The LVOC TWG recommended considering addressing emissions from storage specific to the LVOC and other chemical sectors in the WGC BREF. Nevertheless, diffuse emissions from the storage and handling of materials are comparable across all IED sectors and it would not be efficient to address them in each and every BREF. This could also lead to diverging BAT that are not justified in substance.
- The scope of the WGC BREF is anticipated to be wide, as it will cover the whole chemical industry and a number of pollutants. It is likely that a significant number of questionnaires will need to be developed, filled out and analysed. Addressing diffuse emissions would require an approach that differs considerably from the one to be taken for channelled emissions. It is unlikely that BAT-AELs would be set for diffuse emissions. Therefore, addressing diffuse emissions might not constitute the best use of the limited resources, considering also that such emissions might not be a KEI and that such emissions are already covered to some extent in the CWW and EFS BREFs.
- The IED Article 13 forum gives its opinion on the Work Programme pursuant to IED Article 13(3)(b).

## **EIPPCB** proposal

• Keep EIPPCB Proposal 4 unchanged:

EIPPCB Proposal 4: to exclude the prevention/reduction of diffuse emissions to air from the scope of the WGC BREF.

## 2.2.2.3 Emissions of noise and odour

Noise and odour emissions are already addressed in the CWW BREF.

## Original EIPPCB proposal

EIPPCB Proposal 5: to exclude emissions of noise and odour from the scope of the WGC BREF.

#### Summary of initial positions

- 16 out of 19 IPs agreed with the proposal, 3 partly agreed and none disagreed.
- The main concerns of those who partly agreed were as follows:
  - Excluding noise and odour is contrary to BREF review rules (EEB);
  - Channelled emissions of odour to air (techniques, treatment, BAT-AELs) are not covered by the CWW BREF (AT); this same comment was made by one TWG member who agreed with the proposal (SE);
  - There is little data available on the performance of some abatement techniques (e.g. oxidative scrubbers) (ES).
- There were several alternative proposals:
  - to include odour emissions for certain chemicals (e.g. mercaptans) (EEB, UK);
  - to include channelled odour emissions (AT);
  - to collect information on odour emissions and monitoring (ES).

#### **EIPPCB** assessment

- The TWG broadly supported the proposal.
- Noise and odour are covered by the CWW BAT conclusions:
  - BAT 20 and BAT 21 cover odour emissions with the associated monitoring in BAT 6; BAT 22 and BAT 23 cover noise emissions.
- However, no BAT-AELs for odour emissions were set.
- Each TWG decides on the scope of the BREF concerned, focusing on the most relevant environmental issues and the added value that the BAT conclusions could bring. This is fully in line with the BREF Guidance.
- In the CWW BREF, BAT 6 and 20 on odour emissions apply to both channelled and diffuse emissions. BAT 21d addresses the enclosure of waste water and sludge treatment facilities to collect odorous waste gases for further treatment and BAT 21e addresses end-of-pipe treatment.
- There are few chemical installations where odour is measured and very few that use highly odorous substances such as mercaptans. For example, the UBA(DE) report which summarises 2 972 emission measurements at 1 209 emission sources of the chemical industry does not contain any data on odour. Sulphide-containing substances were rarely measured (e.g. hydrogen sulphide: twice; dimethyl sulphide: twice; carbon disulphide: three times).
- Some odour emissions will be addressed if the TWG decides to collect data and to set BAT(-AELs) for specific odorous compounds (e.g. NH<sub>3</sub>, see Section 4.2.9.1).

#### **EIPPCB** proposal

• Keep EIPPCB Proposal 5 unchanged:

**EIPPCB** Proposal 5: to exclude emissions of noise and odour from the scope of the WGC BREF.

• This issue is not proposed for discussion at the KoM.

## 2.2.3 LVOC BREF

The review of the Large Volume Organic Chemicals (LVOC) BREF is nearing completion. The final draft of the revised BREF was published in February 2017. Subsequently, the IED Article 13 forum provided its opinion on the final draft at its meeting on 5 April 2017 and the IED Article 75 committee voted favourably on the BAT conclusions at its meeting on 28 June 2017. The scope of the revised LVOC BREF covers **continuous processes** where the total production capacity of chemicals **exceeds 20 000 t/yr** and includes:

- the production of organic chemicals as specified in Section 4.1(a) to (g) and (k) of Annex I to Directive 2010/75/EU;
- the production of hydrogen peroxide as specified in Section 4.2(e) of Annex I to Directive 2010/75/EU;
- the combustion of fuels in process furnaces/heaters, where this is part of the aforementioned activities.

While the LVOC BAT conclusions contain generic BAT conclusions for emissions of  $NO_x$ , dust,  $SO_2$  and CO to air for the whole LVOC sector, no **generic** BAT-AELs for emissions to air were concluded on at the final TWG meeting. However, BAT and BAT-AELs were concluded on for some specific products and processes which are described in the illustrative chapters of the BREF as indicated in Table 2.1 below.

LVOC illustrativa abantar	DAT AFLS
	DAI-ALLS
Lower olefins (via steam cracking)	None
Ethanolamines	None
TDI/MDI (from toluene/aniline via TDA/MDA)	TVOC, Cl <sub>2</sub> , CCl <sub>4</sub> , HCl and PCDD/Fs
Ethylene oxide / ethylene glycol	TVOC (as specific emission load)
Aromatics, including cyclohexane (from the pygas by-	
products of steam crackers and from	None
reformate/naphtha produced in catalytic reformers)	
Formaldehyde	TVOC and formaldehyde
Phenol (via cumene oxidation)	TVOC and benzene
Ethylbenzene (from benzene) and styrene (via	
ethylbenzene dehydrogenation or co-production with	None
propylene oxide)	
Hydrogen peroxide	TVOC
Ethylene dichloride / vinyl chloride monomer (via	TVOC, sum of EDC and VCM, Cl <sub>2</sub> , HCl and
oxychlorination of ethylene)	PCDD/Fs
Process furnaces/heaters: lower olefins and ethylene	$NO_X$ from the crackers and $NH_3$ from the use of
dichloride crackers	SCR/SNCR

 Table 2.1:
 BAT-AELs for specific products and processes in the LVOC BREF

The LVOC BREF does not include BAT-AELs for emissions to air from:

- combined waste gas treatment;
- the production of large volume organic chemicals that are not described in the LVOC illustrative chapters (e.g. the production of chemicals for which thumbnail descriptions are given in Chapter 2 of the LVOC BREF including acetic acid, aniline, caprolactam, ethanol, fatty acid methyl esters (biodiesel), methanol, etc.);
- some illustrative processes (e.g. no BAT-AELs in four illustrative chapters (see Table 2.1), no BAT-AEL for ethylene oxide from ethylene oxide production);
- the production of the chemicals described in the illustrative chapters, but via different process routes (e.g. vinyl chloride monomer production via direct chlorination of acetylene or propylene oxide by routes other than via co-production with styrene);

• batch processes or from continuous processes with a total production capacity below 20 000 t/yr (e.g. formaldehyde is sometimes produced in smaller stand-alone plants).

<b>Original EIPPC</b>	proposal
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EIPPCB Proposal 6: to include channelled emissions to air from the large volume production of organic chemicals in the scope of the WGC BREF except for the substances produced in those processes for which BAT-AELs have been set during the review of the LVOC BREF.

## Summary of initial positions

- 9 out of 20 IPs agreed with the proposal, 10 partly agreed and 1 disagreed.
- The main concerns of those who partly agreed were as follows:
  - The LVOC BREF only covers certain activities with a production capacity over 20 000 t/yr. The WGC BREF should cover all other LVOC activities, including those below 20 000 t/yr (AT, EEB, IT, PT, SE, UK). The same issue was raised by two TWG members who agreed with the proposal (BE, PL).
    - The LVOC BREF does not cover the abatement of combined emissions originating from more than one process (UK).
    - The proposal does not include diffuse emissions to air (FR).
    - The future of the existing vertical chemical BREFs should be clarified (DE, ePURE, NL, UK). The same issue was raised by one TWG member who agreed with the proposal (PL).
    - The decisions on the interface between the LVOC and WGC BREFs should be made following the data collection (DE, EEB).
    - The WGC BREF should not repeat any of the technical descriptions of the LVOC BREF (EEB).
- The main concern of those who disagreed with the proposal was that channelled emissions from LVOC activities should be reviewed under the next review of the LVOC BREF in order to avoid overlaps and to minimise the number of BREFs that apply to any one site (ES).
- There were several alternative proposals, all of which involved minor changes to the EIPPCB proposal.

#### **EIPPCB** assessment

- The TWG broadly supported the proposal (the comments made by ES, who disagreed with the proposal, were largely similar to the comments made by most of the TWG members who agreed with the proposal).
- In particular, the TWG supported the proposal to cover LVOC activities that are not yet specifically covered by the LVOC BREF, to cover the production of organic compounds with production capacities below 20 000 t/yr and to cover the treatment of combined waste gas streams.
- Diffuse emissions to air are addressed in Section 2.2.2.2.
- As announced in the email of DG ENV dated 14 July 2017, the future of the other existing chemical BREFs will be discussed at the next IED Article 13 forum meeting.
- The term 'substance produced' in the original EIPPCB proposal could be misleading, as the BAT-AELs in the LVOC BREF do not only address substances that are generated/produced in the relevant specific process.
- For CO, indicative emission levels were set in the LVOC BREF. Therefore, it seems more appropriate to refer to BAT-AEPLs in the proposal.

## EIPPCB proposal

• Amend EIPPCB Proposal 6 as follows:

EIPPCB Proposal 6: to include channelled emissions to air from the large volume production of organic chemicals in the scope of the WGC BREF except for the substances produced in those processes for which BAT-AELs BAT-AEPLs have been set during the review of the LVOC BREF.

## 2.2.4 EFS BREF

The Emissions from Storage (EFS) BREF was published in 2006 under the IPPC Directive<sup>12</sup> and a review under the IED is not yet programmed. The EFS BREF is a 'horizontal' BREF that addresses the storage, transfer and handling of liquids, liquefied gases and solids, regardless of the sector or industry.

## **Original EIPPCB proposal**

EIPPCB Proposal 7: to exclude emissions from the storage, transfer and handling of materials from the scope of the WGC BREF.

#### **Summary of initial positions**

- 9 out of 20 IPs agreed with the proposal, 7 partly agreed and 4 disagreed.
- The main concerns of those who partly agreed were as follows:
  - The scope of the WGC BREF should only exclude those emissions that are within the scope of the EFS BREF, namely channelled emissions of dust and diffuse emissions of all substances (AT).
  - A clear definition of storage is needed to avoid overlaps between the WGC and EFS BREFs (e.g. which BREF covers the storage of material between process stages) (UK). The same concern was raised by one TWG member who agreed with the proposal (CEFIC).
  - The review of the existing EFS BREF is not included in the Work Programme (BE, ES). The same concern was raised by two TWG members as the reason for disagreeing with the proposal (FR, SE) and one TWG member who agreed with the proposal (PT).
- The main concerns of those who disagreed were as follows:
  - The EFS BREF is too general to cover the specific aspects of emissions from the storage of chemicals (DK).
  - The TWG for the review of the LVOC BREF recommended during its final TWG meeting to tackle emissions from storage in the WGC BREF, which introduced a delay in regulating these emissions. The EIPPCB proposal undermines the recommendation and introduces an even greater delay (EEB).
  - The timetable for the review of the existing EFS BREF is not yet included in the EIPPCB workplan (FR, SE).
- There were several alternative proposals:
  - to include emissions from storage in the scope of the WGC BREF when they are channelled into a process abatement system (CEFIC, Fertilizers Europe);
  - to include all emissions from storage, transfer and handling of materials in the scope of the WGC BREF (DK, EEB, FR, SE);
  - to exclude from the scope of the WGC BREF only those emissions that are within the scope of the EFS BREF, i.e. to exclude channelled emissions of dust and diffuse emissions of all substances (AT).

## EIPPCB assessment

- The TWG is divided in its opinion on the proposal.
- Emissions from the storage and handling of materials are comparable across all IED sectors and it would not be efficient to address them in each and every BREF. This could also lead to diverging BAT that are not justified in substance.
- The EFS BREF does not seem to exclude certain types of storage (e.g. between different process steps). If necessary, clarification on the boundaries between the WGC and EFS BREFs could be added at a later stage of the drawing up of the WGC BREF.
- The EFS BREF covers the storage and handling of all kinds of solids and liquids, including chemicals such as ammonia, chlorine and (chlorinated) hydrocarbons.
- The scope of the WGC BREF is anticipated to be wide, as it will cover the whole chemical

<sup>&</sup>lt;sup>12</sup> European Commission, Reference Document on Best Available Techniques on Emissions from Storage, 2006, <u>http://eippcb.jrc.ec.europa.eu/reference/BREF/esb\_bref\_0706.pdf</u>.

industry and a number of pollutants. It is likely that a significant number of questionnaires will need to be developed, filled out and analysed. Addressing emissions to air from storage would require a different approach if these are diffuse emissions (see Section 2.2.2.2). Considering that emissions from storage might not be a KEI and that they are already covered in the EFS BREF, it might not constitute the best use of the limited resources to address them in the WGC BREF.

- In line with the EIPPCB Proposal 3 (see Section 2.2.2.1), it seems to make sense to include the combined treatment of waste gases in those cases where a minor share of the pollutant load originates from the storage, transfer and handling of materials.
- As announced in the email of DG ENV dated 14 July 2017, the future of the other existing chemical BREFs will be discussed at the next IED Article 13 forum meeting.
- The IED Article 13 forum gives its opinion on the Work Programme pursuant to IED Article 13(3)(b).

## EIPPCB proposal

• Amend EIPPCB Proposal 7 as follows:

EIPPCB Proposal 7: to generally exclude emissions from the storage, transfer and handling of materials from the scope of the WGC BREF. To include the combined treatment of waste gases in those cases where a minor share of the pollutant load originates from the storage, transfer and handling of materials.

## 2.2.5 LCP BREF and MCP Directive

## 2.2.5.1 Overview

The review of the Large Combustion Plants (LCP) BREF is nearing completion. The final draft was published in June 2016<sup>13</sup>. Subsequently, the IED Article 13 forum provided its opinion on the final draft at its meeting on 20 October 2016 and the IED Article 75 committee voted favourably on the BAT conclusions at its meeting on 28 April 2017. The LCP BREF concerns the following activities specified in Annex I to the IED:

- Section 1.1: Combustion of fuels in installations with a total rated thermal input of 50 MW or more, only when this activity takes place in combustion plants with a total rated thermal input of 50 MW or more;
- Section 1.4: Gasification of coal or other fuels in installations with a total rated thermal input of 20 MW or more, only when this activity is directly associated with a combustion plant;
- Section 5.2: Disposal or recovery of waste in waste co-incineration plants for nonhazardous waste with a capacity exceeding 3 tonnes per hour or for hazardous waste with a capacity exceeding 10 tonnes per day, only when this activity takes place in combustion plants covered under 1.1 above.

The fuels considered in the LCP BREF are any solid, liquid and/or gaseous combustible material including industry-specific fuels, e.g. by-products from chemical industries.

The LCP BREF defines a combustion plant as any technical apparatus in which fuels are oxidised in order to use the heat thus generated. However, process furnaces/heaters are excluded from the scope of the LCP BREF. Process furnaces/heaters are understood to be combustion plants whose flue-gases are used for the thermal treatment of objects or feed material through a direct contact heating mechanism (e.g. a reactor used in the (petro-)chemical industry), or whose radiant and/or conductive heat is transferred to objects or feed material through a solid wall without using an intermediary heat transfer fluid (e.g. a furnace or reactor heating a process stream used in the (petro-)chemical industry such as a steam cracker furnace).

<sup>&</sup>lt;sup>13</sup> European Commission, Best Available Techniques (BAT) Reference Document for Large Combustion Plants, Final draft June 2016, <u>http://eippcb.jrc.ec.europa.eu/reference/BREF/LCP\_FinalDraft\_06\_2016.pdf</u>.

The Medium Combustion Plants (MCP) Directive) applies to combustion plants with a total rated thermal input equal to or greater than 1 MW and less than 50 MW, irrespective of the type of fuel they use. However Article 2 of the MCP Directive excludes the following combustion plants from the scope:

- combustion plants in which the gaseous products of combustion are used for the direct heating, drying or any other treatment of objects or materials;
- post-combustion plants designed to purify the waste gases from industrial processes by combustion, and which are not operated as independent combustion plants;
- facilities for the regeneration of catalytic cracking catalysts;
- reactors used in the chemical industry.

Article 28 of the IED uses a slightly different wording to exclude the same plants from the scope of the special provisions set for large combustion plant in Chapter 3 and Annex V to the IED.

In summary, emissions to air from combustion plants operating at chemical sites are largely addressed by the LCP BREF and the MCP Directive. However, some combustion activities are not covered (see Section 2.2.5.3) and in some cases these might constitute major emission sources.

## 2.2.5.2 Emissions covered by the LCP BREF and MCP Directive

#### **Original EIPPCB proposal**

EIPPCB Proposal 8: to exclude emissions from the combustion of fuels covered by the LCP BREF or the MCP Directive from the scope of the WGC BREF.

#### **Summary of initial positions**

- 16 out of 20 IPs agreed with the proposal, 4 partly agreed and none disagreed.
- The main concerns of those who partly agreed were as follows:
  - The proposal would exclude all installations using conventional fuels (e.g. natural gas) and contradict EIPPCB Proposal 9 (AT, SE).
  - The furnaces, boilers and heaters required for the production of ammonia and nitric acid are outside the scope of the LCP and MCP BREFs and should be within the scope of the WGC BREF (Fertilizers Europe).
  - The LCP BREF is based on outdated data and the MCP Directive cannot be considered as reflecting BAT standards. BAT for emissions to air from MCP with a total rated thermal input below 15 MW should be set since the LCP BREF excludes these (EEB).
- There were several alternative proposals:
  - to exclude emissions from the combustion in installations covered by the LCP BREF or the MCP Directive (AT, SE);
  - to include a statement that directly heated reactors and dryers are included, whilst small combustion plants (< 10 MW), combustion plants that operate for a limited time (< 500 hours per year) and plants burning refinery fuels at the refinery site are excluded (CEFIC);
  - to include a statement that directly heated reactors and dryers are included, whilst small combustion plants < 1 MW are excluded (ES).

#### **EIPPCB** assessment

- The TWG broadly supported the proposal.
- The proposal made by AT and SE is more precise, as the types of combustion plants covered are defined in the scopes of the LCP BREF and the MCP Directive.
- The LCP BREF will be published in the near future. The MCP Directive only entered into force recently and a separate exchange of information on best available and emerging technologies and the related costs is foreseen under that Directive. Including installations covered by the LCP BREF and the MCP Directive would create legal uncertainty because

they are being implemented in the Member States at the same time.

- The scope of the LCP BREF clarifies that the combustion of refinery fuels at a refinery site is covered by the REF BREF.
- The inclusion of directly heated reactors and dryers is addressed in Section 2.2.5.3.
- No rationale was provided for choosing a total rated thermal input of 10 MW as a threshold for the data collection rather than 1 MW which is the threshold used in the MCP Directive. The 1 MW threshold should be used because emissions to air from combustion plants with a total rated thermal input below 1 MW are not subject to European legislation.
- Taking into account the aforementioned exclusions from the scope, there does not seem to be a need to refer to the operating time.

## EIPPCB proposal

• Amend EIPPCB Proposal 8 as follows:

EIPPCB Proposal 8: to exclude emissions from the combustion of fuels combustion plants covered by the LCP BREF-or, the MCP Directive or the REF BREF from the scope of the WGC BREF. To exclude combustion plants with a total rated thermal input below 1 MW.

## 2.2.5.3 Emissions from process furnaces/heaters

#### **Original EIPPCB proposal**

EIPPCB Proposal 9: to include in the scope of the WGC BREF emissions from process furnaces/heaters used in the chemical industry, with the exception of the process furnaces/heaters used in lower olefins and ethylene dichloride crackers, which are covered by the LVOC BREF.

## **Summary of initial positions**

- 9 out of 19 IPs agreed with the proposal, 10 partly agreed and none disagreed.
- The main concerns of those who partly agreed were as follows:
  - Chemical reactors and direct dryers should be included in the scope of the WGC BREF because they do not fall under the scope of the MCP Directive (Art. 2 (3)) (AT, CEFIC).
  - All emissions from equipment required for the operation of ammonia and nitric acid plants should be in the scope of the WGC BREF (Fertilizers Europe).
  - The definition of process furnaces/heaters which is used in the LVOC BREF should be included, including the third part (DK).
  - The scope should exclude specific processes recently reviewed in the LVOC BREF (e.g. aromatics, phenol) (ES).
  - The data basis for the determination of BAT-AELs in the generic chapter of the LVOC BREF was too weak so the data collection should be included in the WGC BREF (CEFIC, EEB).
  - There should not be a complete exclusion of the process furnaces/heaters used in lower olefins and ethylene dichloride crackers because BAT-AELs were not set for all KEIs (e.g. SO<sub>2</sub> and CO) (BE).
  - An overlap of the WGC and LVOC BREFs should be avoided (PT);
  - Process furnaces/heaters burning refinery fuels should be under the scope of the REF BREF (PL).
  - The future of the existing vertical chemical BREFs should be clarified (ePURE, NL);
  - The conditions under which process furnaces/heaters operate will be process-specific, so that they would be better covered under separate vertical BREFs (UK).
  - A cut-off limit should be set, e.g. > 10 MW and > 500 h of operation in order to be aligned with the LVOC BREF (CEFIC).
- There were several alternative proposals:
  - to include emissions from process furnaces/heaters (including direct dryers) used in the chemical industry when not covered by the LCP BREF or the MCP Directive, with the exception of the process furnaces/heaters used in lower olefins and ethylene dichloride crackers, which are covered by the LVOC BREF (AT);

- to exclude process furnaces/heaters burning refinery fuels from the scope of the WGC BREF because they are covered by the REF BREF (PL).

#### EIPPCB assessment

- The TWG broadly supported the proposal.
- IED Article 28 stipulates that reactors used in the chemical industry and plants in which the products of combustion are used for the direct heating, drying, or any other treatment of objects or materials are excluded from Chapter III and Annex V to the IED. The same exclusion is laid down in Article 2(3) of the MCP Directive. These exclusions have been incorporated in the definition of process furnaces/heaters given in the LCP and LVOC BREFs.
- In the case of ammonia production, the most important source for emissions to air is the primary reformer which is a process heater. In the case of nitric acid production, the most important source for emissions to air is the catalytic reactor in which the exothermic reaction takes place.
- The interface of the WGC BREF with the LVOC BREF is addressed in Section 2.2.3. Some gaps in the chapters on illustrative processes were identified.
- The TWG for the review of the LVOC BREF took clear decisions for emissions to air from lower olefins and ethylene dichloride crackers: not to set BAT-AELs for SO<sub>2</sub> emissions and to only set indicative levels for CO emissions. It is not the aim of the WGC BREF to change decisions on BAT and BAT-AELs that were taken during the review of the LVOC BREF.
- The interface of the WGC BREF with the LCP BREF, the MCP Directive and the REF BREF is addressed in Section 2.2.5.2.
- As announced in the email of DG ENV dated 14 July 2017, the future of the other existing chemical BREFs will be discussed at the next IED Article 13 forum meeting.
- Process furnaces/heaters are specific types of combustion plants. Although they may be linked to the production of different chemicals, there should be many similarities. Therefore, generic BAT to reduce emissions from process furnaces/heaters were set in the LVOC BREF. The likely differences in the emission levels of different process furnaces/heaters could be taken into account by gathering data on the combustion process (e.g. on type and quality of the fuel, size, combustion temperature).
- The plant categories in terms of total rated thermal input in the BAT conclusions of the LVOC BREF are relevant for the monitoring frequency, but not for the scope of the BREF and its BAT(-AELs). However, in line with the approach to focus on major emission sources, it would seem reasonable to align the scope of the WGC BREF with the MCP Directive and to exclude process furnaces/heaters with a total rated thermal input below 1 MW.
- The BAT conclusions of the LCP BREF contain special provisions for certain plants operated less than 500 h/yr, but these are limited to emergency uses. This does not seem relevant for process furnaces/heaters used in the chemical industry.

## EIPPCB proposal

• Amend EIPPCB Proposal 9 as follows:

EIPPCB Proposal 9: to include in the scope of the WGC BREF emissions from process furnaces/heaters used in the chemical industry with a total rated thermal input equal to or greater than 1 MW, with the exception of the process furnaces/heaters used in lower olefins and ethylene dichloride crackers, which are covered by the LVOC BREF.

## 2.2.5.4 Examples of process furnaces/heaters

## **Original EIPPCB request**

EIPPCB Request 1: The TWG is asked to provide a list of processes/products which involve the use of process furnaces/heaters.

## **Summary of initial positions**

11 TWG members provided information resulting in a list with 47 individual records. Some records listed multiple processes/products.

- The IPs cover the following products in particular:
  - ammonia, carbon black, hydrofluoric acid, inorganic pigments, nitric acid, phosphates, phosphoric acid, potassium sulphate, silicates, silicon carbide, sulphuric acid, titanium dioxide.
- The IPs cover generic records for the following activities:
- explosives, fertilisers.
- The IPs covers the following processes in particular:
  - drying (e.g. pigments including titanium dioxide, fertilizers including phosphates);
  - steam reforming (e.g. hydrogen for the production of ammonia and  $H_2O_2$ );
  - heating, preheating (production of organic chemicals, e.g. aromatics, and of inorganic chemicals, e.g. carbon black);
  - chemical reactions in furnaces and kilns (e.g. hydrofluoric acid, fluorspar);
  - catalyst regeneration (lower olefins, polyethylene).

The responses to EIPPCB Request 1 and Request 2 overlap to a large extent.

## EIPPCB assessment

- At first sight, many TWG proposals seem to refer to combustion plants that are not covered by the LCP BREF or the MCP Directive. However, further checks might be necessary.
- The EIPPCB has compiled a consolidated list of subsectors/products/processes involving the use of process furnaces/heaters based on the information provided by the TWG members in response to Request 1 (see Annex 2 in Section 7.2). The EIPPCB has added references when information on these process furnaces/heaters can be found in the chemical BREFs.
- Some TWG members have not yet provided a (full) list of proposals.
- Further information might be useful to better understand and categorise the examples given for process furnaces/heaters.

## EIPPCB proposal

- TWG members to complete the consolidated list of subsectors/products/processes involving the use of process furnaces/heaters (see Annex 2 in Section 7.2) by 30 November 2017.
- EIPPCB to harmonise the list by 22 December 2017. This might imply further requests for information to individual TWG members.
- To use the list as the basis for the data collection via the questionnaire.
- To decide at a later stage of the drawing up of the WGC BREF, on the basis of the data collected and the subsequent data assessment, if a dedicated approach is required and if sector- or process-specific BAT and BAT-AELs should be defined.

## 2.2.6 WI BREF

Section 5.2 of Annex I to the IED refers to the 'Disposal or recovery of waste in waste incineration plants or in waste co-incineration plants:

- (a) for non-hazardous waste with a capacity exceeding 3 tonnes per hour;
- (b) for hazardous waste with a capacity exceeding 10 tonnes per day.'

The Draft 1 of the Waste Incineration (WI) BREF has been published in May 2017<sup>14</sup>. The scope of the revised WI BREF is based primarily on the capacity thresholds set for the activities described in Section 5.2 of Annex I to the IED; excluded from the scope of the revised WI BREF are those plants which incinerate or co-incinerate exclusively gaseous waste.

The treatment of gaseous effluents from chemical installations using thermal or catalytic oxidation is thus not covered by the WI BREF. Thermal and catalytic oxidation are described in the CWW and LVOC BREFs, and the LVOC BREF contains BAT-AELs based on these techniques (e.g. for the production of TDI/MDI and EDC/VCM).

## 2.2.6.1 Emissions from the incineration of waste

Original EIPPCB proposal
EIPPCB Proposal 10: to exclude emissions from the incineration of waste covered by the WI
BREF from the scope of the WGC BREF.
Summary of initial positions
<ul> <li>18 out of 20 IPs agreed with the proposal, 2 partly agreed and none disagreed.</li> <li>UK agreed with the proposal and suggested that waste incineration plants which are also used for waste gas treatment should be included for parameters not covered by the WI BREF or IED Annex VI.</li> <li>The main concerns of those who partly agreed were as follows: <ul> <li>Waste incineration plants on chemical sites below the IED tonnage thresholds should be included in the scope of the WGC BREF, as those thresholds are high (EEB).</li> <li>Clarification is needed on how to deal with waste incineration plants below the IED tonnage thresholds (FR).</li> </ul> </li> <li>There were two alternative proposals: <ul> <li>to cover the incineration of lower tonnages of waste, either through a cross-reference clause to the WI BREF or directly in the WGC BREF (EEB);</li> <li>to include substances not subject to a BAT-AEL in the WI BREF or to an ELV in Annex VI to the IED in the scope of the relevant chemical BREFs (UK).</li> </ul> </li> </ul>
EIPPCB assessment
<ul> <li>The TWG broadly supported the proposal.</li> <li>The use of a waste incineration plant for the treatment of gaseous effluents is addressed in Section 2.2.6.2.</li> </ul>
• Waste incineration plants below the IED tonnage thresholds are not covered by the IED. Therefore, they cannot be included in the scope of the WGC BREF. In this sense, EIPPCB Proposal 10 could be reformulated to clarify that waste incineration plants are excluded from the scope independent of their capacity.
EIPPCB proposal
• Amend EIPPCB Proposal 10 as follows: EIPPCB Proposal 10: to exclude emissions from the incineration of waste <del>covered by the</del> WI BREF from the scope of the WGC BREF.

<sup>14</sup> European Commission, JRC SCIENCE FOR POLICY REPORT, Best Available Techniques (BAT) Reference Document on Waste Incineration Working Draft in Progress, <u>http://eippcb.jrc.ec.europa.eu/reference/BREF/WI/WI 5 24-05-2017 web.pdf</u>.

## 2.2.6.2 Thermal treatment of gaseous effluents

#### Original EIPPCB proposal

EIPPCB Proposal 11: to include the thermal treatment of gaseous effluents in the scope of the WGC BREF.

#### Summary of initial positions

- 14 out of 20 IPs agreed with the proposal, 5 partly agreed and 1 disagreed.
- BE agreed with the proposal provided that it does not apply to plants for which BAT-AELs are set in the LVOC BREF or the CAK BREF.
- The main concerns of those who partly agreed were as follows:
  - An overlap of BAT-AELs in the WGC BREF and the existing chemical BREFs should be avoided (PT).
  - Only the thermal treatment of gaseous effluents from production processes should be included, but not the treatment of off-gases from the storage and handling of materials or from waste water treatment in order to avoid overlaps (PL).
  - The (co-)combustion of liquids/internal solvent (wastes) in thermal treatment units should be included (AT, SE).
  - Thermal treatment should refer to cases when: 1) the rated thermal input is lower than 50 MW (otherwise it is covered by the LCP BREF), 2) the main activity is to clean waste gas (definition according to the LVOC BREF) and 3) the threshold is < 10 t/d (hazardous waste) or < 3 t/d (non-hazardous waste) if a fuel substitute is used ('waste') (otherwise it is covered by the WI BREF) (ES). The same comment was made by CEFIC who agreed with the proposal.
- Fertilizers Europe disagreed with the proposal but provided no rationale or alternative proposal to support their view.
- There were two alternative proposals:
  - to include the thermal treatment of gaseous effluents and/or the combustion of liquids/internal solvent (wastes) in the scope of the WGC BREF (AT, SE);
  - to include liquid waste below the IED tonnage thresholds for waste incineration (i.e. 10 t/d of hazardous waste and 3 t/h of non-hazardous waste) (ES).

#### EIPPCB assessment

- The TWG broadly supported the proposal.
- The interface of the WGC BREF with the existing chemical BREFs is addressed in Sections 2.1, 2.2.1, 2.2.2 and 2.2.3. The interface of the WGC BREF with the existing chemical BREFs is addressed in Sections 2.1, 2.2.1, 2.2.2 and 2.2.3.
- Emissions from storage and handling are addressed in Section 2.2.4.
- The thermal treatment of off-gases from waste water treatment is currently not addressed in any chemical BREF, except for the treatment of odour emissions in BAT 21(e) of the CWW BREF.
- The sole combustion of fuels or waste without treatment of gaseous effluents is addressed in Sections 2.2.5.2 and 2.2.6.1, respectively.
- The use of a waste incineration plant for the abatement of pollutants originating from a chemical process is addressed in the LVOC BREF in the case of the production of TDI/MDI and EDC/VCM. Although the BAT conclusions stipulate that waste incineration is outside the scope, BAT 66 and 76 clarify that a waste incineration plant could be used as an alternative to a thermal oxidiser. These BAT apply independently of whether those waste incineration plants are above or below the IED thresholds.
- The LVOC BREF contains BAT-AELs for emissions to air for tetrachloromethane and chlorine in the case of TDI/MDI production and for chlorine and the sum of EDC and VCM in the case of EDC/VCM production. These BAT-AELs were derived using also data from waste incineration plants and therefore apply when a waste incineration plant is used for the thermal treatment of waste gases from TDI/MDI and EDC/VCM production.
- Waste incineration plants below the IED tonnage thresholds are not covered by the IED. Therefore, they cannot be included in the scope of the WGC BREF.

#### EIPPCB proposal

• Amend EIPPCB Proposal 11 as follows:

**EIPPCB** Proposal 11: to include the thermal treatment of gaseous effluents in the scope of the WGC BREF, including when this is carried out in waste incineration plants.

## 2.2.7 ICS BREF

The Industrial Cooling Systems (ICS) BREF was published in 2001 under the IPPC Directive<sup>15</sup>. A review of this BREF under the IED is not yet programmed. The scope of the term 'cooling systems' in the ICS BREF is confined to systems to remove waste heat from any medium, using heat exchange with water and/or air to bring down the temperature of that medium towards ambient levels. This includes refrigeration systems, but excludes the use of refrigerants such as ammonia and hydrofluorocarbons (HFCs).

## **Original EIPPCB proposal**

EIPPCB Proposal 12: to exclude emissions from cooling systems from the scope of the WGC BREF.

## Summary of initial positions

- 17 out of 20 IPs agreed with the proposal, 3 partly agreed (DK, EEB, UK) and none disagreed.
- The main concerns of those who partly agreed were as follows:
  - Emissions from cooling systems specific to the chemical sector should be included (e.g. vapour traps) (DK);
  - The WGC BREF should include refrigeration systems that use refrigerants such as ammonia and chlorofluorocarbons (CFCs) (EEB);
  - The WGC BREF should include emissions from direct cooling systems (UK).
- There were three alternative proposals:
  - to include emissions from cooling systems specific for the chemical sector, e.g. 'vapour traps' (DK);
  - to exclude emissions from cooling systems, except for emissions of ammonia and CFCs (EEB);
  - to include emissions resulting from direct contact cooling systems in the WGC BREF (UK).

## EIPPCB assessment

- The TWG broadly supported the proposal.
- The ICS BREF understands cooling to mean removing excess heat from any medium. Vapour traps are condensers that are used to recover/abate organic compounds from waste gases by cooling. Therefore, the main purpose of vapour traps is to treat waste gases and not to remove excess heat. Consequently, vapour traps should be covered by the WGC BREF.
- The use of refrigerants such as ammonia and CFCs is not specific to the chemical industry, for example they are widely used in the food and drink industry. Although the use of ammonia and CFCs as refrigerants is not covered in the current ICS BREF, it would not be efficient to address this in each and every BREF. This could also lead to diverging BAT that are not justified in substance.
- In the case of direct contact cooling such as water injection, the cooling medium is added to a gas stream. Emissions could result from the gas stream after cooling, but also from the cooling medium (e.g. when components of the gas stream first dissolve in the cooling medium and are subsequently stripped). In both cases, emissions are directly related to a (waste) gas treatment and should thus be included in the WGC BREF.

## **EIPPCB** proposal

• Amend EIPPCB Proposal 12 as follows:

**EIPPCB** Proposal 12: to exclude emissions from indirect cooling systems from the scope of the WGC BREF.

• This issue is not proposed for discussion at the KoM.

<sup>&</sup>lt;sup>15</sup> European Commission, Reference Document on the application of Best Available Techniques to Industrial Cooling Systems, <u>http://eippcb.jrc.ec.europa.eu/reference/BREF/cvs\_bref\_1201.pdf.</u>

## 2.3 Consideration of specific subsectors/products/processes

## 2.3.1 Overview

As laid out in the Commission's Work Programme for the exchange of information under the IED, the drawing up of the WGC BREF will involve collecting information and data from specific subsectors/products/processes that might require a dedicated approach when defining BAT and BAT-AELs for emissions to air. This approach aims at addressing concerns raised by some members of the IED Article 13 forum that generic BAT-AEL ranges could become too account wide or. conversely, not take into the peculiarities of some subsectors/products/processes.

The call for IPs gave examples of possible specific subsectors/products/processes based on information contained in the recent study of Ökopol for the German Federal Environment Agency (UBA(DE)) or in EU Member States' legislation.

## Original EIPPCB request

EIPPCB Request 2: The TWG is asked to provide a list of candidate products/processes that would require a dedicated approach when defining BAT and BAT-AEPLs (which include BAT-AELs) for emissions to air, including a sound justification.

#### **Summary of initial positions**

- 13 TWG members provided information resulting in a list with 104 individual records. Some records contain multiple data and some cover generic issues.
- AT provided a list of products/processes for which there are specific provisions in its domestic legislation.
- IT confirmed the list of subsectors/products/processes for which there are specific provisions in its domestic legislation. This list was included in Table 1.5 of Document 2 of the call for initial positions.
- Several TWG members supported the inclusion of the products/processes listed in Tables 1.4 and 1.5 of Document 2 of the call for initial positions (AT, SE).
- Several TWG members proposed that a dedicated approach should apply to any product/process for which a BAT-AEL is set in the existing chemical BREFs (FR, SE).
- DE proposed that all chemical productions where an integrated process assessment is required should be covered in a specific BREF (e.g. H<sub>2</sub>SO<sub>4</sub>, HNO<sub>3</sub>, H<sub>3</sub>PO<sub>4</sub>, NH<sub>3</sub>, urea, fertilisers, polymers, carbon black, HF,...).
- CEFIC proposed that a dedicated approach should be used for processes with very high concentrations of pollutants and where large centralised abatement systems are used.
- Several TWG members proposed that a dedicated approach should apply to batch production of organic fine chemicals, with BAT-AELs set on a kg/yr basis, and not expressed as concentrations (CEFIC, NO, ORGALIME, UK).
- Several TWG members proposed that specific products/processes should be covered in specific chemical BREFs (CZ, DE, ES).
- Some TWG members proposed a sectorial approach, in particular with regard to:
  - fertilisers (AT, CEFIC, DE, EEB, ES, Fertilizers Europe, IT);
  - pharmaceuticals, including pilot plants (IT, NO, ORGALIME).
- Fertilizers Europe proposed that the 'bubble' concept developed for refineries could be applied to ammonia and nitric acid plants.
- PL proposed that combustion processes using refinery fuels should be covered by the REF BREF.

#### EIPPCB assessment

- The EIPPCB has compiled a consolidated list of 44 processes/products based on the information provided by the TWG members in response to Request 2 (see Annex 3 in Section 7.3). The EIPPCB has added information on the status of these processes/products in the chemical BREFs.
- The candidate products that received most support in requiring a dedicated approach are:
  - sulphuric acid (AT, CEFIC, DE, EEB, ES, EUROALLIAGES, EUROMETAUX, IT);
    - ammonia (AT, CEFIC, DE, ES, Fertilizers Europe, IT, NO);
    - some specific polymers (e.g. PVC, melamine, viscose) (AT, CEFIC, CZ, EEB, IT);
  - carbon black (AT, CEFIC, DE, IT);
  - titanium dioxide (AT, CZ, DE, IT).

- A dedicated approach may not be needed for all subsectors/products/processes for which a BAT-AEL is set in the existing chemical BREFs, as the abatement techniques used and the resulting emission levels might be similar or identical.
- The production of a specific product may need a dedicated approach when there are specific ELVs in existing Member States' legislation. However some of those ELVs may be outdated.
- Not all of the cited processes/products seem to require an integrated analysis of the whole production process as the BAT-AELs are based on end-of-pipe treatment techniques, for example:
  - Hydrofluoric acid production: The LVIC-AAF BREF contains BAT-AELs for SO<sub>2</sub> and fluorides which are based on (alkaline) scrubbing of the tail gas (see Sections 6.4.6, 6.4.7 and 6.5 of the LVIC-AAF BREF). The BAT-AEL for dust emissions from fluorspar drying, transfer and storage is based on the use of abatement techniques such as cyclones, filters and wet scrubbers (see Sections 6.4.8 and 6.5 of the LVIC-AAF BREF).
  - Phosphoric acid production: The LVIC-AAF BREF contains a BAT-AEL for dust emissions from rock grinding which is based on fabric or ceramic filters (see Sections 5.4.8 and 5.5 of the LVIC-AAF BREF). The BAT-AEL for fluoride emissions is based on scrubbers with suitable scrubbing liquids (see Sections 5.4.7 and 5.5 of the LVIC-AAF BREF).
  - Fertilisers: A number of other BAT-AELs given in the LVIC-AAF BREF also seem to be based primarily on end-of-pipe treatment techniques (e.g. for the production of NPK fertilisers, (calcium) ammonium nitrate, and superphosphates).
- A further indication that not all of the cited processes/products seem to require an integrated analysis of the whole production process could be deduced from the similarity of the BAT-AEL ranges. For example, the upper end of the BAT-AEL ranges for fluoride emissions in the LVIC-AAF BREF is almost consistently 5 mg/Nm<sup>3</sup> (there is only one footnote exception).
- However, there are also production processes described in the LVIC BREFs where BAT-AELs are (partly) based on process-integrated techniques, e.g. for emissions of NO<sub>X</sub> from primary reforming where low-NO<sub>X</sub> burners are listed as BAT (see Section 2.5 of the LVIC-AAF BREF).
- The WGC BREF needs to address both batch and continuous processes.
- The OFC BREF for the batch production of organic chemicals sets BAT-AELs for emissions to air as either concentrations (expressed in mg/Nm<sup>3</sup>) or mass flows (expressed in kg/h), while specifying that the averaging period relates to the emission profile. Mass flow thresholds expressed in kg/yr could be challenging for implementation, as measurements are usually only carried out periodically and with a low frequency. Moreover, such thresholds could unjustifiably favour operators with high short-term emission loads when these operate only a limited time per year. In any case, decisions on mass flow thresholds in connection with BAT-AELs will be based on the data collection.
- Decisions on the need to set specific BAT(-AEPLs) can only be based on the results of the data collection and data analysis. The data collection questionnaire could cover:
  - all sectors/subsectors of the chemical industry;
  - generic versus more specific approaches;
  - processes with very high inlet concentrations;
  - centralised or pilot plant abatement systems handling a wide range of substances and flow rates versus specific abatement systems with fewer substances and less variable process conditions.
- The 'bubble' concept has so far only been used in the refineries sector for NO<sub>X</sub> emissions from combustion units and fluid catalytic cracking (see BAT 57 on integrated emission management of the REF BREF) and for SO<sub>2</sub> emissions from combustion units, fluid catalytic cracking and waste gas recovery units (see BAT 58 of the REF BREF). Three factors were essential to justify this approach:
  - recognised site complexity, multiplicity of combustion and process units interlinked in terms of feedstock and energy supply;
  - frequent process adjustments required in function of quality of the crude received;
  - technical necessity to use residues as internal fuels as a part of the process causing frequent adjustment of the fuel mix.

Even though the production of ammonia and nitric acid might be complex processes, they seem less interlinked, as they may be carried out independently from each other. Moreover, natural gas is usually used as the energy source for ammonia production while the production of nitric acid is an exothermic process. Therefore, process residues used as internal fuels seem less relevant. Finally, the quality of the raw materials used for the two processes should generally be quite constant.

- The interface of the WGC BREF with the REF BREF is addressed in Section 2.2.5.2.
- As announced in the email of DG ENV dated 14 July 2017, the future of the other existing chemical BREFs will be discussed at the next IED Article 13 forum meeting.
- The dedicated approach could be carried out in two steps. In the first step, specific complementary worksheets to the generic questionnaire could be developed for certain subsectors/products/processes, where more information on the process itself and on process-
integrated techniques is required to understand the environmental performance of the plant/installation. Examples seem to be process furnaces/heaters for which information on e.g. type and quality of the fuel, size and combustion temperature would be needed. Another example seems to be the production of sulphuric acid. The second step would consist of analysing the data obtained via the questionnaire to decide if specific BAT(-AEPLs) should be set in addition to the generic BAT(-AEPLs).

- Further analysis seems needed to decide which of the 44 subsectors/processes/products in the consolidated list of candidate subsectors/products/processes will require drafting a complementary worksheet to the generic questionnaire. This analysis could, among others, build on an analysis of the existing chemical BREFs and of MS' legislation. Indicators that a complementary worksheet might be needed include the following:
  - Do existing BAT refer to process-integrated techniques for the reduction of emissions to air or are they purely based on end-of-pipe techniques?
  - Are existing BAT-AELs expressed as concentrations or loads? Was there a rationale to express BAT-AELs as specific loads, or was it due to the format of the data provided?
  - Do the BAT-AEL ranges differ significantly from other BAT-AEL ranges set in recent BREFs and if yes, why?
  - How do specific requirements in MS' legislation differ from the general requirements in that legislation and why?

#### EIPPCB proposal

- EIPPCB to select examples from the consolidated list of 44 processes/products and to provide an analysis for these to determine if complementary worksheets to the generic questionnaire are needed. The analysis will include a few example subsectors/processes/products that clearly do justify a complementary worksheet, a few that clearly do not and a few that are in between. The examples will be sent to the TWG by 28 July 2017.
- TWG to provide an updated list of subsectors/products/processes that in their view would require complementary worksheets to the generic questionnaire, with a justification by 4 September 2017.
- EIPPCB to issue a consolidated list in advance of the KoM to facilitate discussion at the meeting.
- To use the list of candidate subsectors/products/processes as the basis for the data collection via questionnaires including when deciding which specific subsectors/products/processes require complementary worksheets.
- To decide at a later stage of the drawing up of the WGC BREF, on the basis of the data collected and the subsequent data assessment, if sector- or process-specific BAT and BAT-AELs should be defined.

## 2.3.2 **Production of sulphuric acid**

The production of sulphuric acid represents a particular issue within the specific products/processes that might require a dedicated approach, as it is also related to the production of non-ferrous metals.

During its final TWG meeting in March 2014, the TWG for the review of the Non-Ferrous Metals (NFM) BREF considered that the production of sulphuric acid was within the scope of the LVIC-AAF BREF and decided that it would therefore be removed from the scope of the NFM BREF in order to ensure consistency and to avoid overlaps. Some NFM TWG members, however, would have preferred to include the production of sulphuric acid within the scope of the NFM BREF.

At that time, the drawing up of the WGC BREF was not yet envisaged. In its letter dated 5 August 2016, the Commission informed the members and observers of the Industrial Emissions Expert Group (IEEG) that the drawing up of the WGC BREF would constitute the first opportunity to reassess the BAT-AELs set in the LVIC-AAF BREF for the production of sulphuric acid<sup>16</sup>.

<sup>&</sup>lt;sup>16</sup> BATIS Forums > Waste Gas Treatment in the Chemical Sector > 01 Preparatory work > 01 Chemical strategy and work programme > 12 COM - Letter to IED Forum on sulphuric acid production,

An initial assessment of the LVIC-AAF BREF and of some Member States' legislation suggested that  $SO_x$  emission levels from sulphuric acid production depend on the production process (e.g. single or double contact, single or double absorption) and that they are (partially) expressed as sulphur conversion levels (see Document 2 of the call for IPs). Moreover, EUROMETAUX argued that NFM plants operate under specific conditions (e.g. high variability of  $SO_2$  inlet concentrations) that are different to those of plants using elemental sulphur as raw material<sup>17</sup>.

This suggests that emissions of  $SO_x$  from the production of sulphuric acid require a dedicated approach including a complementary worksheet to the generic questionnaire. They could be addressed in the WGC BREF, which is likely to require a deeper analysis of the sulphuric acid production process(es). Although specific production processes should in principle not be described in the WGC BREF, a very limited number of exceptions could be acceptable provided that the specific process used is particularly relevant for emissions to air. This could be the case here since the annual production of sulphuric acid in Europe in 2013 was reported to be 19 Mt/yr<sup>18</sup>, of which a significant proportion was produced by NFM plants. In 2005, 39 % of the sulphur dioxide used for sulphuric acid production originated from the production of non-ferrous metals<sup>-</sup>.

#### **Original EIPPCB proposal**

EIPPCB Proposal 13: to include the production of sulphuric acid in the scope of the WGC BREF, including when sulphuric acid is produced in NFM plants.

#### **Summary of initial positions**

- 12 out of 22 IPs agreed with the proposal, 6 partly agreed and 4 disagreed.
- BAT-AELs for emissions from sulphuric acid production are not set in the NFM BREF (BE, ePURE, NL).
- The review of the LVIC-AAF BREF is not scheduled (EEB).
- The main concerns of those who partly agreed were as follows:
  - Sulphuric acid plants should be reviewed in the LVIC-AAF BREF (AT, CEFIC, Fertilizers EUROPE, FI) or be described in a similar chapter in the WGC BREF (CEFIC, Fertilizers Europe, FI). AT agreed with the proposal to deal with a limited number of specific subsectors/products/processes such as sulphuric acid production, if manageable.
  - Sulphuric acid production in NFM plants should be covered in the NFM BREF (EUROMETAUX) or be described in a similar chapter in the WGC BREF with all sources of sulphur dioxide.
  - There are more specific subsectors/products/processes to consider (FR).
  - The main concerns of those who disagreed were as follows:
    - An integrated process assessment is required (DE). (This issue is assessed in Section 2.3.1).
    - The production of sulphuric acid from coke-oven desulphurisation plants must not be considered a chemical abatement process. Significance may be considered low (EUROFER).
    - Sulphuric acid production in ferromolybdenum (FeMo) plants is very specific and should be covered by the LVIC-AAF BREF with a dedicated subchapter (EUROALLIAGES).
    - Clarification is needed on how the data from sulphuric acid plants at NFM sites are to be collected, accessed and used (UK). A similar concern that NFM installations might

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 $<sup>\</sup>label{eq:http://eippcb.jrc.ec.europa.eu/batis/console/forumIndex.jsp?fuseAction=forum_showPost&forumID=119185&postID=119319&creadPost.$ 

<sup>&</sup>lt;sup>17</sup> BATIS Forums > Waste Gas Treatment in the Chemical Sector > 01 Preparatory work > 05 Eurometaux - Background information on sulphuric acid production.

http://eippcb.jrc.ec.europa.eu/batis/console/forumIndex.jsp?fuseAction=forum\_showForum&forumID=120271.
 The University of York, The Essential Chemical Industry online, last amended 20th December 2013, http://www.essentialchemicalindustry.org/chemicals/sulfuric-acid.html.

not contribute to the data collection was raised by BE, who partly agreed with the proposal.

- There were four alternative proposals:
  - to cover all chemical production where an integrated process assessment is required in a specific BREF rather than in the WGC BREF (e.g. production of sulphuric acid, nitric acid, phosphoric acid, hydrofluoric acid, ammonia, urea, fertilisers, polymers, carbon black) (DE);
  - to cover sulphuric acid production in coke-oven gas desulphurisation plants in the IS BREF (EUROFER);
  - to foresee a chapter on sulphuric acid production, similar to the LVIC-AAF BREF, if the TWG decides to include emissions from sulphuric acid production (CEFIC, EUROMETAUX, Fertilizers Europe);
  - to keep the technical descriptions of the processes (Chapter 3.3) to the strict minimum in order to prevent too much text inclusion; cross-references to the existing LVIC-AAF BREF could be made for further information (EEB).

#### **EIPPCB** assessment

- For many chemical processes, detailed process descriptions are already included in the existing chemical BREFs. The aim of the WGC BREF is not to review those descriptions, but to collect data and to set BAT-AEPLs where appropriate. Cross-references to relevant existing chemical BREFs could be included in the WGC BREF.
- The production of sulphuric acid from SO<sub>X</sub>-containing waste gases is carried out in various industrial activities. Several Member states have proposed example plants: the production of molybdenum (BE, NL), viscose (CZ) and pigments (FR)<sup>19</sup>. Although the production of sulphuric acid might be covered by industry-specific vertical BREFs, it would not be efficient to address this in each and every BREF. This could also lead to diverging BAT that are not justified in substance.
- The BAT-AELs in the LVIC-AAF BREF addressed specificities of sulphuric acid production by the type of sulphur source (sulphur-burning, others) and the process type. A similar approach could be applied for the WGC BREF.
- As announced in the email of DG ENV dated 14 July 2017, the future of the other existing chemical BREFs will be discussed at the next IED Article 13 forum meeting.
- E-PRTR (2014)<sup>20</sup> data indicate that sulphuric acid plants at NFM sites emit sulphur oxides in the same order of magnitude as sulphuric acid plants at chemical sites.
- The production of sulphuric acid in coke-oven gas desulphurisation plants was excluded from the scope of the IS BREF (published in 2013) on the basis that it would be covered by the LVIC-AAF BREF. The drawing up of the WGC BREF provides an opportunity to cover all sulphuric acid production processes.
- The relevant industry associations (i.e. CEFIC, EUROALLIAGES, EUROFER, EUROMETAUX) have started to work on the WGC BREF. This should help to ensure that all operators of sulphuric acid plants participate in the drawing up of the WGC BREF.

#### **EIPPCB** proposal

• Amend EIPPCB Proposal 13 as follows:

EIPPCB Proposal 13: to include the production of sulphuric acid in the scope of the WGC BREF, including when sulphuric acid is produced as a by-product, for example in viscose production, pigment production, coke-oven gas desulphurisation plants, ferromolybdenum plants and NFM plants.

<sup>&</sup>lt;sup>19</sup> Sulphuric acid plants used for waste gas treatment; for example Climax Molybdenum, Rotterdam (NL), Glanzstoff-Bohemia (CZ - Viscose), Holliday pigments (FR - pigments), SADACI (BE – Molybdenum roaster)

http://www.sulphuric-acid.com/sulphuric-acid-on-the-web/acid %20plants/Acid\_Plant\_Index.htm.

<sup>&</sup>lt;sup>20</sup> The NFM BREF reports for example 6 NFM installations producing copper and operating a sulphuric acid plant: Atlantic Copper (ES), Aurubis (DE; BG), Boliden (FI, SE), KGHM (PL). E-PRTR reports for 2014 for those installations 17 000 t SO<sub>x</sub> and for chemical facilities producing inorganic acids and basic inorganic chemicals not further specified 20 000 t SO<sub>x</sub>.

# 2.4 Other proposals for the scope of the WGC BREF

Original EIPPCB request	
	• In addition to EIPPCB Request 1 and Request 2, the TWG was asked to provide any other
	proposals for the scope including a rationale.
	Summary of initial positions
	<ul> <li>I1 TWG members provided additional proposals resulting in a list of 46 records: <ul> <li>Provide guidance on how to evaluate BAT-AELs when several gaseous waste streams are combined in one treatment facility (AT, FR, NL).</li> <li>Define the interface of the WGC BREF with the other chemical BREFs and do not consider the WGC a vertical BREF (BE, DK, EUROALLIAGES, EUROMETAUX).</li> <li>Focus on the differences between batch and continuous processes when setting BAT-AELs (DK).</li> <li>Address resource consumption, waste prevention, circular economy and substitution of hazardous substances with less hazardous alternatives (EEB).</li> <li>Address polymer production (particularly LDPE, HDPE, PVC) (EEB, SE).</li> <li>Include the production of sulphuric acid at NFM and FeMo sites in the scope of the NFM BREF (EUROALLIAGES).</li> <li>Include process-integrated techniques such as the choice of fuel (FR).</li> <li>Set annual instead of hourly emission thresholds for batch plants, due to short-term fluctuations (CEFIC, ePURE) or due to the limited number of operating hours per year of some plants (NL).</li> <li>Set hourly emission thresholds to exclude small-scale emissions (DK).</li> <li>Address cadmium, chromium and other impurities in fertilisers (EEB).</li> <li>Include installations that are using substances such as ozone-depleting substances (ODSs)</li> </ul></li></ul>
	<ul> <li>and greenhouse gases (GHG) and operating under exemptions from the other regulations that cover their use. For example the pharmaceutical sector benefits from exemptions as regards some ODSs (FR).</li> <li>Include combined treatment equipment in the data collection (FR).</li> <li>Combine compounds with similar chemical properties and environmental impact (NL).</li> </ul>
	EIPPCB assessment
	<ul> <li>The proposal to provide guidance on how BAT-AELs apply to combined streams is addressed in Section 2.2.2.1 where a similar proposal from BE is assessed.</li> <li>The interface of the WGC BREF with the other chemical BREFs is addressed in Sections 2.1, 2.2.1, 2.2.2 and 2.2.3. The WGC BREF is a vertical BREF in the sense of the definition given in Section 1.1.2 of the BREF Guidance.</li> <li>The data collection will cover both batch and continuous processes – see Section 2.3.1.</li> <li>Resource consumption, waste prevention and Circular Economy type issues are partly addressed in the ENE and CWW BREFs. These topics as well as the substitution of hazardous substances by less hazardous alternatives generally requires an analysis of the specific production processes. The scope of the WGC BREF is already quite wide. Including the aforementioned topics would deviate from the approach to focus the WGC BREF on waste gas treatment</li> </ul>
	<ul> <li>The aim of the WGC BREF is to address emissions to air across the whole chemical industry, including from the production of polymers (see Section 2.1).</li> <li>The production of sulphuric acid at NFM and FeMo production plants is addressed in Section 2.3.2.</li> <li>As the WGC BREF is aimed at the whole chemical industry, it will naturally focus on end-of-pipe techniques, but process-integrated techniques could be considered in specific cases (e.g. for process furnaces/heaters (see Section 2.2.5.3) or the production of sulphuric acid (see Section 2.3.2).</li> </ul>

does not provide negative incentives to the use of process-integrated techniques.
The setting of mass flow thresholds expressed in kg/yr and in connection to the definition of BAT-AELs is addressed in Section 2.3.1. The setting of mass flow thresholds in connection to

- the data collection is addressed in Section 4.3.
- The IED and the BREFs do not cover product quality standards. The presence of impurities in fertilisers is covered by the Fertilisers Regulations 1069/2009 and 1107/2009 and the proposal to amend these regulations<sup>21</sup>.
- The inclusion of ozone-depleting substances as KEIs is addressed in Section 4.2.7.
- The inclusion of the combined treatment of waste gases is addressed in Section 2.2.2.1.
- The grouping of substances is addressed in Section 5.4.

#### **EIPPCB** proposal

- All of the issues raised are covered elsewhere in this document or in other BREFs. Therefore, the EIPPCB has no new proposals to make regarding the scope of the WGC BREF.
- This issue is not proposed for discussion at the KoM.

<sup>&</sup>lt;sup>21</sup> EC circular economy package Brussels, 17.3.2016 COM(2016) 157 final: Annexes to the Proposal for a regulation of the European Parliament and of the Council laying down the rules on the making available on the market of CE marked fertilising products and amending Regulations (EC) No 1069/2009 and (EC) No 1107/2009.

# 3 STRUCTURE (AND CONTENTS) OF THE WGC BREF AND OF ITS BAT CONCLUSIONS

The EIPPCB proposal is based on the current structure of the revised CWW BREF and considering the reflections on the scope above:

#### Preface

#### Scope

#### 1. General information

- 1.1. The chemical industry in Europe
- 1.2. Environmental relevance of the chemical industry for emissions to air
- 1.3. Waste gas in the chemical industry
- 1.4. Waste gas treatment technology

#### 2. Current emission levels

- 2.1. General information on the collection of plant-specific data via questionnaires
- 2.2. Main techniques used to reduce emissions to air
- 2.3. Analysis of emission levels

#### 3. Techniques to consider in the determination of BAT

- 3.1. Monitoring of channelled emissions to air
- 3.2. Generic techniques to reduce channelled emissions to air
  - 3.2.1. Selection of treatment techniques
  - 3.2.2. Individual waste gas treatment techniques
    - 3.2.2.1. Recovery/abatement techniques for both organic and inorganic compounds
    - 3.2.2.2. Abatement techniques for both organic and inorganic compounds
    - 3.2.2.3. Recovery/abatement techniques for dust
    - 3.2.2.4. Recovery/abatement techniques for inorganic compounds
  - 3.2.3. Combination of waste gas treatment techniques
- 3.3 Techniques to reduce channelled emissions to air for specific subsectors/products/processes (if needed, e.g. sulphuric acid production)

# **4.** Best Available Techniques (BAT) conclusions for Common Waste Gas Treatment in the Chemical Sector

Scope

General considerations

Definitions

4.1. Generic BAT conclusions

- 4.1.1. Monitoring
- 4.1.2. Emissions to air
- 4.2. Product/Process-specific BAT conclusions (if needed, e.g. sulphuric acid production)
- 4.3. Description of waste gas treatment techniques

#### 5. Emerging techniques

#### 6. Concluding remarks and recommendations for future work

References

Glossary

Annexes

#### **Original EIPPCB proposal**

EIPPCB Proposal 14: to use the structure (and contents) shown above for the drawing up of the WGC BREF.

#### Summary of initial positions

- 7 out of 21 IPs agreed with the proposal, 14 partly agreed and none disagreed.
- The main concerns of those who partly agreed were as follows:
  - Duplication with the CWW BREF should be avoided (BE, UK).
  - Clear descriptions of waste gas management techniques should be included (DE, EEB).
  - Site management techniques should be included (ePURE, NL).
  - One-page thumbnail descriptions of specific processes should be developed (DK).
  - Chapter 3 should be divided into subsections for specific processes to link processes/products to abatement techniques and BAT-AELs (AT, EUROFER, EUROMETAUX, FR, NO).
  - Section 4.1.2 should be divided into subsections for different processes (CZ, PL).
  - No process-specific subsections should be included (DE, UK).
  - Chapters 3 and 4 should be subdivided according to pollutant (DE).
  - The structure of the BREF should be decided after the data collection (IT).
  - Cross-media effects of the waste gas treatment techniques should be included (UK).

#### EIPPCB assessment

- Site and waste gas management techniques are described in Section 3.1 of the CWW BREF. That information does not need to be duplicated in the WGC BREF, as it already resulted in the setting of BAT.
- While duplication of information with the CWW BREF should be generally avoided, it seems difficult to set BAT for end-of-pipe treatment techniques and related BAT-AELs if the corresponding information cannot be found in either the WGC BREF or the CWW BREF. An efficient option could be to use as far as possible cross-references to the CWW BREF and to only add new/updated information (e.g. on plant-specific performances).
- The decision on whether to include sections on specific subsectors/products/processes depends on the decisions taken in relation to the scope (see Section 2.3.1). The inclusion of specific subsectors/products/processes is foremost needed if process-integrated techniques are relevant for setting BAT and BAT-AELs for emissions to air. Again, an efficient option could be to use as far as possible cross-references to more specific chemical BREFs and to only add new/updated information where this is relevant for the setting of BAT(-AELs). A decision on this should be made later when more information is available.
- The proposed structure based on the CWW BREF is based on a subdivision by pollutant groups. A sharper subdivision is difficult as some techniques can be used to abate several pollutants at the same time.
- The standard 10-heading format of the techniques to consider in the determination of BAT includes a section on cross-media effects.

#### EIPPCB proposal

• Amend EIPPCB Proposal 14 as follows:

EIPPCB Proposal 14: to generally use the structure (and contents) shown above for the drawing up of the WGC BREF and to use as far as possible cross-references to the CWW BREF and other more specific chemical BREFs. To decide at a later stage of the drawing up of the WGC BREF if Chapters 3 and 4 should be subdivided to address specific subsectors/products/processes.

# 4 KEY ENVIRONMENTAL ISSUES (KEIs) FOR THE WGC BREF

# 4.1 Overview

The EIPPCB considers that two major issues need to be addressed when selecting the KEIs for emissions to air from the chemical industry: The first one is of a qualitative nature and concerns the identification of relevant substances for emissions to air (see Section 4.2), while the second one is of a quantitative nature and concerns the question of when the mass flow of a given substance (or group of substances) in gaseous effluents is large enough to be considered relevant (see Section 4.3).

The TWG responses to the call for IPs on KEIs are collated in Annex 4 'Overview of IPs on KEIs' (see Section 7.4).

# 4.2 Identification of relevant substances

## 4.2.1 EIPPCB approach

#### 4.2.1.1 Overview

The EIPPCB compiled a list of more than 60 pollutants as candidate KEIs in Document 3 of the call for initial positions, as single substances and groups of substances. The list included:

- candidates proposed by the UK, CEFIC, Germany (UBA(DE) report) and the VCI report;
- substances referred to in the IED and the current chemical BREFs;
- substances with European Air Quality Standards;
- substances contained in the E-PRTR.

0	Original EIPPCB request		
E	EIPPCB Request 4: TWG members are asked to provide their views on which of the substances		
in	cluded in the current chemical BREFs, European ambient air quality standards and the		
E.	E-PRTR should be selected as KEIs for the WGC BREF, by filling in the corresponding cells in		
	Document 3. A rationale should be provided to support each proposed substance.		
E.	EIPPCB approach to summarise the initial positions		
٠	For each listed candidate KEI:		
	- the total number of initial positions differs slightly between different KEIs because		
	some TWG members did not comment on some KEIs;		
	- when IWG members agreed with the proposed KEI, the rationale is only reported if		
	new information or evidence has been made available;		
	- when I wG members partly agreed or disagreed with the proposed KEI, the summary only describes specific information/comments that provide evidence with regard to the		
	relevance and significance of the KFI candidate.		
	- when TWG members informed that a substance is not relevant for their Member State		
	or industry sector the IP was considered an abstention and not counted in the totals of		
	those who agreed/partly agreed/disagreed.		
E	IPPCB approach to assess candidate KEIs		
-	The approach uses the criteria for 'identifying KEIs in a consistent and practical manner'		
•	presented by the Commission at the IED Article 13 forum meeting in $2015^{22}$		
•	The KEIs that are selected should be those for which the WGC BREE has the highest		
	potential to set BAT-AELs that would significantly improve the level of environmental		
	protection compared to current emission levels (Criteria 4 for defining KEIs). The reduction		
	in emissions would contribute to IED objectives and/or broader EU environmental targets.		
٠	The EIPPCB assessment of each KEI was mainly based on the following sources of		
	information:		
	- the initial positions of TWG members;		
	- REACH/CLP data (see Section 4.2.1.2.1);		
	- E-PRTR data (see Section 4.2.1.2.2);		
	- EEA reports (see section 4.2.1.2.3);		
	- EU ETS data (see Section 4.2.1.2.4);		
	- the recent UBA(DE) and VCI reports (see Section 4.2.1.2.5);		
	- the EXIsting Chemical BREFS; the IBC Deference Deport on Monitoring of Emissions to Air and Water from IED		
	- the JRC Reference Report on Monitoring of Emissions to All and water from IED installations (ROM) (revised final draft of June 2017):		
	- published monitoring methods, such as FN standards		
•	The environmental <b>relevance</b> of pollution for each candidate KEI has been assessed as 'high'		
-	or 'low' based on its toxicity to human health and the environment as well as on the		
	recognition of its relevance in international treaties or European legislation. A substance is		
	rated as 'high' if any of the following criteria is met:		
	- it is a CMR substance with a harmonised classification of 1 or 2;		
	- it is a SVHC;		
	- a European Ambient Air Quality Standard has been set for the substance;		
	- it is subject to an International Convention to restrict its use or to reduce its emissions;		
	- it is a greenhouse gas or an ozone-depleting substance;		

- BAT-AELs have been set in other chemical BREFs for the substance.

<sup>&</sup>lt;u>22 BATIS > Forums > Waste Gas Treatment in the Chemical Sector > 01 Preparatory work > 01 Chemical strategy and work</u> programme > 09 COM – Presentation Criteria for identifying key environmental issues Forum 2015-10-19

#### EIPPCB approach to assess candidate KEIs (continued)

- The **significance** of chemical activities for each candidate KEI has been assessed as 'high', 'medium' or 'low' by using E-PRTR data:
  - high: the chemical sector emits more than 5 % of the total industrial emissions;
  - medium: the chemical sector emits between 2 % and 5 % of the total industrial emissions;
  - low: the chemical sector emits less than 2 % of the total industrial emissions.

[Note: The 2 % and 5 % values have been chosen solely because they are pragmatic and seem to work in practice. For example, there is broad agreement that gaseous chlorides should be included in the WGC BREF and the chemical sector emits 2.1 % of total industrial emissions, so setting the threshold at 2 % gives a result of 'medium'.]

Other sources of information that were used to assess the significance include the following:

- REACH data on tonnage bands and the uses of the substance at industrial sites (see Section 4.2.1.2.1);
- EEA reports for greenhouse gases and ozone-depleting substances (see Section 4.2.1.2.3).
- The likely **availability of emission data** for each candidate KEI has been assessed as 'high', 'medium' or 'low' based on the information from the E-PRTR, as well as the UBA(DE) and VCI reports prepared in the context of front-loading the work on the WGC BREF:
  - high: more than 30 data points available;
  - medium: between 10 and 30 data points available;
  - low: fewer than 10 data points available.

[Note: Past experience suggests that more than 10 data points generally provide a good basis for setting BAT-AEPLs while more than 30 data points generally provide a very good basis. The E-PRTR data points relate to final (abated) emissions that are above the reporting threshold, whereas the WGC BREF questionnaire will collect data on unabated emissions and set a lower reporting threshold than the E-PRTR. Hence, the number of data points in the E-PRTR will generally be lower than the number of installations that will report emissions in response to the WGC BREF questionnaire. Nevertheless, the number of data points in the E-PRTR is indicative of the number of data points that are likely to be available to the WGC BREF.]

- The **availability of standardised emission monitoring methods** for each KEI has been assessed using the ROM, the LVOC BREF (final draft), the UBA(DE) report and CEN standards. The WGC BREF questionnaire will ask for emission data and information on the monitoring method used. The preference will be for data that have been obtained using a European standard, because this will ensure comparability of the monitoring data.
- To facilitate the discussion at the KoM, the candidate KEIs have been grouped into:
  - groups of substances with certain characteristics e.g. CMR (see Section 4.2.2);
  - substances covered by European Air Quality Standards (see Section 4.2.3);
  - substances covered by the Stockholm Convention (see Section 4.2.4);
  - substances covered by the Minamata Convention on Mercury (see Section 4.2.5);
  - greenhouse gases covered by the EU ETS (see Section 4.2.6);
  - ozone-depleting substances (see Section 4.2.7);
  - other organic substances (see Section 4.2.8);
  - other gases (see Section 4.2.9);
  - other metals (see Section 4.2.10);
  - phosphate (see Section 4.2.11);
  - other proposals (see Section 4.2.12).

#### EIPPCB approach to proposing candidate KEIs

• A candidate KEI is not proposed for discussion when a clear TWG majority was in favour or against the inclusion of that candidate KEI and the EIPPCB assessment confirmed this TWG position.

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#### 4.2.1.2 Information sources

#### 4.2.1.2.1 REACH/CLP

REACH/CLP information may be used to support the development of BREFs.

The list of polluting substances in Annex II to the IED contains the 'Substances and mixtures which have been proved to possess carcinogenic or mutagenic properties or properties which may affect reproduction via the air'. This type of information is available from the Classification and Labelling (C&L) inventory<sup>23</sup>.

The CLP Regulation defines three categories of carcinogens:

- Category 1A 'known to have carcinogenic potential for humans', classification is largely based on human evidence;
- Category 1B 'presumed to have carcinogenic potential for humans', classification is largely based on animal evidence;
- Category 2 'suspected human carcinogens' done on the basis of evidence obtained from human and/or animal studies, but which is not sufficiently convincing to place the substance in Category 1A or 1B.

Similar category definitions are given for mutagenic substances ('germ cell mutagens') and substances toxic to reproduction.

The REACH risk assessments cover exposure scenarios which are integrated into chemical safety reports. ECHA publishes information included in the registration dossiers in different information layers like the Brief Profiles<sup>24</sup> on its website, if the information is not claimed to be confidential.

A selection of REACH/CLP data on the candidate KEIs is presented in Annex 5 (see Section 7.5):

- Harmonised classification including CMR properties (C&L inventory).
- Brief profiles:
  - SVHC (REACH Candidate List and Authorisation List Annex XIV to REACH).
  - Properties of concern: CMR (1A, 1B, 2) in the harmonised classification and/or in a REACH registration dossier and/or PBT categorisation by at least one REACH registrant (the PBT categorisation includes vPvB substances<sup>25</sup>).
  - REACH Annex XVII restrictions<sup>26</sup> and Annex XIV authorisations<sup>27</sup> on the manufacture, placing on the market and use of certain dangerous substances, preparations and articles.
  - Tonnage (band) of the substance manufactured and/or imported into the European Economic Area.
  - Uses at industrial sites generic information regarding the release to the environment.

<sup>&</sup>lt;sup>23</sup> <u>https://echa.europa.eu/</u> -> Information on Chemicals -> C&L Inventory.

<sup>&</sup>lt;sup>24</sup> <u>https://echa.europa.eu/</u> -> Information on Chemicals -> Search for Chemicals (enter name of chemical) -> BP.

<sup>&</sup>lt;sup>25</sup> ECHA What is an Infocard <u>https://echa.europa.eu/documents/10162/22177693/what is an infocard en.pdf/4960b3a4-a84f-461d-926c-b4a683b2f98f.</u>

<sup>&</sup>lt;sup>26</sup> https://echa.europa.eu/addressing-chemicals-of-concern/restrictions/substances-restricted-under-reach.

<sup>27</sup> https://echa.europa.eu/addressing-chemicals-of-concern/authorisation/recommendation-for-inclusion-in-the-authorisationlist/authorisation-list.

#### 4.2.1.2.2 E-PRTR

The E-PRTR dataset<sup>28</sup> used in the assessments relates to EU-28 emissions to air for 2014, which was the last year for which complete data was available online. The E-PRTR dataset for 2015 was only published in early July 2017 which was too late for it to be fully taken into account in this BP (because most of the assessments had already been completed). However, some 2015 data has been used, for example in the assessment of HCFCs (see Section 4.2.7.3).

The main limitations of the E-PRTR data for the purpose of the drawing up of the WGC BREF are as follows:

- The E-PRTR covers a restricted number of substances and groups of substances.
- The E-PRTR assigns emissions to a facility and only lists the main IED activity of the facility, so any other IED activities at a facility are not listed. For example, a non-ferrous metal facility that is roasting a sulphide ore may include a sulphuric acid manufacturing plant that uses sulphur dioxide as a feedstock. The E-PRTR will not mention the sulphuric acid plant as a chemical production activity.
- Only about 25 % of the chemical installations covered by the IED report their emissions to the E-PRTR (779 out of 5 084). The emissions of the other 75 % of the chemical installations are below the E-PRTR reporting thresholds.
- The E-PRTR data relate to final (abated) emissions that are above the reporting threshold, whereas the WGC BREF questionnaire is proposed to collect data above a certain threshold for **unabated emissions** which are expected to be lower than the reporting thresholds of the E-PRTR (see Section 4.3). Depending on the participation quota, the number of installations that report emissions in response to the WGC BREF questionnaire could therefore be higher than the number of facilities reporting in the E-PRTR. Nevertheless, the number of data points in the E-PRTR is indicative of the number of data points that could become available to the drawing up of the WGC BREF.

#### 4.2.1.2.3 EEA reports

The following reports of European Environmental Agency were used in the assessment of fluorinated greenhouse gases and the ozone-depleting substances:

- EEA Report No 33/2016, Fluorinated greenhouse gases 2015<sup>29</sup>;
- EEA Report No 19/2016, Ozone-depleting substances 2015<sup>30</sup>.

#### 4.2.1.2.4 EU ETS

EU ETS data for 2014<sup>31</sup> were used in the assessments because they could be compared with the E-PRTR data for 2014.

The main limitations of the EU ETS data are:

• For nitrous oxide (N<sub>2</sub>O) emissions, the EU ETS only covers chemical plants producing nitric, adipic and glycoxylic acids as well as glyoxal.

<sup>&</sup>lt;sup>28</sup> <u>http://prtr.ec.europa.eu/#/pollutantreleases.</u> <u>http://prtr.ec.europa.eu/#/pollutantreleases.</u>

<sup>&</sup>lt;sup>29</sup> https://www.eea.europa.eu/publications/fluorinated-greenhouse-gases.

<sup>&</sup>lt;sup>30</sup> <u>https://www.eea.europa.eu/publications/ozone-depleting-substances-2015.</u>

<sup>&</sup>lt;sup>31</sup> https://ec.europa.eu/clima/policies/ets\_en. The data used for the nitrous oxide assessment were obtained directly from DG CLIMA and are available on BATIS > Forums > Waste Gas Treatment in the Chemical Sector > 01 Preparatory Work > 08 EU ETS data nitrous oxide (N2) for 2014.

# For perfluorocarbons (PFCs) emissions, the EU ETS only covers aluminium production. 4.2.1.2.5 Reports from UBA(DE) and VCI

The UBA(DE) report<sup>32</sup> analyses 2 972 measurements from 1 209 emission sources of the chemical industry sector in Germany. Data were compiled and assessed from 550 measurement reports on periodic measurements (approximately 25 % of the 2 000 installations of the chemical industry in Germany). Most measurements were performed in the period from 2012 to 2015. The focus of the project was on periodic measurement reports because these contain contextual information about the emission such as the process and the waste gas treatment. Continuous measurement data were not compiled and assessed in this project. The UBA(DE) report also provides information on the nature of the activity of the chemical installation and the monitoring methods used.

The VCI report<sup>33</sup> is based on the collection and evaluation of emission declarations from German chemical companies in 2012. VCI received feedback from 43 companies, which corresponds to 119 sites and equates to 600 plants (35 % of all German chemical plants) with 19 005 data points from nearly 7 300 emission sources.

<sup>&</sup>lt;sup>32</sup> BATIS > Forums > Waste Gas Treatment in the Chemical Sector > 01 Preparatory Work > 04 UBA study on definition of best available techniques (BAT) for WGC.

<sup>&</sup>lt;sup>33</sup> BATIS > Forums > Waste Gas Treatment in the Chemical Sector > 01 Preparatory Work > 06 CEFIC/VCI – Data assessment of the current emission situation in Germany – Summary.

## 4.2.2 Groups of substances with certain characteristics

## 4.2.2.1 CMR substances

#### **Original EIPPCB proposal**

There was no proposal for the inclusion or exclusion of CMR substances as a KEI group.

- Using all the CMR classifications (1A, 1B and 2) produces a list 25 candidate KEIs:
  - acrylonitrile benzene, cadmium (compounds), carbon disulphide, carbon monoxide, chloromethane, DEHP, dichloromethane, 1,2-dichloroethane, ethylene oxide, formaldehyde, hexachlorobenzene, lead (compounds), mercury (compounds), naphthalene, nickel (compounds), phenol, PAHs, propylene oxide, tetrachloroethylene, tetrachloromethane, toluene, trichloroethylene, trichloromethane, vinyl chloride.
- Using only the CMR classifications 1A and 1B produces 15 candidate KEIs:
  - acrylonitrile, benzene, cadmium (compounds), carbon monoxide, DEHP, 1,2dichloroethane, ethylene oxide, formaldehyde, hexachlorobenzene, lead (compounds), mercury (compounds), PAHs, propylene oxide, trichloroethylene, vinyl chloride.

#### Summary of initial positions

- 7 out of 12 IPs supported the inclusion of CMR substances as a KEI group, 2 partly supported it and 3 did not support it.
- The main arguments put forward by those who supported the inclusion as a KEI group were as follows:
  - It is necessary to look at specific substances that are relevant to the chemical industry rather than considering CMR substances as a group (DK, FR). The same issue was raised by ES and SE who partly supported the inclusion as a KEI group (ES suggested benzene as an example of a CMR substance that should be considered as a KEI).
  - A large amount of measurement data is available in the UBA(DE) report (EEB).
- The main arguments put forward by those who did not support the inclusion as a KEI group were as follows:
  - Production and use are already intensively controlled by different regulations like REACH. The use of abatement techniques will depend on the physico-chemical characteristics of the substance (CEFIC).
  - It is hard to define what kind or which substances (as individual compounds) should be included in this group and how it/they should be measured (PL).

#### **EIPPCB** assessment

- The TWG broadly supported the inclusion of CMR substances as a KEI group.
- The relevance is 'high' for CMR substances.
- The significance varies between 'high', 'medium' and 'low' depending on the substance.
- The likely availability of emission data varies between 'high', 'medium' and 'low' depending on the substance.
- In the EU, there are many CMR substances that are used, produced or unintentionally generated. The substances differ considerably in their physico-chemical properties. Consequently, different abatement techniques are used to reduce their emissions. Since the WGC BREF will focus on abatement techniques it is impractical to consider CMR substances as a KEI group. However the CMR classification is a relevant criterion to use when assessing candidate KEI substances.
- Standardised emission monitoring methods are available for some substances, but not for others. There is no method that allows the measuring of CMR substances in their entirety (e.g. with a toxicity test).
- The CMR classification of the candidate KEIs is given in Annex 5 (see Section 7.5). 15 candidate KEIs belong to the CMR category 1A or 1B and 10 candidate KEIs to the CMR category 2.
- If an individual substance in the list is not proposed as a KEI then its emissions are covered by the parameter TVOC (see Section 4.2.8.1).

#### **EIPPCB** proposals

- Not to include CMR substances as a KEI group.
- To individually assess each CMR substance that is on the candidate KEI list to see if it should be included as a KEI.

#### 4.2.2.2 Other harmful organic substances

#### **Original EIPPCB proposal**

There was no proposal for the inclusion or exclusion of more harmful organic substances as a KEI group.

#### Summary of initial positions

- 3 out of 10 IPs supported the inclusion of more harmful organic substances as a KEI group, 4 partly supported it and 3 did not support it.
- The main arguments put forward by those who supported the inclusion as a KEI group were as follows:
  - It is necessary to look at more specific substances that are relevant to the chemical industry (DK). The same issue was raised by SE who partly supported the inclusion as a KEI group.
  - A large amount of measurement data is available in the UBA(DE) report (EEB).
- The main issue raised by those who partly supported the inclusion as a KEI group was that SVHCs should be treated separately (ePURE, NL).
- The main issue raised by FR, who did not support the inclusion as a KEI group, was that it is difficult to consider these substances as a group though it is relevant to consider them as individual substances if they are emitted by a significant proportion of the chemical industry.

#### **EIPPCB** assessment

- The TWG is divided in its opinion on the inclusion of more harmful organic substances as a KEI group.
- In DE organic compounds with specific hazardous properties are considered separately from other, less harmful, organic compounds. In DE these more harmful organic compounds are categorised as 'Organic Compounds Class I'. They are measured individually and then summated using EN 13649 or a national standard.
- Many of the substances in the list of more harmful organic substances are SVHCs or CMR substances so if they are individually assessed as candidate KEIs their relevance will be classified as 'high'.
- The significance varies between 'high', 'medium' and 'low' depending on the substance.
- The likely availability of emission data varies between 'high', 'medium' and 'low' depending on the substance.
- Standardised emission monitoring methods are available for some substances, but not for others. There is no method that allows the measuring of more harmful organic substances in their entirety (e.g. with a toxicity test).
- If an individual substance in the list is not proposed as a KEI then its emissions are covered by the parameter TVOC (see Section 4.2.8.1).

#### **EIPPCB** proposals

- Not to include more harmful organic substances as a KEI group.
- To individually assess each of the more harmful organic substances that is on the candidate KEI list to see if it should be included as a KEI.

#### 4.2.2.3 Non-CMR halogenated organic compounds

#### **Original EIPPCB proposal**

There was no proposal for the inclusion or exclusion of non-CMR halogenated organic compounds as a KEI group.

#### **Summary of initial positions**

- 3 out of 9 IPs supported the inclusion of non-CMR halogenated organic substances as KEI group, 4 partly supported it and 2 did not support it.
- The main arguments put forward by those who partly supported the inclusion as a KEI group were as follows:
  - SVHCs should be treated separately (ePURE, NL).
  - It is necessary to look at specific substances that are relevant to the chemical industry (SE). The same issue was raised by CZ and FR who did not support the inclusion as a KEI group.

#### EIPPCB assessment

- The TWG is divided in its opinion on the inclusion of non-CMR halogenated organic compounds as a KEI group.
- Some of the 'non-CMR halogenated organic substances' are SVHCs so if they are individually assessed as candidate KEIs their relevance will be classified as 'high'.
- The significance varies between 'high', 'medium' and 'low' depending on the substance.
- The likely availability of emission data varies between 'high', 'medium' and 'low' depending on the substance.
- Standardised emission monitoring methods are available for some substances, but not for others. There is no method that allows the measuring of non-CMR halogenated organic compounds in their entirety (e.g. with a toxicity test).
- If an individual substance in the list is not proposed as a KEI then its emissions are covered by the parameter TVOC (see Section 4.2.8.1).

#### **EIPPCB** proposals

- Not to include non-CMR halogenated organic compounds as a KEI group.
- To individually assess each of the non-CMR halogenated organic compounds that is on the candidate list to see if it should be included as a KEI.

#### 4.2.3 European Air Quality Standards substances

#### 4.2.3.1 Overview

Human health can be adversely affected by exposure to pollutants in ambient air. In response, the  $EU^{34}$  has developed an extensive body of legislation which establishes health-based standards and objectives for pollutants in ambient air:

- Limit values for particulate matter  $(PM_{10})$ , fine particles  $(PM_{2.5})$ , sulphur dioxide, nitrogen dioxide, lead, carbon monoxide and benzene.
- Target values for ozone, arsenic, cadmium, nickel and PAHs. (Ground-level ozone (or tropospheric ozone) is not a candidate KEI because it is typically not emitted directly by industrial processes, but formed by the reaction of sunlight on air containing hydrocarbons and nitrogen oxides. Ozone formation is therefore controlled by reducing the emissions of hydrocarbons and nitrogen oxides).

<sup>&</sup>lt;sup>34</sup> <u>http://ec.europa.eu/environment/air/quality/standards.htm</u>, retrieved on 02/06/2017.

#### 4.2.3.2 Nitrogen oxides (NO<sub>x</sub>)

#### **Original EIPPCB proposal**

To include nitrogen oxides (NO<sub>X</sub>) as a KEI.

#### Summary of initial positions

• 17 out of 17 IPs agreed with the proposal to include nitrogen oxides (NO<sub>X</sub>) as a KEI.

#### EIPPCB assessment

- The TWG fully supported the inclusion of NO<sub>X</sub> as a KEI.
- The relevance is 'high':
  - Ambient air quality: limit value for  $NO_X$  (2010).
  - $NO_X$  is an ozone precursor. Ambient air quality: target value for ozone (2010).
  - BAT-AELs were set in all chemical BREFs except the CAK BREF.
- The significance is 'high' because chemical facilities accounted for 5.1 % of all industrial emissions in the E-PRTR (4<sup>th</sup> rank of all industry activities) (reporting threshold 100 t/yr).
- The likely availability of emission data is 'high':
  - 185 chemical facilities reported emissions to air in the E-PRTR (mainly for the IED activities 'basic organic chemicals', 'basic inorganic chemicals' and 'NPK-based fertilizers').
  - VCI report: numerous data.
  - UBA(DE) report: 211 measurements.
- A European monitoring standard is available: EN 14792:2017.
- The interface of the WGC BREF with the LVOC BREF is addressed in Section 2.2.3. The EIPPCB Proposal 6 is to exclude emissions for which BAT-AEPLs have been set during the review of the LVOC BREF.

#### EIPPCB proposal

• Amend the EIPPCB proposal as follows:

To include nitrogen oxides  $(NO_x)$  as a KEI, except for the emissions for which BAT-AEPLs have been set during the review of the LVOC BREF.

#### 4.2.3.3 Dust (including fine particulate matter PM<sub>10</sub> and PM<sub>2.5</sub>)

#### **Original EIPPCB proposal**

To include dust as a KEI.

#### Summary of initial positions

- 16 out of 17 IPs agreed with the proposal to include dust as a KEI and 1 partly agreed.
- CZ partly agreed and proposed that total particulate matter should be included but not PM<sub>10</sub> or PM<sub>2.5</sub>, without providing a rationale.

#### EIPPCB assessment

- The TWG broadly supported the inclusion of dust as a KEI.
- The relevance is 'high':
  - Ambient air quality: limit values for  $PM_{10}$  (2005) and  $PM_{2.5}$  (2015).
  - BAT-AELs for dust were set in all chemical BREFs except for the CAK and LVOC BREFs. However, BAT 5 and 11 were set in the LVOC BREF to prevent/reduce dust emissions to air.
- The significance is 'high' because chemical facilities accounted for 6.7 % of all industrial emissions of  $PM_{10}$  in the E-PRTR (5<sup>th</sup> rank of all industry activities) (reporting threshold 50 t/yr).
- The likely availability of emission data is 'high':
  - 31 chemical facilities reported particulate  $(PM_{10})$  emissions to air in the E-PRTR (mainly for the IED activities 'basic organic chemicals', 'basic inorganic chemicals' and 'NPK-based fertilizers').
  - VCI report: numerous data.
  - UBA(DE) report: 682 measurements.
- European monitoring standards are available:
  - Dust: EN 13284-1:2001.
  - PM<sub>10</sub> and PM<sub>2.5</sub>: EN ISO 23210:2009.
- Smaller dust particles (i.e.  $PM_{2.5}$ ) are more harmful to human health than larger dust particles (i.e.  $PM_{10}$ ), which is why separate ambient air quality standards have been set for them. Where data is available on  $PM_{10}$  and  $PM_{2.5}$ , it should be collected for the WGC BREF.

#### EIPPCB proposal

• Amend the EIPPCB proposal as follows:

To include dust as a KEI. To collect data on total dust. To collect data on  $PM_{10}$  and  $PM_{2.5}$  (if available).

#### 4.2.3.4 Sulphur oxides (SO<sub>x</sub>)

#### **Original EIPPCB proposal**

To include sulphur oxides (SO<sub>X</sub>) as a KEI.

#### **Summary of initial positions**

- 16 out of 18 IPs agreed with the proposal to include sulphur oxides as a KEI and 1 partly agreed.
- The main point raised by EUROFER, who partly agreed, was that SO<sub>2</sub> emissions from the production of H<sub>2</sub>SO<sub>4</sub> as a by-product of coke-oven gas desulphurisation plants may be considered not relevant in terms of number of installations, geographical spread and contribution to total (industrial) emissions in the EU.

#### EIPPCB assessment

- The TWG broadly supported the inclusion of SO<sub>X</sub> as a KEI.
- The issue raised by EUROFER, was regarding which installations should be in the scope of the WGC BREF, not about SO<sub>x</sub> being selected as a KEI.
- The relevance is 'high':
  - Ambient air quality: limit value for SO<sub>2</sub> (2005).
  - BAT-AELs for SO<sub>x</sub> were set in all chemical BREFs except the CAK, LVOC and SIC BREFs. However, BAT 6, 12 and 13 were set in the LVOC BREF to reduce sulphur dioxide emissions.
- The significance is 'medium' because chemical facilities accounted for 4.2 % of all industrial emissions in the E-PRTR (4<sup>th</sup> rank of all industry activities) (reporting threshold 150 t/yr). However, the significance increases to 'high' (7.6 % of all industrial emissions) when the emissions from the 'production of non-ferrous metals from ore, concentrates or secondary raw materials' is included (see EIPPCB Proposal 13 in Section Production of sulphuric acid 2.3.2).
- The likely availability of emission data is 'high':
  - 87 chemical facilities reported emissions to air in the E-PRTR. The main activities of the facilities, their number and share of total chemical industry releases to air are:
    - basic organic chemicals (47; 47.3 %);
    - basic inorganic chemicals (36; 42.5 %);
    - NPK fertilisers (4; 10.0 %).
  - 44 non-ferrous metals facilities reported emissions to air in the E-PRTR.
  - VCI: numerous data.
  - UBA(DE): 92 measurements, main activity 'basic organic chemicals' and 'basic inorganic chemicals'.
- A European monitoring standard is available: EN 14791:2017.

#### **EIPPCB** proposal

• Keep the EIPPCB proposal unchanged:

To include sulphur oxides (SO<sub>X</sub>) as a KEI.

#### 4.2.3.5 Carbon monoxide (CO)

#### **Original EIPPCB proposal**

There was no proposal for the inclusion or exclusion of carbon monoxide as a KEI.

#### Summary of initial positions

- 6 out of 14 IPs supported the inclusion of CO as a KEI, 2 partly supported it and 6 did not support it.
- The main arguments put forward by those who supported the inclusion as a KEI were as follows:
  - Low CO levels are an indicator of good combustion conditions (AT, EEB, SE).
  - CO should only be a KEI for non-combustion-related emissions (CZ).
- The main concern of FR, who partly supported the inclusion as a KEI, was that data on CO emissions should be collected and correlated with NO<sub>X</sub> emissions. Then the approach of the LCP and LVOC BREF should be taken to set BAT-AELs for NO<sub>X</sub> and indicative levels for CO instead of BAT-AELs. The same issue was raised by CEFIC who did not support the inclusion as a KEI.
- The other issue raised by CEFIC, was that the CO emissions from the chemical industry are minor compared with the overall emissions from industry and that most of the chemical industry emissions are already covered by the LCP BREF and the MCPD (see EIPPCB Proposal 8 in Section 2.2.5.2).

#### **EIPPCB** assessment

- The TWG is divided in its opinion on the inclusion of carbon monoxide as a KEI.
- BAT-AELs in the LCP and LVOC BREFs for combustion processes were set for NO<sub>X</sub> emissions; the corresponding CO emission levels were only indicative. There is a split view recorded on the use of indicative levels instead of BAT-AELs for CO in the LVOC BREF (BE, DE, SE, EEB).
- The relevance is 'high':
  - Ambient air quality: limit value for CO (2005).
  - Harmonised classification, CMR properties: toxic to reproduction 1A.
  - BAT-AELs in the LVIC-S and POL BREFs.
- The significance is 'high' because chemical facilities accounted for 7.7 % of all industrial emissions in the E-PRTR (4<sup>th</sup> rank of all industrial activities) (reporting threshold 500 t/yr).
  - Thermal or catalytic oxidisers are commonly used for TVOC abatement in chemical activities. Carbon monoxide levels can be used to assess the performance of the oxidiser.
  - Combustion plants are proposed to be excluded from the scope (see EIPPCB Proposal 8 in Section 2.2.5.2) except for process furnaces/heaters (see EIPPCB Proposal 9 in Section 2.2.5.3). The TWG already identified a considerable number of these types of installations in the chemical industry.
  - E-PRTR data do not differentiate between emissions from combustions plants covered by the LCP BREF and emissions from process furnaces/heaters.
- The likely availability of emission data is 'high':
  - VCI: numerous data.
  - UBA(DE): 123 measurement data.
- A European monitoring standard is available: EN 15058:2017.
- The interface of the WGC BREF with the LVOC BREF is addressed in Section 2.2.3. The EIPPCB Proposal 6 is to exclude emissions for which BAT-AEPLs have been set during the review of the LVOC BREF.

#### **EIPPCB** proposal

- To include CO as a KEI, except for the emissions for which BAT-AEPLs have been set during the review of the LVOC BREF.
- To decide at a later stage of the drawing up of the WGC BREF whether or not BAT-AELs will be set.

#### 4.2.3.6 Benzene

#### **Original EIPPCB proposal**

There was no proposal for the inclusion or exclusion of benzene as a KEI.

#### **Summary of initial positions**

- 11 out of 15 IPs supported the inclusion of benzene as a KEI, 2 partly supported it and 2 did not support it.
- The argument put forward by CEFIC, who did not support the inclusion as a KEI, was that benzene can be covered by the parameter TVOC. They also noted that it is classified as a CMR substance.

#### EIPPCB assessment

- The TWG broadly supported the inclusion of benzene as a KEI.
- CEFIC noted that benzene is a CMR substance. Assessing benzene in its own right as a KEI is in line with the proposal for CMR substances made in Section 4.2.2.1.
- The relevance is 'high':
  - Ambient air quality: limit value for benzene (2010).
    - Harmonised classification, CMR properties: carcinogenic 1A; mutagenic 1B.
  - Benzene is restricted under REACH.
    - A BAT-AELs was set in the LVOC BREF (BAT 57).
- The significance is 'high' because chemical facilities accounted for 11 % of all industrial emissions in the E-PRTR (3<sup>rd</sup> rank of all industry activities) (reporting threshold 1 t/yr).
- The likely availability of emission data is 'medium':
  - 35 chemical facilities reported emissions to air to the E-PRTR. Emissions to air are dominated by the activity 'basic organic chemicals' (33 facilities, 94 % of total chemical industry releases to air).
  - UBA(DE): 18 measurements.
  - VCI indicated total emissions were 419 kg/yr, but did not specify how many measurements were involved.
- A European technical specification for monitoring is available: CEN/TS 13649:2014.
- The interface of the WGC BREF with the LVOC BREF is addressed in Section 2.2.3. The EIPPCB Proposal 6 is to exclude emissions for which BAT-AEPLs have been set during the review of the LVOC BREF.

#### **EIPPCB** proposal

• To include benzene as a KEI, except for the emissions for which BAT-AEPLs have been set during the review of the LVOC BREF.

#### 4.2.3.7 Lead and its compounds (as Pb)

#### **Original EIPPCB proposal**

There was no proposal for the inclusion or exclusion of lead and its compounds as a KEI.

#### Summary of initial positions

- 5 out of 13 IPs supported the inclusion of lead and its compounds as a KEI, 2 partly supported it and 6 did not support it.
- The main arguments put forward by those who supported the inclusion as a KEI were as follows:
  - Lead is classified as a SVHC (EEB); the same comment was made by ePURE and NL who partly supported the inclusion as a KEI.
  - Lead is a priority substance under the Water Framework Directive and air emissions can be transferred into water bodies (AT, SE).
- The main arguments put forward by those who did not support the inclusion as a KEI were as follows:
  - Metals can be covered by the parameter dust (except Hg) (CEFIC, EUROMETAUX);
  - The chemical industry emissions are minor compared to overall emissions from industry (CEFIC).

#### **EIPPCB** assessment

• The TWG is divided in its opinion on the inclusion of lead and its compounds as a KEI.

- The relevance is 'high':
  - Ambient air quality: limit value for lead (2005 or 2010 in the immediate vicinity of specific notified industrial sources).
  - Harmonised classification (lead and its compounds), CMR properties: toxic to reproduction 1A, SVHC: PBT.
  - Lead is restricted under REACH.
  - A BAT-AEL for dust from lead oxide manufacture has been set in the LVIC-S BREF ( $< 0.1-0.2 \text{ mg/m}^3$ , to be achieved by using a main filter followed by a security filter).
- The significance is 'low' because chemical facilities accounted for 1.1 % of total industry releases to air) (reporting threshold 200 kg/yr). VCI indicates low levels of total emissions (1.09 kg/yr).
- The likely availability of data is 'medium':
  - 2 chemical facilities reported emissions to air to the E-PRTR from the activity 'basic organic chemicals'.
  - UBA(DE): 5 measurements.
  - The SIC BREF reports 12 companies using lead azide, lead trinitroresorcinate and/or lead picrate for the production of explosives.
- A European monitoring standard is available: EN 14385:2004.
- Large quantities of lead and its compounds are produced and/or imported by the EU chemical industry:
  - Lead is registered under REACH with a tonnage band of 1 000 000 10 000 000 tonnes per year. The ECHA brief substance profile indicates that the substance is used in the production of polymers and releases to the environment likely occur from chemical activities as an intermediate step in further manufacturing of another substance.
  - Lead(IV) oxide (PBO<sub>2</sub>, CAS 1309-60-0) is registered by one registrant under REACH with a tonnage band of 100 – 1000 t/yr. The ECHA brief substance profile indicates that the substance is used in the production of explosives and releases to the environment likely occur from the manufacturing of the substance.
  - Lead(II, IV) oxide ( $Pb_3O_4$ , orange lead, CAS 1314-41-6) is registered by nine active registrants/suppliers under REACH with a tonnage band of  $10\,000 - 100\,000$  t/yr. The ECHA brief substance profile indicates that releases to the environment of the substance likely occur from chemical activities as an intermediate step in further manufacturing of another substance (use of

intermediates) and the manufacturing of the substance. The substance is used in the production of polymers and adsorbents at industrial sites.

- Lead azide (CAS 13424-46-9) is registered under REACH by 5 registrants with a tonnage band of 10 100 tonnes per year. The ECHA brief substance profile indicates that the substance is used in the production of explosives and releases to the environment likely occur in the formulation of mixtures and in the production of articles (explosives).
- Lead trinitroresorcinate (CAS 15245-44-0) is registered under REACH by 9 registrants with a tonnage band of 10 100 tonnes per year. The ECHA brief substance profile indicates that the substance is used in the production of explosives and releases to the environment likely occur in the formulation of mixtures and in the production of articles (explosives).
- Lead picrate (6477-64-1) is up to now pre-registered.
- Low ELVs for lead and its compounds can be found in the national legislation of several EU MS (e.g. 0.5 mg/Nm<sup>3</sup> in DE, 1 mg/Nm<sup>3</sup> in FR). The low emissions from the chemical industry reported in E-PRTR are probably because most releases are below the E-PRTR reporting threshold as a direct consequence of the very low emission level set in MS legislation. However, lead and its compounds are relevant substances and are used in significant quantities in the chemical industry. Therefore, the WGC BREF questionnaire should collect data on lead emissions to establish which processes are involved and what (if any) abatement equipment is being used.

**EIPPCB** proposal

• To include lead and its compounds as a KEI.

#### 4.2.3.8 Nickel and its compounds (as Ni)

#### **Original EIPPCB proposal**

There was no proposal for the inclusion or exclusion of nickel and its compounds as a KEI.

#### Summary of initial positions

- 6 out of 13 IPs supported the inclusion of nickel and its compounds as a KEI, 1 partly supported it and 6 did not support it.
- The main arguments put forward by those who supported the inclusion as a KEI were as follows:
  - It is classified as a SVHC (EEB, ePURE, NL).
  - Emissions from the chemical industry (LVOC, SIC) are significant (AT, FR).
  - There are ambient air quality standards (AT).
- The main arguments put forward by those who did not support the inclusion as a KEI were as follows:
  - Metals can be covered by the parameter dust (except Hg) (CEFIC, EUROMETAUX).
  - The chemical industry emissions are minor compared to overall emissions from industry (CEFIC).

#### EIPPCB assessment

• The TWG is divided in its opinion on the inclusion of nickel and its compounds as a KEI.

- The relevance is 'high':
  - Ambient air quality: target value for nickel (2012).
  - Harmonised classification of elementary nickel, CMR properties: carcinogenic 2.
  - Harmonised classification of nickel dichloride, CMR properties: carcinogenic 1A, mutagenic 2, toxic to reproduction 1B.
  - Nickel is restricted under REACH.
- The significance is 'medium' because chemical facilities accounted for 2.7 % of all industrial emissions in the E-PRTR (3<sup>rd</sup> rank of all industrial activities) (reporting threshold 50 kg/yr).
- The likely availability of emission data is 'medium':
  - 16 chemical facilities reported emissions to air to the E-PRTR with the main activity:
    - 'basic organic chemicals' (9, 80.3 %);
    - 'basic inorganic chemicals' (6, 18.6 %);
    - 'NPK fertilisers' (1, 1.5 %).
  - UBA(DE): 24 measurements, mainly for the activities 'basic organic chemicals' and 'basic inorganic chemicals'.
  - The VCI report had no data.
- A European monitoring standards is available: EN 14385:2004.
- Large quantities of nickel and its compounds are produced and/or imported by the EU chemical industry.
  - Nickel is registered under REACH with a tonnage band of 100 000+ tonnes per year. The ECHA brief substance profile indicates that the substance is used in the manufacture of chemicals and releases to the environment likely occur from chemical activities as an intermediate step in further manufacturing of another substance.
  - Nickel sulphide (CAS 16812-54-7) is registered by 37 active registrants/suppliers under REACH with a tonnage band of 10 000+ tonnes per year. The ECHA brief substance profile indicates the substance is used for the manufacture of chemicals and releases to the environment likely occur from chemical activities as an intermediate step in further manufacturing of another substance.
- It is not clear from the available data sources which chemical processes are responsible for the nickel emissions. The WGC BREF questionnaire should collect data on nickel emissions to establish which processes are involved and what (if any) abatement equipment is being used.

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#### EIPPCB proposal

• To include nickel and its compounds as a KEI.

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#### 4.2.3.9 Arsenic and its compounds (as As)

#### Original EIPPCB proposal

There was no proposal for the inclusion or exclusion of arsenic and its compounds as a KEI.

#### Summary of initial positions

- 3 out of 14 IPs supported the inclusion of arsenic and its compounds as a KEI, 3 partly supported it and 8 did not support it.
- The main arguments put forward by those who supported the inclusion as a KEI were as follows:
  - It is classified as a CMR substance (EEB).
  - There are ambient air quality standards (AT).
  - Metals can be covered by the parameter dust (except Hg) (NL). The same comment was made by CEFIC and EUROMETAUX who did not support the inclusion as a KEI.
- The other main argument put forward by BE, CEFIC and ES, who did not support the inclusion as a KEI, was that chemical industry emissions are minor compared to all industry sectors.

#### **EIPPCB** assessment

- The TWG did not support the inclusion of arsenic and its compounds as a KEI.
- The relevance is 'high':
  - Ambient air quality: target value for arsenic (2012).
  - No harmonised classification, but arsenic compounds have 'properties of concern', e.g. arsenic acid and arsenic (V) oxide: carcinogenic.
  - Arsenic is restricted under REACH.
- The significance is 'low' because chemical facilities accounted for 0.1 % of all industrial emissions in the E-PRTR (reporting threshold 20 kg/yr). VCI data indicate low levels of total emissions (1.12 kg/yr).
- The likely availability of emissions data is 'low':
  - 2 chemical facilities reported emissions to air to the E-PRTR from the activity 'basic organic chemicals'.
  - UBA(DE) report: 1 measurement.
- A European monitoring standard is available: EN 14385:2004.
- If arsenic and its compounds are present as particulates in the waste gas, their emissions are covered by the parameter dust (see Section 4.2.3.3).

#### EIPPCB proposal

- Not to include arsenic and its compounds as a KEI.
- This issue is not proposed for discussion at the KoM.

#### 4.2.3.10 Cadmium and its compounds (as Cd)

#### **Original EIPPCB proposal**

There was no proposal for the inclusion or exclusion of cadmium and its compounds as a KEI.

#### Summary of initial positions

- 5 out of 14 IPs supported the inclusion of cadmium and its compounds as a KEI, 1 partly supported it and 8 did not support it.
- The main arguments put forward by those who supported the inclusion as a KEI were as follows:
  - It is classified as a CMR substance and as an SVHC (EEB, ePURE, NL).
  - There are ambient air quality standards (AT).
  - It is a priority substance under the Water Framework Directive and air emissions can be transferred into water bodies (AT).
  - It is a KEI for EU soil pollution with cadmium in fertilisers as the main source (EEB).
- The main arguments put forward by those who did not supported the inclusion as a KEI were as follows:
  - Metals can be covered by the parameter dust (except Hg) (CEFIC, EUROMETAUX).
  - The chemical industry emissions are minor compared to all industry sectors (BE, CEFIC).

#### EIPPCB assessment

- The TWG is divided in its opinion on the inclusion of cadmium and its compounds as a KEI.
- The relevance is 'high':
  - Ambient air quality: target value for cadmium (2012).
  - Harmonised classification, CMR properties: carcinogenic 1B, mutagenic 2, toxic to reproduction 2.
  - Cadmium is restricted under REACH.
- The significance is 'low' because chemical facilities accounted for 0.7 % of all industrial emissions in the E-PRTR (reporting threshold 10 kg/yr). VCI indicated low levels of total emissions (0.16 kg/yr).
- The likely availability of emission data is 'low':
  - 3 chemical facilities reported emissions to air to the E-PRTR.
  - UBA(DE): 2 measurements.
- A European monitoring standard is available: EN 14385:2004.
- If cadmium and its compounds are present as particulates in the waste gas, their emissions are covered by the parameter dust (see Section 4.2.3.3).

#### **EIPPCB** proposal

• Not to include cadmium and its compounds as a KEI.

#### 4.2.3.11 Polycyclic aromatic hydrocarbons (PAHs)

#### **Original EIPPCB proposal**

There was no proposal for the inclusion or exclusion of polycyclic aromatic hydrocarbons (PAHs) as a KEI.

#### Summary of initial positions

- 7 out of 13 IPs supported the inclusion of PAHs as a KEI, 1 partly supported it and 5 did not support it.
- The main arguments put forward by those who supported the inclusion as a KEI were as follows:
  - The chemical industry produces 20 % of all industrial emissions (SE).
  - It is classified as a CMR substance and as an SVHC (AT, EEB, ePURE, NL, SE).
  - There are ambient air quality standards (AT).
- The main argument put forward by CEFIC, who did not support the inclusion as a KEI, was that only two chemical industry sites report emissions of PAHs.

#### EIPPCB assessment

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- The TWG is divided in its opinion on the inclusion of PAHs as a KEI.
- The relevance is 'high':
  - Ambient air quality: target value for PAHs (2012).
    - Harmonised classification, CMR properties for benzo[*a*]pyrene, benzo[*def*]chrysene (they belong to the PAH group): carcinogenic 1B, mutagenic 1B, toxic to reproduction 1B.
    - Some PAHs are restricted under REACH.
- The significance is 'high' because chemical facilities accounted for 22.2 % of all industrial emissions in the E-PRTR (2<sup>nd</sup> rank of all industry activities) (reporting threshold 50 kg/yr).
- The likely availability of emission data is 'low':
  - 2 chemical facilities (main activity 'basic organic chemicals' and 'NPK-based fertilizers') report to the E-PRTR.
  - The VCI and UBA(DE) reports contain no data.
- International monitoring standards are available: ISO 11338-1:2003 and ISO 11338-2:2003.

#### EIPPCB proposal

• Not to include polycyclic aromatic hydrocarbons as a KEI.

## 4.2.4 Stockholm Convention substances

#### 4.2.4.1 Overview

Under the Stockholm Convention on Persistent Organic Pollutants, Parties shall promote in some cases and require in others the use of best available techniques, and promote the application of best environmental practices<sup>35</sup>.

The chemicals listed in Annex C of the Stockholm Convention include polychlorinated dibenzop-dioxins (PCDDs), polychlorinated dibenzofurans (PCDFs), polychlorinated biphenyls (PCBs) and hexachlorobenzene (HCB).

PCBs have not been considered a KEI candidate, because releases to air were not reported through the E-PRTR for the chemical industry.

#### 4.2.4.2 PCDD/Fs (dioxins + furans)

**Original EIPPCB proposal** There was no proposal for the inclusion or exclusion of PCDD/Fs as a KEI group. Summary of initial positions • 9 out of 14 IPs supported the inclusion of PCDD/Fs as a KEI group, 2 partly supported it and 3 did not support it. The main concerns of those who partly supported the inclusion as a KEI group were as follows: PCDD/Fs are relevant for thermal treatment or combustion processes if the waste gas contains chlorine and chlorinated compounds (CEFIC, UK). the contribution of the chemical industry is very low, e.g. less than 0.2 % in Germany (CEFIC). • The main concerns of FR, who did not support the inclusion as a KEI, was that PCDD/Fs are only relevant for specific processes using aromatics and chlorine. **EIPPCB** assessment The TWG broadly supported the inclusion of PCDD/Fs as a KEI group. The relevance is 'high': Emissions of unintentionally produced PCDD/Fs from thermal processes involving organic matter and chlorine are a result of incomplete combustion or chemical reactions, covered by the Stockholm Convention (Annex C, Part II). Specific chemical production processes, especially production of chlorophenols and chloranil, have been identified as a source category (Annex C, Part III). BAT-AELs were set in the LVOC BREF for TDI/MDI and EDC/VCM production (i.e. BAT 66 and 76, respectively). • The significance is 'medium' because chemical facilities accounted for 2.7 % of all industrial emissions in the E-PRTR (4<sup>th</sup> rank of all industry activities) (reporting threshold 0.1 g/yr). VCI reported total emissions (0.08 g/yr). • The likely availability of emission data is 'medium': 10 chemical facilities reported emissions to air to the E-PRTR. Emissions to air are dominated by the activity 'basic organic chemicals' and basic pharmaceutical products (8 facilities, 98.6 % of total chemical industry releases to air). UBA(DE): 30 measurements, mainly for the activity 'basic organic chemicals', few data on other activities, but no data on fertilisers). VCI: no data.

<sup>&</sup>lt;sup>35</sup> Guidelines on best available techniques and provisional guidance on best environmental practices relevant to Article 5 and Annex C of the Stockholm Convention on Persistent Organic Pollutants, Secretariat of the Stockholm Convention on Persistent Organic Pollutants (2008).

- The toxicity of some PCBs (i.e. dioxin-like PCBs) is similar to the toxicity of PCDD/Fs and the WHO has assigned toxic equivalency factors for 12 PCB congeners.
- European monitoring standards are available: EN 1948-1:2006, EN 1948-2:2006 and EN 1948-3:2006 for PCDD/Fs and EN 1948-4:2010 for dioxin-like PCBs.
- The interface of the WGC BREF with the LVOC BREF is addressed in Section 2.2.3. The EIPPCB Proposal 6 is to exclude emissions for which BAT-AEPLs have been set during the review of the LVOC BREF.

#### **EIPPCB** proposal

- To include PCDD/Fs and dioxin-like PCBs as a KEI group, except for the emissions for which BAT-AEPLs have been set during the review of the LVOC BREF.
- To collect data as international toxic equivalent (I-TEQ) and WHO toxic equivalent (WHO-TEQ), if available.

#### 4.2.4.3 Hexachlorobenzene (HCB)

#### Original EIPPCB proposal

There was no proposal for the inclusion or exclusion of hexachlorobenzene as a KEI.

#### Summary of initial positions

- 5 out of 13 IPs supported the inclusion of hexachlorobenzene (HCB) as a KEI, 3 partly supported it and 5 did not support it.
- The main arguments put forward by those who supported the inclusion as a KEI were as follows:
  - it is classified as CMR and SVHC (AT, EEB, ePURE, NL, SE);
  - emissions from the chemical industry are significant (AT, SE).
- The main argument put forward by ES, who did not support the inclusion as a KEI, was that HCB can be covered by the parameter TVOC. The same argument was put forward by CEFIC, who partly who partly supported the inclusion as a KEI and noted that it is a CMR substance.

#### **EIPPCB** assessment

- The TWG is divided in its opinion on the inclusion of HCB as a KEI.
- The relevance is 'high':
  - Emissions of unintentionally produced HCB from thermal processes involving organic matter and chlorine are a result of incomplete combustion or chemical reactions, covered by the Stockholm Convention (Annex C, Part II). Specific chemical production processes, especially production of chlorophenols and chloranil, have been identified as a source category (Annex C, Part III).
  - Harmonised classification, CMR properties: carcinogenic 1B.
- The significance is 'high' because chemical facilities accounted for 100 % of all industrial emissions in the E-PRTR (reporting threshold 10 kg/yr). According to the European Environment Agency, industrial processes and product use contribute to 16 % of the total HCB emissions to air<sup>36</sup>.
- The likely availability of emission data is 'low' because three chemical facilities reported HCB releases to air in E-PRTR. The VCI and UBA(DE) reports contain no data.
- A European technical specification for monitoring is available: CEN/TS 13649:2014.
- Emissions of HCB are covered by the parameter TVOC (see Section 4.2.8.1).

EIPPCB proposal

• Not to include hexachlorobenzene as a KEI.

<sup>&</sup>lt;sup>30</sup> <u>https://www.eea.europa.eu/data-and-maps/indicators/eea32-persistent-organic-pollutant-pop-emissions-1/assessment-6</u>, retrieved on 02/06/2016.

#### 4.2.5 The Minamata Convention on Mercury

#### 4.2.5.1 **Overview**

The Minamata Convention on Mercury is an international treaty designed to protect human health and the environment from anthropogenic emissions and releases of mercury and mercury compounds.

#### 4.2.5.2 Mercury and its compounds (as Hg)

Original EIPPCB proposal	
There was no proposal for the inclusion or exclusion of mercury and its compounds as a KEI.	
Summary of initial positions	
<ul> <li>7 out of 13 IPs supported the inclusion of mercury and its compounds as a KEI, 1 partly supported it and 5 did not support it.</li> <li>The main arguments put forward by those who supported the inclusion as a KEI were as follows: <ul> <li>It is classified as CMR and a SVHC (EEB, NL, SE). The same argument was put forward by ePURE who partly who partly supported the inclusion as a KEI.</li> <li>It is covered by the Minamata convention (AT, EEB, SE).</li> </ul> </li> <li>The main arguments put forward by those who did not support the inclusion as a KEI were as follows: <ul> <li>It is covered by the Minamata convention (AT, EEB, SE).</li> </ul> </li> </ul>	
- Most of the emissions have already been covered by the CAK BREF (FR).	
EIPPCB assessment	
<ul> <li>The Two is divided in its opinion of the inclusion of increary and its compounds as a KEI.</li> <li>The relevance is 'high': <ul> <li>Mercury is covered by the Minamata Convention and the Mercury Regulation (EU) 2017/852<sup>37</sup>.</li> <li>The CAK BREF concluded on the conversion of mercury cell plants to membrane cell plants and the decommissioning of mercury cell plants. It did not address the production of specialities such as alcoholates, dithionites and alkali metals by using alkali metal amalgam with the mercury cell techniques.</li> <li>Harmonised classification, CMR properties: toxic to reproduction 1B.</li> <li>Mercury is restricted under REACH.</li> </ul> </li> <li>The significance is 'high' because chemical facilities accounted for 9.7 % of all industrial emissions in the E-PRTR (4<sup>th</sup> rank of all industrial activities) (reporting threshold 10 kg/yr) However, most of the chemical facilities reporting mercury emissions in E-PRTR are chlor-alkali plants where the use of mercury is forbidden as of December 2017.</li> <li>The likely availability of emission data 'high': <ul> <li>37 chemical facilities reported emissions to air to the E-PRTR. The main activities of the facilities, their number and share of total chemical industry releases to ai are: <ul> <li>'Basic organic chemicals' (20, 71.3 %);</li> <li>'Basic inorganic chemicals' (16, 28 %);</li> <li>NPK fertilisers (1, 0.6 %).</li> </ul> </li> </ul></li></ul>	

<sup>&</sup>lt;sup>37</sup> REGULATION (EU) 2017/852 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 17 May 2017 on mercury, and repealing Regulation (EC) No 1102/2008 http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32017R0852&from=EN.

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chemicals'.

- The VCI report had no data.
- The Mercury Regulation prohibits the use of mercury and mercury compounds, whether in pure form or in mixtures, in manufacturing processes. The phase-out of mercury starts in December 2017 and will end in 2022 with the exception of a derogation for the production of sodium or potassium methylate or ethylate which will be phased out by 2028.
- The Mercury Regulation imposes conditions on the production of sodium or potassium methylate or ethylate, e.g.:
  - The release of mercury and of mercury compounds into air, water and land in terms of per unit production shall be reduced by 50 % by 2020 as compared to 2010.
  - The capacity of installations using mercury or mercury compounds shall not be increased and new installations shall not be allowed.
- Taking into account the measures of the Mercury Regulation, it is very unlikely that the WGC BREF will significantly improve the level of environmental protection.
- A European monitoring standard is available: EN 13211:2001.

#### EIPPCB proposal

- Not to include mercury and its compounds as a KEI.
- This issue is not proposed for discussion at the KoM.

#### 4.2.6 Greenhouse gases

#### 4.2.6.1 Overview

The scope of the EU ETS has been extended several times by amending Annex I to Directive 2003/87/EC which lists the emissions from activities to which the Directive applies. The activities and GHG emissions relevant to the WGC BREF are:

- combustion units with a total rated thermal input exceeding 20 MW (CO<sub>2</sub>);
- production of carbon black where combustion units with a total rated thermal input exceeding 20 MW are operated (CO<sub>2</sub>);
- production of nitric acid, adipic acid, glyoxal and glyoxylic acid (CO<sub>2</sub> and N<sub>2</sub>O);
- production of ammonia, soda ash and sodium bicarbonate (CO<sub>2</sub>);
- production of bulk organic chemicals by cracking, reforming partial or full oxidation or by similar processes with a production capacity exceeding 100 tonnes per day (CO<sub>2</sub>);
- production of hydrogen and synthesis gas by reforming or partial oxidation with a production capacity exceeding 25 tonnes per day  $(CO_2)$ .

Methane, hydrofluorocarbons and sulphur hexafluoride are listed as greenhouse gases in Annex I to the Directive, but Annex I does not list any activities that emit these substances.

Perfluorocarbons (PFCs) are listed as greenhouse gases in Annex II of the EU ETS, but Annex I only lists primary aluminium production as an activity that emits PFCs.

Regulation EU (No) 517/2014 on fluorinated greenhouse gases applies to certain hydrofluorocarbons and perfluorocarbons as well as to sulphur hexafluoride (see Annex I to the Regulation).

#### **Original EIPPCB proposal and request**

EIPPCB Proposal 16: to exclude as KEIs the substances/groups of substances whose emissions are regulated by the EU Emissions Trading System (EU ETS), Regulation (EU) No 517/2014 on fluorinated greenhouse gases ....

EIPPCB Request 5: TWG members are asked to provide their views on which substances' emissions are controlled by other legislation and so should not be selected as KEIs in the WGC BREF, by filling in the corresponding cells in Document 3. A rationale should be provided to support each proposed substance (Request 5).

#### Summary of initial positions

• UK raised the issue that Article 9(1) of the IED states 'Where emissions of a greenhouse gas from an installation are specified in Annex I to Directive 2003/87/EC in relation to an activity carried out at that installation, the permit shall not include an emission limit value for direct emissions of that gas, unless necessary to ensure that no significant local pollution is caused.'

#### **EIPPCB** assessments

- The restrictions imposed by Article 9(1) of the IED mean that, in practice, the WGC BREF should not set BAT-AELs for any emissions covered by the EU ETS, because those values cannot be put into IED permits (though BAT could be set without BAT-AELs).
  - TWG members had different responses for the different EU ETS substances:
    - The responses for carbon dioxide are addressed in Section 4.2.6.2 below.
    - The responses for nitrous oxide are addressed in Section 4.2.6.3 below.
    - The responses for methane are addressed in Section 4.2.6.4 below.
    - The responses for hydrofluorocarbons are addressed in Section 4.2.6.5 below.
    - The responses for perfluorocarbons are addressed in Section 4.2.6.6 below.
    - The responses for sulphur hexafluoride are addressed in Section 4.2.6.7 below.

#### 4.2.6.2 Carbon dioxide (CO<sub>2</sub>)

#### **Original EIPPCB proposal**

Not to include carbon dioxide as a KEI.

#### Summary of initial positions

- 14 out of 15 IPs agreed that CO<sub>2</sub> should be excluded as a KEI and 1 disagreed.
- The main argument of those who agreed that it should be excluded was that emissions are already regulated by the EU ETS.
- The main arguments of EEB, who disagreed that CO<sub>2</sub> should be excluded as KEI, were that policy instruments such as the EU ETS are not based on BAT considerations and that greenhouse gases should be included because benchmarks depend on BAT which are fixed in the BREFs.

#### **EIPPCB** assessment

- The restrictions imposed by Article 9(1) of the IED mean that, in practice, the WGC BREF could only set BAT-AELs for carbon dioxide for installations not covered by the EU ETS (though BAT could be set without BAT-AELs). The EU ETS covers any facility where the total rated thermal input of combustion units is greater than 20 MW (with only units greater than 3 MW counting towards the total).
- As CO<sub>2</sub> emissions are generally not abated, techniques to reduce such emissions are related to increasing the energy efficiency. The proposal for the WGC BREF is, however, to focus on the treatment of waste gases. Other policy instruments (e.g. the Energy Efficiency Directive), and the ENE BREF, are in place that aim at improving the energy efficiency of industrial installations.
- Setting benchmarks for the EU ETS requires looking at specific production processes; this would not be in line with a generic approach to look at emissions to air from the chemical industry. Mechanisms for setting those benchmarks outside the BREFs exist.<sup>38</sup>

#### **EIPPCB** proposal

• Keep the EIPPCB proposal unchanged:

Not to include carbon dioxide as a KEI.

<sup>&</sup>lt;sup>38</sup> Fraunhofer, ECOFYS, Öko-Institut: Methodology for the free allocation of emission allowances in the EU ETS post 2012 -Sector report for the chemical industry, November 2009 (https://ec.europa.eu/clima/sites/clima/files/ets/allowances/docs/bm\_study-chemicals\_en.pdf).

#### 4.2.6.3 Nitrous oxide (N<sub>2</sub>O)

#### **Original EIPPCB proposal**

Not to include nitrous oxide as a KEI.

#### Summary of initial positions

- 9 out of 16 IPs agreed that  $N_2O$  should be excluded as a KEI, 1 partly agreed and 5 disagreed.
- The main arguments of those who agreed that it should be excluded were as follows:
  - Emissions are already regulated by the EU ETS (CEFIC, CZ, Fertilizers Europe, FR, IT, UK). However DE made the comment that the Directive on Emission Trading refers to using BAT.
  - IED Article 9(1) prevents the setting of ELVs in IED permits for greenhouse gases unless necessary to ensure that no significant local pollution is caused (UK).
- The main arguments of those who partly agreed/disagreed that it should be excluded were as follows:
  - N<sub>2</sub>O emissions are included in the LVIC-AAF BREF (AT, DE, DK, EEB, SE). The same comment was made by ES who partly agreed.

- The chemical industry has significant emissions of N<sub>2</sub>O (AT, DE, DK, SE).

#### **EIPPCB** assessment

- The restrictions imposed by Article 9(1) of the IED mean that, in practice, the WGC BREF could only set BAT-AELs for nitrous oxide emissions from installations not covered by the EU ETS (though BAT could be set without BAT-AELs).
- According to Article 30(2)(k) of Directive 2003/87/EC on the EU ETS, the Commission shall draw up a report on the application of this Directive, considering the practicality of developing Community-wide benchmarks as a basis for allocation, taking into account the best available techniques and cost-benefit analysis. Such benchmarks are usually set as the mass of pollutant emitted per mass of product. This would consequently require the WGC BREF to look at specific production processes which would not be in line with a generic approach to look at emissions to air from the chemical industry. Mechanisms for setting those benchmarks outside the BREFs exist.<sup>38</sup>
- The LVIC-AAF BREF contains information on the nitrous oxide emissions from nitric acid production and on techniques to reduce those emissions. A related BAT-AEL is set. Nitrous oxide emissions from nitric acid production are covered by Annex I to the Directive on the EU ETS so Article 9(1) of the IED applies which means that a BAT-AEL in the WGC BREF would not be used for setting ELVs.
- In 2014, there were 58 installations that reported emissions of  $N_2O$  to the EU ETS and 79 chemical installations that reported  $N_2O$  emissions to the E-PRTR (E-PRTR reporting threshold 10 t/yr).
- Comparing the EU ETS and E-PRTR lists is not straightforward because the two databases sometimes use different names for the same installation and some installations have several entries in the EU ETS. However, an initial comparison shows that there are 30 to 35 installations reporting to the E-PRTR that are not covered by the EU ETS and that their emissions are significant.
- The relevance is 'high' because  $N_2O$  is a potent greenhouse gas and also an ozone-depleting substance. Although  $N_2O$  is not covered by the Montreal Protocol, it is currently considered the largest ozone-depleting substance emitted through human activities<sup>39</sup>.
- The significance is 'high'. The installations reporting to the E-PRTR that are not covered by the EU ETS have total  $N_2O$  emissions in excess of 10 kt/yr. This is 50 % of the chemical activity emissions and 25 % of all industrial emissions reported in the E-PRTR.
- E-PRTR data suggest that N<sub>2</sub>O emissions are relevant for many chemical activities.
- The availability of emission data is 'high' with data on 30 to 35 installations reporting to the E-PRTR that are not covered by the EU ETS. The VCI and UBA(DE) reports contain no

<sup>&</sup>lt;sup>39</sup> National Oceanic and Atmospheric Administration (NOAA): NOAA Study Shows Nitrous Oxide Now Top Ozone-Depleting Emission, <u>http://www.noaanews.noaa.gov/stories2009/20090827\_ozone.html</u>.

data.

• A European monitoring standard is available: EN ISO 21258:2010.

#### EIPPCB proposal

• Amend the EIPPCB proposal as follows:

To include nitrous oxide as a KEI, except for emissions from activities covered by Annex I to Directive 2003/87/EC of the EU ETS.

#### 4.2.6.4 Methane (CH<sub>4</sub>)

#### **Original EIPPCB proposal**

Not to include methane as a KEI.

#### Summary of initial positions

- 9 out of 14 IPs agreed that  $CH_4$  should be excluded as KEI, 2 partly agreed and 3 disagreed.
- The main argument of those who agreed that methane should be excluded was that emissions are already regulated by the EU ETS (CEFIC, CZ, ES).
- The main arguments of those who disagreed that it should be excluded were as follows:
  - Methane is emitted in large quantities by the chemical industry and the emissions should be included as part of TVOC (AT). The same point was made by DK and UK who partly agreed with the proposal and FR and SE who agreed.
  - Policy instruments such as the EU ETS are not based on BAT considerations and greenhouse gases should be included because benchmarks depend on BAT which are fixed in the BREFs (EEB).

#### EIPPCB assessment

- Although methane is a potent greenhouse gas and is listed in Annex II to the EU ETS Directive, it is not listed in its Annex I 'Categories of activities to which the Directive applies' so Article 9(1) of the IED does not apply to methane.
- The relevance is 'high' because methane is a greenhouse gas.
- The significance is 'low' because E-PRTR data show that chemical facilities accounted for only 0.6 % of all industrial emissions in the E-PRTR (6<sup>th</sup> rank of all industry activities) (reporting threshold 100 t/yr).
- The availability of data is 'medium':
  - 17 chemical facilities reported methane emissions to the E-PRTR. The main activities of the facilities, their number and share of total chemical industry releases to air are:
    - basic organic chemicals (9; 18.7 %);
    - basic inorganic chemicals (5, 21.8 %);
    - NPK fertilisers (3, 59.4 %).
  - The UBA(DE) report had no data for methane, but it is covered as TVOC.
  - The VCI report had no data.
- The proposal to set benchmarks for the EU ETS is assessed in Section 4.2.6.2.
- If methane is not included as a KEI then emissions of methane are covered by the parameter TVOC (see Section 4.2.8.1).
- A European monitoring standard is available: EN 25139:2011.

#### **EIPPCB** proposal

- Keep the EIPPCB proposal unchanged:
- Not to include methane as a KEI.

#### 4.2.6.5 Hydrofluorocarbons (HFCs)

#### **Original EIPPCB proposal**

Not to include hydrofluorocarbons as a KEI group.

#### Summary of initial positions

- 11 out of 15 IPs agreed that HFCs should be excluded as a KEI, 2 partly agreed and 3 disagreed.
- The main argument of those who agreed that it should be excluded was that emissions are already regulated by the EU ETS and the Regulation on fluorinated greenhouse gases (CEFIC, CZ, ES, FR, IT, UK).
- The main arguments of those who disagreed that it should be excluded were as follows:
  - HFCs are emitted in considerable quantities by the chemical industry and the chemical industry is responsible for a major share of the overall HFC emissions (AT, SE);
  - policy instruments such as the EU ETS are not based on BAT considerations and greenhouse gases should be included because benchmarks depend on BAT which are fixed in the BREFs (EEB).

#### EIPPCB assessment

- Although HFCs are potent greenhouse gases and are listed in Annex II to the EU ETS Directive, they are not listed in its Annex I 'Categories of activities to which the Directive applies' so Article 9(1) of the IED does not apply to HFCs.
- Hydrofluorocarbons in the sense of Regulation (EC) No 166/2006 concerning the establishment of the E-PRTR are: HFC23, HFC32, HFC41, HFC4310mee, HFC125, HFC134, HFC134a, HFC152a, HFC143, HFC143a, HFC227ea, HFC236fa, HFC245ca, HFC365mfc.
- The production of fluorinated greenhouse gases is dominated by the production of HFCs, which accounted for more than 90 % by weight and of 55 % by CO<sub>2</sub> equivalents. In 2015, 5 HFCs were produced: HFC134a was the main HFC produced followed by HFC365mfc which was also produced in significant amounts. For confidentiality reasons, the EEA report only includes the total amount of all HFCs produced.<sup>29</sup>
- The CEFIC sector group EFCTC, which represents the European fluorocarbons and sulphur hexafluoride manufacturers<sup>40</sup>, provides information on their products and their main applications.
  - HFC134a is being used in industry:
    - as a blend component for stationary air-conditioning and commercial refrigeration;
    - as a propellant for pharmaceutical aerosols;
    - as a component in blowing agents for polymers;
  - HFC365mfc is being used in industry:
    - as a foam blowing agent for polyurethane foams;
    - blend component for solvents.
- Regulation (EU) No 517/2014:
  - requires leak checks for equipment using HFCs, e.g. for refrigeration and air conditioning (Art. 4) and leakage detection systems (Art. 5) above defined thresholds;
  - requires the phase-out of foams that contain HFCs except when to meet national safety standards (2020/2023 depending on the foam type) (Annex III).
- Emissions to air from indirect cooling systems are proposed to be excluded from the scope (see Section 2.2.7).
- The relevance is 'high' because HFCs reported by E-PRTR are greenhouse gases.
- The significance is 'high' because chemical facilities accounted for 82 % of all industrial emissions in the E-PRTR (1<sup>st</sup> rank of all industry activities) (reporting threshold 100 kg/yr).
- The likely availability of emission data is 'high' because there are 117 chemical facilities that reported emissions to air in the E-PRTR in 2015. The VCI and UBA(DE) reports

<sup>&</sup>lt;sup>40</sup> European Fluorocarbons Technical Committee (EFCTC) <u>http://www.fluorocarbons.org/hfc-products-applications/</u>.
contain no data.

- A European technical specification for monitoring is available: CEN/TS 13649:2014.
- Taking into account the measures summed up in Annex III to Regulation (EU) No 517/2014, it is unlikely that the WGC BREF will significantly improve the level of environmental protection.

# EIPPCB proposal

• Keep the EIPPCB proposal unchanged:

Not to include hydrofluorocarbons as a KEI group.

# 4.2.6.6 Perfluorocarbons (PFCs)

### **Original EIPPCB proposal**

Not to include perfluorocarbons as a KEI group.

### **Summary of initial positions**

- 9 out of 16 IPs agreed that PFCs should be excluded as a KEI group, 2 partly agreed and 5 disagreed.
- The main argument of those who agreed that it should be excluded was that PFC emissions are already regulated by the EU ETS and the Regulation on fluorinated greenhouse gases (BE, CEFIC, CZ, FR, IT, UK).
- The main arguments of those who disagreed that it should be excluded were as follows:
  - PFCs are emitted in considerable quantities by the chemical industry and the chemical industry is responsible for a major share of the overall PFCs emissions (AT, SE);
  - policy instruments such as the EU ETS are not based on BAT considerations and greenhouse gases should be included because benchmarks depend on BAT which are fixed in the BREFs (EEB).

### EIPPCB assessment

- Although PFCs are potent greenhouse gases and are listed in Annex II to the EU ETS Directive, Annex I only covers PFC emissions from primary aluminium production. E-PRTR data show that the total industrial emission of PFCs is 331 t/yr from 28 installations. The emissions from primary aluminium production are 35 t/yr from 9 installations. So the EU ETS only covers 11 % of emissions from 32 % of the installations which is a relatively small proportion of the total PFC emissions.
- Perfluorocarbons in the sense of Regulation (EC) No 166/2006 concerning the establishment of the E-PRTR are: CF<sub>4</sub>, C<sub>2</sub>F<sub>6</sub>, C<sub>3</sub>F<sub>8</sub>, C<sub>4</sub>F<sub>10</sub>, c-C<sub>4</sub>F<sub>8</sub>, C<sub>5</sub>F<sub>12</sub>, C<sub>6</sub>F<sub>14</sub>.
- In 2015, 3 PFCs were produced which accounted for 0.5 % of the production by weight of all fluorinated greenhouse gases and of 2 % of the production by  $CO_2$  equivalents. For confidentiality reasons, the EEA report only includes the total amount of all PFCs produced.<sup>29</sup>
- The CEFIC sector group EFCTC, which represents the European fluorocarbons and sulphur hexafluoride manufacturers<sup>41</sup>, provided information on their products and their main applications. According to this information, PFCs are being used:
  - in the semiconductor industry;
  - in medical applications;
  - in polymer solvent applications;
  - as heat transfer fluids.
- Regulation (EU) No 517/2014:
  - lists the PFCs in Annex I Section 2 as fluorinated greenhouse gases;
  - major applications were phased out between 2007 and 2015 (Annex III).
- E-PRTR data show that PFC emissions from the chemical industry are 248 t/yr from 7 installations. So the chemical industry is responsible for 75 % of the emissions from only 25 % of the installations. The chemical installation with the highest emissions emits 190 t/yr, which is 75 % of chemical industry emissions and 57 % of the total emissions. This is an unusually high proportion of emissions from a single site.
- The relevance is 'high' because PFCs are potent greenhouse gases.
- The significance is 'high' because chemical facilities accounted for 75 % of all industrial emissions in the E-PRTR (1<sup>st</sup> rank of all industry activities) (reporting threshold 100 kg/yr).
  The likely availability of emission data is 'low':
  - There are only 6 chemical facilities that reported emissions to air in the E-PRTR in 2015.
  - The VCI and UBA(DE) reports contain no data.

<sup>&</sup>lt;sup>41</sup> European Fluorocarbons Technical Committee (EFCTC) http://www.fluorocarbons.org/hfc-products-applications/

- A European technical specification for monitoring is available: CEN/TS 13649:2014.
- Taking into account the measures summed up in Annex III to Regulation (EU) No 517/2014, it is very unlikely that the WGC BREF will significantly improve the level of environmental protection.

### **EIPPCB** proposal

• Keep the EIPPCB proposal unchanged:

Not to include PFCs as a KEI group.

# 4.2.6.7 Sulphur hexafluoride

### **Original EIPPCB proposal**

Not to include sulphur hexafluoride (SF<sub>6</sub>) as a KEI.

### Summary of initial positions

- 10 out of 15 IPs agreed that  $SF_6$  should be excluded as a KEI, 1 partly agreed and 4 disagreed.
- The main argument of those who agreed that SF<sub>6</sub> should be excluded was that emissions are already regulated by the EU ETS and the Regulation on fluorinated greenhouse gases (BE, CEFIC, CZ, ES, FR, IT, UK).
- The main arguments of those who disagreed that it should be excluded were as follows:
  - SF<sub>6</sub> is emitted in considerable quantities by the chemical industry and the chemical industry is responsible for a major share of the overall SF<sub>6</sub> emissions (AT, SE);
    - policy instruments such as the EU ETS are not based on BAT considerations and greenhouse gases should be included because benchmarks depend on BAT which are fixed in the BREFs (EEB).

### EIPPCB assessment

- Although  $SF_6$  is a potent greenhouse gas and is listed in Annex II to the EU ETS Directive, it is not listed in its Annex I 'Categories of activities to which the Directive applies' so Article 9(1) of the IED does not apply to  $SF_6$ .
- SF<sub>6</sub> was produced in 2015, but for confidentiality reasons, the data are not available.<sup>29</sup>
- The CEFIC sector group EFCTC, which represents the European fluorocarbons and sulphur hexafluoride manufacturers<sup>42</sup>, provides information on their products and their main applications.  $SF_6$  is being used:
  - as an insulating gas in high-voltage switchgear;
  - as a blanketing gas for magnesium production;
  - for etching and cleaning in the semiconductor industry.
- Regulation (EU) No 517/2014:
  - lists SF<sub>6</sub> as a fluorinated greenhouse gas in Annex I, Section 3;
  - phased out major applications between 2007 and 2015 (Annex III).
- E-PRTR data show that the emissions from the chemical industry decreased from 10.6 t/yr in 2007 to 0.5 t/yr in 2014.
- The relevance is 'high' because  $SF_6$  is a potent greenhouse gas.
- The significance is 'high' because chemical facilities accounted for 5.5 % of all industrial emissions in the E-PRTR (4<sup>th</sup> rank of all industry activities) (reporting threshold 50 kg/yr).
- The likely availability of emission data is 'low':
  - There is only 1 chemical facility that reported emissions to air in the E-PRTR in 2015.
  - The VCI and UBA(DE) reports contain no data.
- A European technical specification for monitoring is available: CEN/TS 13649:2014.
- Taking into account the measures summed up in Annex III to Regulation (EU) No 517/2014, it is very unlikely that the WGC BREF will significantly improve the level of environmental protection.

### **EIPPCB** proposal

• Keep the EIPPCB proposal unchanged: Not to include sulphur hexafluoride as a KEI.

<sup>&</sup>lt;sup>42</sup> European Fluorocarbons Technical Committee (EFCTC) http://www.fluorocarbons.org/hfc-products-applications/

### 4.2.7 Ozone-depleting substances

### 4.2.7.1 Overview

# **Original EIPPCB proposal and request**

EIPPCB Proposal 16: to exclude as KEIs the substances/groups of substances whose emissions are regulated by .... Regulation (EC) No 1005/2009 on ozone-depleting substances.

EIPPCB Request 5: TWG members are asked to provide their views on which substances' emissions are controlled by other legislation and so should not be selected as KEIs in the WGC BREF, by filling in the corresponding cells in Document 3. A rationale should be provided to support each proposed substance.

### Summary of initial positions

- The TWG responses to this proposal expressed almost opposite views; 4 IPs agreed with excluding almost all of these substances (BE, CEFIC, ES, FR), but 7 others wanted almost all of them to be included (AT, DE, DK, EEB, NL, ePURE, SE).
- FR raised the issue that the regulations contain exemptions for some ozone-depleting substances that allow them to be used in some activities of the chemical industry (for example the pharmaceutical activities). FR proposed that installations using these exemptions should be checked because the WGC BREF might be relevant for addressing the emissions from those installations.
- UK raised the issue that Regulation (EC) No 1005/2009 does not regulate ozone-depleting substances when used as feedstocks or produced as side products. Therefore, emissions from such processes should not be excluded as KEIs (subject to meeting other criteria for inclusion in the WGC BREF).

### **EIPPCB** assessments

The ozone-depleting substances Regulation (EC) No 1005/2009 contains two derogations that are relevant to the WGC BREF:

- Article 7 provides a derogation for the production, placing on the market and use of controlled substances as feedstock for chemical processes.
- Article 8 provides a derogation for the production, placing on the market and use of controlled substances as process agents. Commission Decision 2010/372/EU permitted 6 undertakings to operate under an Article 8 derogation.
- The use of these derogations has been considered as part of the KEI assessments. •
- TWG members had different responses for different ozone-depleting substances:
  - The responses for chlorofluorocarbons are addressed in Section 4.2.7.2 below.
  - The responses for hydrochlorofluorocarbons are addressed in Section 4.2.7.3 below.
  - The responses for halons are addressed in Section 4.2.7.4 below.
  - The responses for 1,1,1-trichloroethane are addressed in Section 4.2.7.5 below.
  - The responses for carbon tetrachloride are addressed in Section 4.2.7.6 below.

# 4.2.7.2 Chlorofluorocarbons (CFCs)

# Original EIPPCB proposal

Not to include chlorofluorocarbons as a KEI group.

### Summary of initial positions

- 10 out of 16 IPs agreed that CFCs should be excluded as a KEI group, 3 partly agreed and 3 disagreed.
- The main argument of those who agreed that it should be excluded was that CFCs are already regulated by the Regulation on ozone-depleting substances (CEFIC, CZ, ES, FR, IT).
- The main arguments of those who disagreed that it should be excluded were as follows:
  - CFCs are emitted in considerable quantities by the chemical industry and the chemical industry is responsible for a major share of the overall CFC emissions (AT, SE);
  - policy instruments such as the Montreal Protocol are not based on BAT considerations and ozone-depleting substances should be included because benchmarks depend on BAT which are fixed in the BREFs (EEB).

# **EIPPCB** assessment

- Chlorofluorocarbons in the sense of Regulation (EC) No 166/2006 concerning the establishment of the E-PRTR are those substances listed in Groups I and II of Annex I to Regulation (EC) No 1005/2009 on substances that deplete the ozone layer.
- Only minor quantities of CFCs were produced in 2015. For confidentiality reasons, the data on production, import and export are not available.<sup>30</sup>
- The relevance is 'high' because CFCs are ozone-depleting substances.
- The significance is 'high' because chemical facilities accounted for 75 % of all industrial emissions in the E-PRTR (1<sup>st</sup> rank of all industry activities) (reporting threshold 1 kg/yr).
- The likely availability of emission data is 'low' because there are only 6 chemical facilities that reported emissions to air in the E-PRTR in 2015. The VCI and UBA(DE) reports contain no data.
- A European technical specification for monitoring is available: CEN/TS 13649:2014.

# **EIPPCB** proposal

• Keep the EIPPCB proposal unchanged: Not to include CFCs as a KEI group.

# 4.2.7.3 Hydrochlorofluorocarbons (HCFCs)

<b>Original EIPPCB</b>	proposal

Not to include hydrochlorofluorocarbons as a KEI group.

### Summary of initial positions

- 11 out of 15 IPs agreed that HCFCs should be excluded as a KEI group, 2 partly agreed and 2 disagreed.
- The main argument of those who agreed that it should be excluded was that HCFCs are already regulated by the Regulation on ozone-depleting substances (CEFIC, CZ, ES, FR, IT).
- The main arguments of those who disagreed that it should be excluded were as follows:
  - HCFCs are emitted in considerable quantities by the chemical industry and the chemical industry is responsible for a major share of the overall HCFC emissions (AT, SE);
  - policy instruments such as the Montreal Protocol are not based on BAT considerations and ozone-depleting substances should be included because benchmarks depend on BAT which are fixed in the BREFs (EEB).

### EIPPCB assessment

- Hydrochlorofluorocarbons in the sense of Regulation (EC) No 166/2006 concerning the establishment of the E-PRTR are those substances listed in Group VIII of Annex I to Regulation (EC) No 1005/2009 on ozone-depleting substances.
- The use of HCFCs as refrigerants is generally prohibited.
- According to Art. 8 (2) controlled substances may continue to be used as process agents in existing installations where emissions are insignificant.
- Controlled substances produced in the EU were predominantly HCFCs (71 % of the total production in metric tonnes). Chlorodifluoromethane (HCFC-22) is the most important HCFC which is used for the production of polymers (e.g. polytetrafluorethylene). In 2015, controlled substances were produced almost exclusively for feedstock use inside the EU (91 % of the total production in metric tonnes).
- The number of chemical industry facilities reporting emissions to the E-PRTR decreased from 148 in 2010 to 100 in 2014 and to 43 in 2015. The emissions decreased from 327 t in 2010 to 183 t in 2014 and to 149 t in 2015.
- The relevance is 'high' because HCFCs are ozone-depleting substances.
- The significance is 'high' because chemical facilities accounted for 71 % of all industrial emissions in the E-PRTR (data from 2015) (1<sup>st</sup> rank of all industry activities) (reporting threshold 1 kg/yr). Emissions to air are dominated by the activity 'basic organic chemicals' (97 %). The reason why the chemical industry emissions are ranked so high is that all other uses are prohibited or being phased-out.
- The likely availability of emission data is 'high' because there are more than 30 chemical facilities that reported emissions to air in the E-PRTR in 2015.
- A European technical specification for monitoring is available: CEN/TS 13649:2014.
- Taking into account the measures of Regulation (EC) No 1005/2009, it is very unlikely that the WGC BREF will significantly improve the level of environmental protection.

### **EIPPCB** proposal

• Amend the EIPPCB proposal as follows:

Not to include HCFCs as a KEI group.

# 4.2.7.4 Halons

### **Original EIPPCB proposal**

Not to include halons as a KEI group.

### Summary of initial positions

- 9 out of 15 IPs agreed that halons should be excluded as a KEI group, 2 partly agreed and 4 disagreed.
- The main argument of those who agreed that it should be excluded was that emissions are already regulated by the Regulation on ozone-depleting substances (CEFIC, CZ, ES, FR).
- The main arguments of those who disagreed that it should be excluded were that:
  - halons are emitted in considerable quantities by the chemical industry and the chemical industry is responsible for a major share of the overall halon emissions (AT, SE);
  - policy instruments such as the Montreal Protocol are not based on BAT considerations and ozone-depleting substances should be included because benchmarks depend on BAT which are fixed in the BREFs (EEB).

### EIPPCB assessment

- Halons in the sense of Regulation (EC) No 166/2006 concerning the establishment of the E-PRTR are those substances listed in Groups III and VI of Annex I to Regulation (EC) No 1005/2009 on ozone-depleting substances. This includes bromochlorodifluoromethane, bromotrifluoromethane and dibromotetrafluoroethane (Group III) as well as bromomethane (Group VI). Annex II to Regulation (EC) No 1005/2009 on ozone-depleting substances also lists dibromodifluoromethane, but this substance is not included in the E-PRTR.
- Production in EU is limited to halon 1202 (Dibromodifluoromethane), for confidentiality reasons the data on production, import and export are not available.
- The relevance is 'high' because halons are ozone-depleting substances.
- The significance is 'high' because chemical facilities accounted for 97 % of all industrial emissions in the E-PRTR (1<sup>st</sup> rank of all industry activities) (reporting threshold 1 kg/yr).
- The likely availability of emission data is 'low' because there are only 3 chemical facilities that reported emissions to air in the E-PRTR in 2015. The VCI and UBA(DE) reports contain no data.
- Emissions of halons are covered by the parameter TVOC (see Section 4.2.8.1).
- A European technical specification for monitoring is available: CEN/TS 13649:2014.

- Keep the EIPPCB proposal unchanged:
- Not to include halons as a KEI group.

# 4.2.7.5 1,1,1-Trichloroethane (CH<sub>3</sub>CCl<sub>3</sub>)

Original EIPPCB proposal	
Not to include 1,1,1-trichloroethane as a KEI.	
Summary of initial positions	
• 9 out 15 IPs agreed that CH <sub>3</sub> CCl <sub>3</sub> should be excluded as KEI, 3 partly agreed and 3 disagreed.	
• The main argument of those who agreed that it should be excluded was that already 1,1,1-trichloroethane regulated by the Regulation on ozone-depleting substances (CEFIC, ES, FR, IT).	
<ul> <li>The main arguments of those who disagreed that it should be excluded were as follows:         <ul> <li>1,1,1-trichloroethane is emitted in considerable quantities by the chemical industry and the chemical industry is responsible for a major share of the overall 1,1,1-trichloroethane emissions (AT, SE);</li> <li>policy instruments such as the Montreal Protocol are not based on BAT considerations and ozone-depleting substances should be included because benchmarks depend on BAT which are fixed in the BREFs (EEB).</li> </ul> </li> </ul>	
EIPPCB assessment	
• E-PRTR data show that the total emissions of 1,1,1-trichloroethane are 27.7 t/yr from 21 installations. The emissions from the chemical industry are 4.85 t/yr from 1 installation.	
<ul> <li>The relevance is 'high' because 1,1,1-trichloroethane is an ozone-depleting substance.</li> <li>The significance is 'high' because chemical facilities account for 17.5 % of all industrial emissions in the E-PRTR (2<sup>nd</sup> rank of all industry activities) (reporting threshold 100 kg/yr).</li> </ul>	
<ul> <li>The likely availability of emission data is 'low' because there is only 1 chemical facility reporting emissions to air in the E-PRTR. The VCI and UBA(DE) reports contain no data.</li> <li>Emissions of 1,1,1-trichloroethane are covered by the parameter TVOC (see Section 4.2.8.1).</li> </ul>	
• A European technical specification for monitoring is available: EN 13649:2014.	
EIPPCB proposal	
• Keen the EIPPCB proposal unchanged:	

• Keep the EIPPCB proposal unchanged: Not to include 1,1,1-trichloroethane as a KEI.

# 4.2.7.6 Tetrachloromethane (CCl<sub>4</sub>)

### Original EIPPCB proposal

Not to include tetrachloromethane as a KEI.

### Summary of initial positions

- 9 out of 15 IPs agreed that  $CCl_4$  should be excluded as a KEI, 2 partly agreed and 4 disagreed.
- The main arguments of those who agreed that it should be excluded were that:
  - emissions are already regulated by the Regulation on ozone-depleting substances (CEFIC, CZ, ES, FR, IT);
    - it should not be considered separately but as part of the candidate KEI 'halogens and their compounds' (ePURE, NL).
- The main arguments of those who disagreed that it should be excluded were that:
  - CCl<sub>4</sub> is emitted in large quantities by the chemical industry and the emissions should be included as part of TVOC (AT);
  - all halogenated compounds should be included expressed as one parameter (DK);
  - policy instruments such as the Montreal Protocol are not based on BAT considerations and ozone-depleting substances should be included because benchmarks depend on BAT which are established in the BREFs (EEB).

### EIPPCB assessment

- Tetrachloromethane is one of the most important controlled substance produced in the EU. In 2015, controlled substances were produced almost exclusively for feedstock use inside the EU (91 % of the total production in metric tonnes). The ECHA brief substance profile reports a tonnage band between 1 000 10 000 tonnes per year and indicates that the substance is used for the manufacture of chemicals and rubber products and that releases to the environment is likely to occur from the industrial use.
- E-PRTR data show that the total emissions of  $CCl_4$  are 29.3 t/yr from 13 installations. The emissions from the chemical industry are 24.3 t/yr from 11 installations.
- The relevance is 'high':
  - CCl<sub>4</sub> is an ozone-depleting substance.
  - Harmonised classification, CMR properties: carcinogenic 2.
  - A BAT-AEL was set in the LVOC BREF for TDI/MDI production (i.e. BAT 66).
- The significance is 'high' because chemical facilities accounted for 83 % of all industrial emissions in the E-PRTR (1<sup>st</sup> rank of all industry activities) (reporting threshold 100 kg/yr).
- The likely availability of emission data is 'medium':
  - There are 12 chemical facilities that reported emissions to air in the E-PRTR (10 facilities for the 'basic organic chemicals' activity, 2 facilities for the 'basic inorganic chemicals' activity) in 2015.
  - The VCI and UBA(DE) reports contain no data.
- A European technical specification for monitoring is available: CEN/TS 13649:2014.
- The interface of the WGC BREF with the LVOC BREF is addressed in Section 2.2.3. The EIPPCB Proposal 6 is to exclude emissions for which BAT-AEPLs have been set during the review of the LVOC BREF.

# EIPPCB proposal

• Amend the EIPPCB proposal as follows:

To include tetrachloromethane as a KEI, except for the emissions for which BAT-AEPLs have been set during the review of the LVOC BREF.

# 4.2.8 Other organic substances

# 4.2.8.1 **TVOC [NMVOC, TOC, VOC]**

# **Original EIPPCB proposal**

### To include TVOC as a KEI.

### **Summary of initial positions**

- 16 out of 17 IPs agreed with the proposal to include TVOC as a KEI and 1 disagreed.
- Fertilizers Europe disagreed, because it is not a key substance for the fertilisers activity.

### **EIPPCB** assessment

- The TWG broadly supported the inclusion of TVOC as a KEI.
- The relevance is 'high':
  - Substances measured as TVOC contribute to the formation of ground-level (tropospheric) ozone.
  - TVOC includes many CMR substances.
  - BAT-AELs were set in the LVOC, OFC, POL and SIC BREFs.
- The significance is 'high' because chemical facilities accounted for 19.4 % of all industrial emissions in the E-PRTR (3<sup>rd</sup> rank of all industry activities) (reporting threshold 100 000 kg/yr).
- The likely availability of emission data is 'high':
  - E-PRTR: 185 chemical facilities. The main activities of the facilities, their number and share of total chemical industry releases to air are:
    - 'basic organic chemicals' (125; 71.4 %);
    - 'basic pharmaceutical products' (49; 24.5 %).
  - VCI: numerous data.
  - UBA(DE): 438 measurements, mostly for the main activity 'basic organic chemicals', few for other activities, but none for the NPK fertilisers activity.
- Definitions and monitoring:
  - A European standard for monitoring of TVOC is available: EN 12619:2013.
  - IED Article 3(45) defines volatile organic compounds (VOCs), but the analytical parameter TVOC covers all organic compounds that are in the gaseous state during the emission (e.g. at an elevated temperature).
  - FR uses the parameter non-methane volatile organic compound (NMVOC) in its domestic legislation. As the parameter TVOC also includes methane, it encompasses more substances than the parameter NMVOC.
  - The UBA(DE) report uses the term TOC, referring in most cases to EN 12619:2013.
- The interface of the WGC BREF with the LVOC BREF is addressed in Section 2.2.3. The EIPPCB Proposal 6 is to exclude emissions for which BAT-AEPLs have been set during the review of the LVOC BREF.

# EIPPCB proposal

• Amend the EIPPCB proposal as follows:

To include TVOC as a KEI, except for the emissions for which BAT-AEPLs have been set during the review of the LVOC BREF. To collect NMVOC data where TVOC data are not available.

• This issue is not proposed for discussion at the KoM.

# 4.2.8.2 Formaldehyde

### **Original EIPPCB proposal**

There was no proposal for inclusion or exclusion of formaldehyde as a KEI.

### **Summary of initial positions**

- 7 out of 14 IPs supported the inclusion of formaldehyde as a KEI:
  - formaldehyde is classified as a SVHC/CMR (AT, EEB, ePURE, NL).
- 7 did not support the inclusion as a KEI:
  - it is covered by the LVOC BREF (BE, CEFIC, ES, UK).

### EIPPCB assessment

The TWG is divided in its opinion on the inclusion of formaldehyde as a KEI.

- The relevance is 'high':
  - Harmonised classification, CMR properties: carcinogenic 1B, mutagenic 2.
    - A BAT-AEL was set in the LVOC BREF for formaldehyde production (i.e. BAT 45).
- There are no E-PRTR data available to assess the significance. The ECHA brief substance profile indicates that releases to the environment of formaldehyde are likely to occur from industrial use in the case of chemical activities for thermoplastic manufacture and as an intermediate step in further manufacturing of another substance. Formaldehyde is manufactured and/or imported in large quantities in the European Economic Area (> 1 000 000 t/yr).
- The availability of representative data is 'high':
  - The UBA(DE) report (34 measurements) indicates that monitoring data are likely to become available during the data collection from plants with a production capacity of less than 20 kt/yr (the production capacity threshold for inclusion in the scope of the LVOC BREF). The main activities are 'basic plastic materials' and 'oxygen-containing hydrocarbons'.
- Monitoring:
  - No EN or ISO standard is available, national/industry standards are available.
- The interface of the WGC BREF with the LVOC BREF is addressed in Section 2.2.3. The EIPPCB Proposal 6 is to exclude emissions for which BAT-AEPLs have been set during the review of the LVOC BREF.

- To include formaldehyde as a KEI, except for the emissions for which BAT-AEPLs have been set during the review of the LVOC BREF.
- This issue is not proposed for discussion at the KoM.

# 4.2.8.3 Vinyl chloride monomer (VCM)

### **Original EIPPCB proposal**

There was no proposal for inclusion or exclusion of vinyl chloride monomer as a KEI.

### Summary of initial positions

- 6 out of 14 IPs supported the inclusion of VCM as KEI:
- Substance is classified as SVHC and CMR (ePURE, NL, EEB).
- 4 partly supported the inclusion as KEI (DE, FR, PL, UK):
  - Major emissions covered by the LVOC BREF (FR);
  - Exclude activities covered by the LVOC BREF (PL).
- 4 did not support the inclusion as KEI:
  - Emissions are almost covered by the LVOC BREF (BE, CEFIC, ES).

### EIPPCB assessment

- The TWG is divided in its opinion on the inclusion of vinyl chloride monomer as a KEI.
- The relevance is 'high':
  - Harmonised classification, CMR properties: carcinogenic 1A.
    - VCM is restricted under REACH.
    - BAT-AELs were set in the LVOC BREF for EDC/VCM production (i.e. BAT 76) and in the POL BREF.
- The significance is 'high' because chemical facilities accounted for 97.6 % of all industrial emissions in the E-PRTR (1<sup>st</sup> rank of all industrial activities) (reporting threshold 1000 kg/yr).
- E-PRTR data indicate that the emissions are only partly covered by the LVOC activities, because a major part of the emissions is caused by the production of 'basic plastic materials', which was not in the scope of the LVOC BREF.
- The activity 'basic organic chemicals' accounted for 98.1 % of all chemical industry emissions, thereof:
  - 'basic plastic materials' account for 62.1 %; and
  - 'halogenated hydrocarbons' account for 17.7 %; and
  - 17.7 % of the emissions were not specified within 'basic organic chemicals'.
- The likely availability of emission data is 'high':
  - E-PRTR: 34 chemical facilities including facilities where ethylene dichloride and vinyl chloride monomer are produced.
  - The UBA(DE) report (12 measurements) indicates that monitoring data are likely to become available during the data collection from plants with a production capacity of less than 20 kt/yr (the production capacity threshold for inclusion in the scope of the LVOC BREF). Monitoring data are likely to become available for the 'basic organic chemicals' activity regarding the subactivities halogenic hydrocarbons, plastic materials and a few organometallic compounds.
- A European technical specification for monitoring is available: CEN/TS 13649:2014. National standards are available. Most data from UBA(DE) refer to the use of national standards.
- The interface of the WGC BREF with the LVOC BREF is addressed in Section 2.2.3. The EIPPCB Proposal 6 is to exclude emissions for which BAT-AEPLs have been set during the review of the LVOC BREF.

### **EIPPCB** proposal

• To include vinyl chloride monomer as a KEI, except for the emissions for which BAT-AEPLs have been set during the review of the LVOC BREF.

# 4.2.8.4 Ethylene dichloride (EDC; 1,2-dichloroethane)

### **Original EIPPCB proposal**

There was no proposal for inclusion or exclusion of ethylene dichloride as a KEI.

### **Summary of initial positions**

- 4 out of 14 IPs supported the inclusion of ethylene dichloride as a KEI:
   EDC is classified as CMR (AT, EEB, SE).
- 2 partly supported the inclusion as a KEI:
  - exclude activities covered by the LVOC BREF (PL).
- 8 did not support the inclusion as a KEI (BE, CEFIC, ePURE, ES, Fertilizers Europe, FR, NL, UK):
  - it is covered by the LVOC BREF (BE, CEFIC, ES, FR, UK);
  - emissions are representatively covered by the LVOC BREF, i.e. BAT 144, Table 17.25 (CEFIC);
  - it can be covered by the candidate KEI 'halogens and their compounds' (ePURE, NL).

# EIPPCB assessment

- The TWG did not support the inclusion of ethylene dichloride as a KEI.
- The relevance is 'high':
  - harmonised classification, CMR properties: CMR: carcinogenic 1B.
  - EDC is on the authorisation list under REACH.
  - A BAT-AEL was set in the LVOC BREF for EDC/VCM production (i.e. BAT 76).
- The significance is 'high' because chemical facilities accounted for 98.7 % of all industrial emissions in the E-PRTR (1<sup>st</sup> rank of all industrial activities) (reporting threshold 1 000 kg/yr).
- The likely availability of emission data is 'medium':
  - E-PRTR: 23 chemical facilities. Main activity basic organic chemicals (18) representing 98.5 % of the total chemical industry emissions, mainly:
    - halogenic hydrocarbons (2 activities, 22 % of the total chemical industry emissions);
    - basic plastic materials (9 activities, 53 % of the total chemical industry emissions);
    - unspecified (6 activities, 24 % of the total chemical industry emissions).
  - The UBA(DE) report (10 measurements) indicates that monitoring data are likely to become available during the data collection from plants with a production capacity of less than 20 kt/yr (the production capacity threshold for inclusion in the scope of the LVOC BREF), mainly for the activity 'basic organic chemicals' with the combined activities halogenic hydrocarbons and plastic materials.
- Although most of the EDC produced is used for VCM production, EDC is also used to
  produce ethylene diamines and chlorinated solvents such as tri- and tetrachloroethylene. No
  BAT for these processes were set in the LVOC BREF. Approximately one third of the
  chemical facilities reporting EDC emissions in E-PRTR do not seem to be related to
  EDC/VCM production.
- A European technical specification for monitoring is available: CEN/TS 13649:2014.
- The interface of the WGC BREF with the LVOC BREF is addressed in Section 2.2.3. The EIPPCB Proposal 6 is to exclude emissions for which BAT-AEPLs have been set during the review of the LVOC BREF.

### **EIPPCB** proposal

• To include ethylene dichloride as a KEI, except for the emissions for which BAT-AEPLs have been set during the review of the LVOC BREF.

# 4.2.8.5 Chloromethane

### **Original EIPPCB proposal**

There was no proposal for inclusion or exclusion of chloromethane as a KEI.

### Summary of initial positions

- 5 out of 12 IPs supported the inclusion of chloromethane as a KEI:
  - chloromethane is classified as a SVHC/CMR (AT, EEB, SE).
- 2 partly supported the inclusion as a KEI.
- 5 did not support the inclusion as a KEI (CEFIC, ePURE, ES, Fertilizers Europe, NL):
  - it can be covered by the parameter TVOC (CEFIC);
    - it can be covered by the candidate KEI 'halogens and their compounds' (ePURE, NL).

### **EIPPCB** assessment

- The TWG is divided in its opinion on the inclusion of chloromethane as a KEI.
- The relevance is 'high' because of
  - the harmonised classification, CMR properties: carcinogenic 2.
    - chloromethane is an ozone-depleting substance that is not covered by the Montreal Protocol, but listed as a new substance in Annex II to Regulation (EC) No 1005/2009 on ozone-depleting substances
- There are no E-PRTR data available to assess the significance. Chloromethane is registered by 32 active registrants/suppliers under REACH with a tonnage band of 1 0000 000 10 000 000 tonnes per year. The ECHA brief substance profile indicates the substance is used as an intermediate for the manufacture of chemicals and releases to the environment likely occur from chemical activities as an intermediate step in further manufacturing of another substance.
- The likely availability of emission data is 'medium':
  - UBA(DE): 22 measurements, activities organic chemicals, mainly plastic materials and some plant health products.
- A European technical specification for monitoring is available: CEN/TS 13649:2014. National technical specifications are available.

### **EIPPCB** proposal

• To include chloromethane as a KEI.

# 4.2.8.6 Dichloromethane

### **Original EIPPCB proposal**

There was no proposal for inclusion or exclusion of dichloromethane as a KEI.

### Summary of initial positions

- 6 out of 13 IPs supported the inclusion of dichloromethane as a KEI:
  - dichloromethane is classified as CMR (AT, FR, SE);
  - chemical industry responsible for major share of all industrial emissions (AT, SE);
  - it is emitted by different activities (FR).
- 3 partly supported the inclusion as a KEI:
  - it can be covered by the parameter TVOC (CEFIC).
- 4 did not support the inclusion as a KEI:
  - it can be covered by the candidate KEI 'halogens and their compounds' (ePURE, NL).

### **EIPPCB** assessment

- The TWG is divided in its opinion on the inclusion of dichloromethane as a KEI.
- The relevance is 'high':
  - Harmonised classification, CMR properties: carcinogenic 2.
  - Dichloromethane is restricted under REACH.
  - Dichloromethane is an ozone-depleting substance that is not covered by the Montreal Protocol, due to its short lifetime in the atmosphere. Nevertheless, scientists warn of an increasing threat to stratospheric ozone from dichloromethane<sup>43</sup>.
- The significance is 'high' because chemical facilities accounted for 91.4 % of all industrial emissions in the E-PRTR (1<sup>st</sup> rank of all industrial activities) (reporting threshold 1 000 kg/yr).
- The likely availability of emission data is 'high':
  - 84 chemical facilities reported emissions to air to the E-PRTR. The main activities of the facilities, their number and share of total chemical industry releases to air are:
    - 'basic pharmaceutical products' (53, 78.8 %);
    - 'basic organic chemicals' (28, 19.6 %).
- A European technical specification for monitoring is available: CEN/TS 13649:2014.

### **EIPPCB** proposal

• To include dichloromethane as a KEI.

<sup>&</sup>lt;sup>43</sup> Ryan Hossaini, Martyn P. Chipperfield, Stephen A. Montzka, Amber A. Leeson, Sandip S. Dhomse and John A. Pyle: The increasing threat to stratospheric ozone from dichloromethane. Nature Communications 2017, Volume 8 (https://www.nature.com/articles/ncomms15962.pdf).

# 4.2.8.7 Trichloromethane

**Original EIPPCB proposal** There was no proposal for inclusion or exclusion of trichloromethane as a KEI. Summary of initial positions • 5 out of 11 IPs supported the inclusion of trichloromethane as a KEI: trichloromethane is classified as CMR (AT, FR, SE); trichloromethane is classified as acute toxic (EEB). • 2 partly supported the inclusion as a KEI: - it can be covered by the parameter TVOC (CEFIC). • 4 did not support the inclusion as a KEI: it can be covered by the candidate KEI 'halogens and their compounds' (ePURE, NL). **EIPPCB** assessment The TWG is divided in its opinion on the inclusion of trichloromethane as a KEI. • The relevance is 'high': harmonised classification, CMR properties: carcinogenic 2, toxic to reproduction 2: trichloromethane is restricted under REACH. • The significance is 'high' because chemical facilities accounted for 85.2 % of all industrial emissions in the E-PRTR (1<sup>st</sup> rank of all industrial activities) (reporting threshold 500 kg/yr). • The likely availability of emission data is 'medium': E-PRTR: 21 chemical facilities. Main activities (number of facilities, contribution to total chemical industries emissions): 'basic organic chemicals' (6, 61.8 %); 'basic inorganic chemicals' (2, 1.6 %); . 'NPK fertilizers' (1, 1.4 %); 'basic pharmaceutical products' (12, 35 %). UBA(DE): 1 measurement, for the 'basic organic chemicals' activity. • A European technical specification for monitoring is available: CEN/TS 13649:2014.

EIPPCB proposal

• To include trichloromethane as a KEI.

# 4.2.8.8 Trichloroethylene

### **Original EIPPCB proposal**

There was no proposal for inclusion or exclusion of trichloroethylene as a KEI.

### **Summary of initial positions**

- 6 out of 15 IPs supported the inclusion of trichloroethylene as a KEI:
- trichloroethylene is classified as a SVHC/CMR (AT, EEB, ePURE, NL, SE).
- 4 partly supported the inclusion as a KEI:
  - it can be covered by the parameter TVOC (CEFIC).
- 5 did not support the inclusion as a KEI.

# EIPPCB assessment

- The TWG is divided in its opinion on the inclusion of trichloroethylene as a KEI.
- The relevance is 'high':
  - harmonised classification, CMR properties: carcinogenic 1B, mutagenic 2;
  - trichloroethylene is on the authorisation list under REACH.
- The significance is 'high' because chemical facilities accounted for 29.1 % of all industrial emissions in the E-PRTR (2<sup>nd</sup> rank of all industrial activities) (reporting threshold 2 000 kg/yr).
- The availability of representative data is 'low':
  - E-PRTR: 1 chemical facility reported emissions to air to the E-PRTR under the activity 'basic organic chemicals/basic plastic materials'.
  - The VCI and UBA(DE) reports contain no data.
- Emissions of trichloroethylene are covered by the parameter TVOC (see Section 4.2.8.1).
- A European technical specification for monitoring is available: CEN/TS 13649:2014.

# EIPPCB proposal

• Not to include trichloroethylene as a KEI.

# 4.2.8.9 Tetrachloroethylene

# Original EIPPCB proposal There was no proposal for inclusion or exclusion of tetrachloroethylene as a KEI. Summary of initial positions 4 out of 13 IPs supported the inclusion of tetrachloroethylene as a KEI: tetrachloroethylene is classified as CMR (AT, EEB, SE). 2 partly supported the inclusion as a KEI: it can be covered by the parameter TVOC (PL). 7 did not support the inclusion as a KEI (BE, CZ, ePURE, ES, Fertilizers Europe, FR, NL): it can be (ePURE, NL). EIPPCB assessment The TWG did not support the inclusion of tetrachloroethylene as a KEI. The relevance is 'high' because of the harmonised classification, CMR properties: carcinogenic 2.

- The significance is 'medium' because chemical facilities accounted for 2.1 % of all industrial emissions in the E-PRTR (3<sup>rd</sup> rank of all industrial activities) (reporting threshold 2 000 kg/yr).
- The likely availability of representative data is 'low':
  - E-PRTR: 2 chemical facilities reported emissions to air to the E-PRTR for the activity 'basic organic chemicals'.
  - UBA(DE): 1 measurement.
- Emissions of tetrachloroethylene are covered by the parameter TVOC (see Section 4.2.8.1).
- A European technical specification for monitoring is available: CEN/TS 13649:2014.

- Not to include tetrachloroethylene as a KEI.
- This issue is not proposed for discussion at the KoM.

# 4.2.8.10 Di-(2-ethyl hexyl) phthalate (DEHP)

### **Original EIPPCB proposal**

There was no proposal for inclusion or exclusion of DEHP as a KEI.

### Summary of initial positions

- 6 out of 12 IPs supported the inclusion of DEHP as a KEI:
- DEHP is classified as a SVHC/CMR (AT, EEB, ePURE, NL, SE).
- 2 partly supported the inclusion as a KEI.
- 4 did not support the inclusion as a KEI (CEFIC, ES, Fertilizers Europe, FR):
   it could be included in TVOC (ES).

### EIPPCB assessment

- The TWG is divided in its opinion on the inclusion of DEHP as a KEI.
- The relevance is 'high':
  - harmonised classification, CMR properties: toxic to reproduction 1B;
  - DEHP is on the authorisation list and is restricted under REACH.
- The significance is 'high' because chemical facilities accounted for 6.8 % of all industrial emissions in the E-PRTR (4th rank of all industrial activities) (reporting threshold 10 kg/yr).
- The availability of representative data is 'low':
  - E-PRTR: 2 chemical facility reported emissions to air to the E-PRTR for the activity 'basic organic chemicals'.
  - The VCI and UBA(DE) reports contain no data.
- Emissions of DEHP are covered by the parameter TVOC (see Section 4.2.8.1).
- A European technical specification for monitoring is available: CEN/TS 13649:2014.

# **EIPPCB** proposal

• Not to include DEHP as a KEI.

# 4.2.8.11 Ethylene oxide

### **Original EIPPCB proposal**

There was no proposal for inclusion or exclusion of ethylene oxide as a KEI.

### Summary of initial positions

- 4 out of 12 IPs supported the inclusion of ethylene oxide as a KEI:
  - ethylene oxide is classified as a SVHC/CMR (EEB, ePURE, NL, SE);
  - a high number of measurement data are available in the UBA(DE) study (EEB, SE).
- 3 partly supported the inclusion as a KEI.
- 5 did not support the inclusion as a KEI:
  - it is covered by the LVOC BREF (UK);
  - E-PRTR data report vast majority of emissions from production of ethylene oxide has been covered in the LVOC BREF (CEFIC);
  - it can be covered by the parameter TVOC (ES).

### **EIPPCB** assessment

- The TWG is divided in its opinion on the inclusion of ethylene oxide as a KEI.
- The relevance is 'high':
  - Harmonised classification, CMR properties: carcinogenic 1B, mutagenic 1B, properties of concern: PBT.
  - A BAT to reduce emissions of ethylene oxide was set in the LVOC BREF (i.e. BAT 52).
  - Emissions of ethylene oxide may result from the production of glycol ethers (see Section 2.1.2.7.1 of the LVOC BREF).
- The significance is 'high' because chemical facilities accounted for 91.9 % of all industrial emissions in the E-PRTR (1<sup>st</sup> rank of all industrial activities) (reporting threshold 1 000 kg/yr).
- The availability of representative data is 'high':
  - E-PRTR: 2 chemical facilities. Main activities 'basic organic chemicals' with the subactivities:
    - simple hydrocarbons (1, 88 %);
    - sulphurous hydrocarbons (1, 12 %).
  - The UBA(DE) report (31 measurements) indicates that monitoring data are likely to become available during the data collection from plants with a production capacity of less than 20 kt/yr (the production capacity threshold for inclusion in the scope of the LVOC BREF), mainly for the activity 'basic organic chemicals' with the sub-activities 'oxygen-containing hydrocarbons' and 'plastic materials'.
- No BAT-AELs for emissions of ethylene oxide were set in the LVOC BREF, due to the limited data collected (see Section 7.3.1 of the LVOC BREF).
- A European technical specification for monitoring is available: CEN/TS 13649:2014.

### EIPPCB proposal

• To include ethylene oxide as a KEI.

# 4.2.8.12 Propylene oxide

### **Original EIPPCB proposal**

There was no proposal for inclusion or exclusion of propylene oxide as a KEI.

### Summary of initial positions

- 5 out of 11 IPs supported the inclusion of propylene oxide as a KEI:
  - propylene oxide is classified as a SVHC/CMR (AT, EEB ePURE, NL, SE);
  - a high number of measurement data from the UBA(DE) report are available (EEB, SE).
- 2 partly supported the inclusion as a KEI.
- 4 did not support the inclusion as a KEI:
  - The production of propylene oxide is covered in the LVOC BREF. BAT-AELs were not set (CEFIC).

### EIPPCB assessment

- The TWG is divided in its opinion on the inclusion of propylene oxide as a KEI.
- The relevance is 'high':
  - Harmonised classification, CMR properties: carcinogenic 1B, mutagenic 1B.
  - LVOC BREF: The co-production of propylene oxide with styrene monomer is described in Chapter 5. The production of propylene oxide by other process routes is included as a thumbnail description in Chapter 2.
  - Emissions of propylene oxide may result from the production of glycol ethers (see Section 2.1.2.7.1 of the LVOC BREF).
- The significance is 'high':
  - There are no E-PRTR data available to assess the significance. In the LVOC BREF, Section 2.1.2.8, the use of the substance is reported. Propylene oxide is a major industrial product with a production of more than 7 million tonnes per year worldwide. Approximately 70 % of it is used to produce polyether polyols, which is a raw material for polyurethane production. The remainder is used to produce propylene glycol, which is a raw material for unsaturated polyesters, and an additive in food products and cosmetics. The ECHA brief substance profile indicates that releases to the environment of this substance are likely to occur from chemical activities: thermoplastic manufacture, and as an intermediate step in further manufacturing of another substance (use of intermediates), as well as manufacturing of the substance (partly covered by the LVOC BREF). ECHA reports a tonnage band between 1 000 000 t/yr and 10 000 000 t/yr for manufacture and/or import of the substance.
  - The availability of representative data is 'medium' because UBA(DE) reported 24 measurements for the activity 'basic organic chemicals', mainly plastic materials.
- No BAT-AELs for emissions of propylene oxide were set in the LVOC BREF, due to the limited data collected (see Section 5.3.1.3 of the LVOC BREF).
- A European technical specification for monitoring is available: CEN/TS 13649:2014. UBA(DE) reports the use of national standards.

### EIPPCB proposal

• To include propylene oxide as a KEI.

# 4.2.8.13 Toluene

### **Original EIPPCB proposal**

There was no proposal for inclusion or exclusion of toluene as a KEI.

### Summary of initial positions

- 4 out of 12 IPs supported the inclusion of toluene as a KEI:
   toluene is classified as CMR (AT, EEB, SE).
- 3 partly supported the inclusion as a KEI:
  - it can be covered by the parameter TVOC (CEFIC).
- 5 did not support the inclusion as a KEI:

- it can be covered by the parameter TVOC (FR).

# **EIPPCB** assessment

- The TWG is divided in its opinion on the inclusion of toluene as a KEI.
- The relevance is 'high':
  - Harmonised classification, CMR properties: toxic to reproduction 2.
  - Toluene is restricted under REACH.
  - The LVOC BREF indicates emissions to air as an environmental issue in the thumbnail descriptions: toluene emissions to air from the production of bisphenol A (Section 2.1.2.1.2 of the LVOC BREF), caprolactam (Section 2.1.4.7 of the LVOC BREF).
- There are no E-PRTR data available to assess the significance. Toluene (CAS 18-88-3) is registered by 85 active registrants/suppliers under REACH with a tonnage band of 1 000 000 10 000 000 tonnes per year. The ECHA brief substance profile indicates the substance is used for the manufacture of chemicals and releases to the environment likely occur from chemical activities as an intermediate step in further manufacturing of another substance
- The likely availability of emission data is 'medium' because UBA(DE) reported 26 measurements, mainly for the activity 'basic organic chemicals'.
- A European technical specification for monitoring is available: CEN/TS 13649:2014.

### **EIPPCB** proposal

• To include toluene as a KEI.

# 4.2.8.14 Naphthalene

### **Original EIPPCB proposal**

There was no proposal for inclusion or exclusion of naphthalene as a KEI.

### Summary of initial positions

- 4 out of 13 IPs supported the inclusion of naphthalene as a KEI:
  - naphthalene is classified as a SVHC/CMR (AT, EEB, SE);
  - naphthalene is a priority substance under the Water Framework Directive (AT).
- 2 partly supported the inclusion as a KEI.
- 7 did not support the inclusion as a KEI:
- only 6 facilities report to the E-PRTR: 2.4 % of total industrial emission (CEFIC).

### EIPPCB assessment

- The TWG did not support the inclusion of naphthalene as a KEI.
- The relevance is 'high' because of the harmonised classification, CMR properties: carcinogenic 2.
- The significance is 'medium' because chemical facilities accounted for 2.3 % of all industrial emissions in the E-PRTR (6<sup>th</sup> rank of all industrial activities) (reporting threshold 100 kg/yr).
- The likely availability of representative data is 'low':
  - E-PRTR: 6 chemical facilities, main activity basic organic chemicals;
  - UBA(DE): no measurements.
- Emissions of naphthalene are covered by the parameter TVOC (see Section 4.2.8.1).
- International monitoring standards are available: ISO 11338-1:2003 and ISO 11338-2:2003.

- Not to include naphthalene as a KEI.
- This issue is not proposed for discussion at the KoM.

# 4.2.8.15 Phenol

### **Original EIPPCB proposal**

There was no proposal for inclusion or exclusion of phenol as a KEI.

### Summary of initial positions

- 2 out of 12 IPs supported the inclusion phenol as a KEI:
   phenol is classified as a SVHC/CMR (AT, EEB).
- 3 partly supported the inclusion as a KEI.
- 7 did not support the inclusion as a KEI:
  - BAT-AELs have not been set in the LVOC BREF (Section 13.7.1 phenol production) (CEFIC).

### **EIPPCB** assessment

- The TWG did not support the inclusion of phenol as a KEI.
- The relevance is 'high' because of the harmonised classification, CMR properties: mutagenic 2.
- There are no E-PRTR data available to assess the significance. Phenol is registered by 63 active registrants with a tonnage band of 1 000 000 10 000 000 tonnes per year. The ECHA brief substance profile indicates that releases to the environment of phenol are likely to occur for thermoplastic manufacture and as an intermediate step in further manufacturing of another substance (use of intermediates).
- The likely availability of representative data is 'low': the UBA(DE) reports 7 measurements.
- Emissions of phenol are covered by the parameter TVOC (see Section 4.2.8.1).
- A European technical specification for monitoring is available: CEN/TS 13649:2014.

- Not to include phenol as a KEI.
- This issue is not proposed for discussion at the KoM.

# 4.2.8.16 Acetic acid

### **Original EIPPCB proposal**

There was no proposal for inclusion or exclusion of acetic acid as a KEI.

### Summary of initial positions

- 2 out of 12 IPs supported the inclusion of acetic acid as a KEI (AT, EEB):
  - acetic acid is classified as a harmful substance (AT);
  - a high number of measurement data are available (EEB).
- 2 partly supported the inclusion as a KEI.
- 8 did not support the inclusion as a KEI:
  - acetic acid is not listed as a pollutant, emissions are limited to a small number of units in Europe (CEFIC, ES).

### EIPPCB assessment

- The TWG did not support the inclusion of acetic acid as a KEI.
- The relevance is 'low':
  - harmonised classification, CMR properties: not CMR;
    - no BAT-AELs are set in the existing chemical BREFs.
- There are no E-PRTR data available to assess the significance. The ECHA brief substance profile indicates that releases to the environment of acetic acid are likely to occur from manufacturing of the substance, and for thermoplastic manufacture. The tonnage band for the manufacture and/or import of the substance is 1 000 000–10 000 000 t/yr.
- The likely availability of emission data is 'high':
  - UBA(DE): 44 measurements, mainly 'basic organic chemistry'; few 'basic inorganic chemicals'.
- Emissions of acetic acid are covered by the parameter TVOC (see Section 4.2.8.1).
- A European technical specification for monitoring is available: EN 13649:2014.

- Not to include acetic acid as a KEI.
- This issue is not proposed for discussion at the KoM.

# 4.2.8.17 Methanol

### **Original EIPPCB proposal**

There was no proposal for inclusion or exclusion of methanol as a KEI.

### Summary of initial positions

- 3 out of 13 IPs supported the inclusion of methanol as a KEI:
  - methanol is classified as a harmful substance (AT);
  - methanol is part of TVOC (EEB, SE);
  - a high number of measurement data are available (EEB).
- 2 partly supported the inclusion as a KEI.
- 8 did not support the inclusion as a KEI:
  - methanol can be covered by the parameter TVOC (CEFIC).

### **EIPPCB** assessment

- The TWG did not support the inclusion of methanol as a KEI.
- The relevance is 'low':
  - harmonised classification, CMR properties: not CMR;
    - no BAT-AELs are set in the existing chemical BREFs.
- There are no E-PRTR data available to assess the significance. Methanol is registered by 173 active registrants with a tonnage band 10 000 000 100 000 000 tonnes per year. The ECHA brief substance profile indicates that releases to the environment of this substance are likely to occur, as an intermediate step in further manufacturing of another substance.
- The likely availability of emission data is 'high' because UBA(DE) reported 80 measurements, mainly 'basic organic chemistry'.
- Emissions of methanol are covered by the parameter TVOC (see Section 4.2.8.1).
- A European technical specification for monitoring is available: CEN/TS 13649:2014.

### **EIPPCB** proposal

• Not to include methanol as a KEI.

• This issue is not proposed for discussion at the KoM.

# 4.2.9 Other gases

# 4.2.9.1 Ammonia (NH<sub>3</sub>)

# Original EIPPCB proposal

To include ammonia (NH<sub>3</sub>) as a KEI.

# Summary of initial positions

- 16 out of 18 IPs agreed with the proposal to include of NH<sub>3</sub> as a KEI, including Member States, industry and an NGO, and 2 partly agreed:
  - CEFIC partly agreed, because they wanted the scope restricted to specific processes that emit ammonia (e.g. fertilisers, soda ash, combustion processes fitted with SCR/SNCR).
  - Fertilizers Europe partly agreed, because they would prefer a vertical BREF or alternatively a specific approach with a dedicated chapter in the WGC BREF.

# EIPPCB assessment

- The TWG broadly supported the inclusion of ammonia as a KEI.
- The relevance is 'high':
  - Ammonia leads to the secondary formation of dust in the atmosphere. Ambient air quality limit values have been set for  $PM_{10}$  (2005) and  $PM_{2.5}$  (2015) (see Section 4.2.3.3).
  - BAT-AELs were set in the LVIC-AAF, LVOC, OFC and SIC BREFs.
- The significance is 'high' because chemical facilities accounted for 9.5 % of all industrial emissions in the E-PRTR (2<sup>rd</sup> rank of all industry activities) (reporting threshold 10 000 kg/yr).
- The likely availability of emission data is 'high':
  - 90 chemical facilities reported emissions to air in the E-PRTR. The main activities of the facilities, their number and share of total chemical industry releases to air are:
    - basic organic chemicals (30, 8.2 %);
    - basic inorganic chemicals (31, 50.5 %);
    - NPK fertilisers (29, 41.1 %).
  - VCI: numerous data.
  - UBA(DE): 80 measurements. Ammonia emissions from the use of SCR or SNCR are measured.
- Monitoring:
  - No EN or ISO standard available, national/industry standards are available.
- The interface of the WGC BREF with the LVOC BREF is addressed in Section 2.2.3. The EIPPCB Proposal 6 is to exclude emissions for which BAT-AEPLs have been set during the review of the LVOC BREF.

# EIPPCB proposal

• Amend the EIPPCB proposal as follows:

To include ammonia as a KEI, except for the emissions for which BAT-AEPLs have been set during the review of the LVOC BREF.

• This issue is not proposed for discussion at the KoM.

# 4.2.9.2 Halogens and their compounds

Original EIPPCB proposal
There was no proposal for inclusion or exclusion of halogens and their compounds as a KEI.
Summary of initial positions
<ul> <li>7 out of 15 IPs supported the inclusion of halogens and their compounds as a KEI: <ul> <li>UK clarified that they intended to refer to emissions of halogens and hydrogen halides. The same comment was made by CEFIC, who partly supported the inclusion as a KEI.</li> <li>DK: all halogenated compounds should be included – expressed by one parameter.</li> </ul> </li> <li>4 partly supported the inclusion as a KEI: <ul> <li>Only chlorine and hydrogen chloride are commonly used and fluorinated/brominated compounds are limited to specific processes/products (CEFIC).</li> <li>SVHCs should be treated separately (ePURE, NL).</li> <li>Some halogenated compounds are CMR substances and an important part of emissions comes from the chemical industry (SE).</li> </ul> </li> <li>4 did not support the inclusion as a KEI.</li> </ul>
EIPPCB assessment
<ul> <li>The TWG broadly supported the inclusion of halogens and their compounds as a KEI.</li> <li>The TWG members had different understandings of the term 'halogens and their compounds' and in particular on:         <ul> <li>whether this would include halogenated organic compounds;</li> <li>which (organo)halogens would be included.</li> </ul> </li> </ul>
<ul> <li>There is no method that allows the measurement of halogenated compounds in their entirety.</li> <li>Therefore it seems more appropriate to individually assess the halogenated compounds of the KEI candidate list (see Sections 4.2.4 to 4.2.8 for halogenated organic compounds and Sections 4.2.9.3 to 4.2.9.7 for inorganic halogen compounds).</li> </ul>
EIPPCB proposal
• Not to include halogens and their compounds as a KEI.

• To individually assess each of the halogens and their compounds that is on the candidate KEI list to see if it should be included as a KEI.

# 4.2.9.3 Chlorine and inorganic compounds (as total CI)

### **Original EIPPCB proposal**

There was no proposal for inclusion or exclusion of chlorine and inorganic compounds as a KEI group.

### Summary of initial positions

• 5 out of 13 IPs supported the inclusion of chlorine and inorganic compounds as a KEI, 4 partly supported it and 4 did not support it.

# EIPPCB assessment

- The relevance is 'high':
  - BAT-AELs for chlorine are set in the CAK, LVIC-S, LVOC, and OFC BREFs;
  - BAT-AELs for hydrogen chloride are set in the LVIC-AAF, LVOC, OFC, and SIC BREFs.
- The significance is 'medium' because chemical facilities accounted for 2.1 % of all industrial emissions in the E-PRTR (4<sup>th</sup> rank of all industry activities) (reporting threshold 10 000 kg/yr).
- The availability of representative data is 'high':
  - E-PRTR: 14 chemical facilities. Main activities basic organic chemicals and basic inorganic chemicals).
  - VCI: numerous data.
  - UBA(DE): 177 measurements. Main activities are 'basic organic chemicals' and 'basic inorganic chemicals'. Only few data are available for other activities.
- A European standard for monitoring gaseous chlorides is available: EN 1911:2010. The analytical parameter includes hydrogen chloride (HCl), and also other gaseous chlorine compounds (e.g. elementary chlorine (Cl<sub>2</sub>)) that dissolve in the absorption solution and dissociate into chloride ions.
- In the case of continuous measurements, it is hydrogen chloride (HCl) that is measured.
- The interface of the WGC BREF with the LVOC BREF is addressed in Section 2.2.3. The EIPPCB Proposal 6 is to exclude emissions for which BAT-AEPLs have been set during the review of the LVOC BREF.

### **EIPPCB** proposal

• To include gaseous chlorides as a KEI group, which will include hydrogen chloride, except for the emissions for which BAT-AEPLs have been set during the review of the LVOC BREF.

# 4.2.9.4 Hydrogen chloride (HCI)

### **Original EIPPCB proposal**

There was no proposal for inclusion or exclusion of hydrogen chloride as a KEI.

### Summary of initial positions

• 7 out of 15 IPs supported the inclusion of HCl as a KEI, 4 partly supported it and 4 did not support it.

### EIPPCB assessment

- The TWG broadly supported the inclusion of hydrogen chloride as a KEI.
- Hydrogen chloride is included in the parameter gaseous chlorides (see Section 4.2.9.3).
- No EN or ISO standard is available. Instead, gaseous chlorides are measured (see Section 4.2.9.3).

### EIPPCB proposal

• Not to include hydrogen chloride as a separate KEI and instead to include gaseous chlorides as a KEI group.

# 4.2.9.5 Chlorine (Cl<sub>2</sub>)

### **Original EIPPCB proposal**

There was no proposal for inclusion or exclusion of chlorine (Cl<sub>2</sub>) as a KEI.

### Summary of initial positions

- 6 out of 14 IPs supported the inclusion of chlorine (Cl<sub>2</sub>) as a KEI:
  - there are chlorine BAT-AELs in BREFs (AT, DK, EEB, SE);
    - toxic compound, high number of measurement data available (EEB).
- 5 partly supported the inclusion as a KEI.
- 3 did not support the inclusion as a KEI.

### **EIPPCB** assessment

- The TWG is divided in its opinion on the inclusion of chlorine (Cl<sub>2</sub>) as a KEI.
- The relevance is 'high' because of the BAT-AELs in the CAK, LVIC-S, LVOC (BAT 66 and 76), and OFC BREFs.
- There are no E-PRTR data available to assess the significance. The ECHA brief substance profile indicates that releases to the environment of chlorine are likely to occur from the manufacturing of the substance.
- The likely availability of emission data is 'high':
  - The UBA(DE) report (41 measurements) indicates that monitoring data are likely to become available during the data collection from plants with a production capacity of less than 20 kt/yr (the production capacity threshold for inclusion in the scope of the LVOC BREF) and from plants outside of the scope of the CAK BREF; main activities 'basic organic/inorganic compounds' and plant protection products/biocides.
- No EN monitoring standard is available, national/industry standards are available.
- The interface of the WGC BREF with the LVOC BREF is addressed in Section 2.2.3. The EIPPCB Proposal 6 is to exclude emissions for which BAT-AEPLs have been set during the review of the LVOC BREF.

### **EIPPCB** proposal

• To include chlorine as a KEI, except for the emissions for which BAT-AEPLs have been set during the review of the CAK and LVOC BREFs.

# 4.2.9.6 Fluorine and inorganic compounds (as total F)

# Original EIPPCB proposal

There was no proposal for inclusion or exclusion of fluorine and inorganic compounds as a KEI group.

### Summary of initial positions

- 4 out of 12 IPs supported the inclusion of fluorine and inorganic compounds as a KEI group:
  - check redundancy of candidate KEI hydrogen fluoride (EEB).
- 4 partly supported the inclusion as a KEI group:
  - Halogens and inorganic compounds are ranked as level 1 substances by CEFIC.
     However, only Cl<sub>2</sub> and HCl are most commonly used substances, whereas bromine (and fluorine compounds) are limited to specific productions (CEFIC).
  - Emitted in not insignificant quantities (SE).
- 4 did not support the inclusion as a KEI group.

# EIPPCB assessment

- The TWG is divided in its opinion on the inclusion of fluorine and inorganic compounds as a KEI group.
- The relevance is 'high' because BAT-AELs are set in the existing LVIC-AAF and LVIC-S BREFs.
- The significance is 'medium' because chemical facilities accounted for 2.2 % of all industrial emissions in the E-PRTR (4<sup>th</sup> rank of all industrial activities) (reporting threshold 5 000 kg/yr).
- The likely availability of emission data is 'high':
  - E-PRTR: 10 chemical facilities. The main activities of the facilities, their number and share of total chemical industry releases to air are:
    - 'basic organic chemicals' (3, 41.7 %);
    - basic inorganic chemicals' (4, 32.2 %);
    - NPK fertilisers (3, 10.7 %).
  - VCI: numerous data.
  - UBA(DE) report: 41 measurements, mainly for the activities 'basic organic chemicals' and 'basic inorganic chemicals'.
- An international monitoring standard for gaseous fluorides is available: ISO 15713:2006. The analytical parameter includes hydrogen fluoride (HF) and other gaseous fluorine compounds that dissolve in the absorption solution and dissociate into fluoride ions.
- In the case of continuous measurements, it is hydrogen fluoride (HF) that is measured.

### EIPPCB proposal

• To include gaseous fluorides as a KEI group (which will include hydrogen fluoride).

# 4.2.9.7 Hydrogen bromide (HBr)

### **Original EIPPCB proposal**

There was no proposal for inclusion or exclusion of hydrogen bromide as a KEI.

### **Summary of initial positions**

- 4 out of 12 IPs supported the inclusion of HBr as a KEI (AT, DE, DK, EEB):
  - BAT-AELs are set in the OFC BREF (AT, DK);
  - high number of measurement data is available UBA(DE) report (EEB).
- 4 partly supported the inclusion as a KEI:
  - Halogens and inorganic compounds are ranked as level 1 substances by CEFIC.
     However, only Cl<sub>2</sub> and HCl are most commonly used substances, whereas bromium (and fluor compounds) are limited to specific productions (CEFIC).
- 4 did not support the inclusion as a KEI.

### **EIPPCB** assessment

- The TWG is divided in its opinion on the inclusion of hydrogen bromide as a KEI.
- The relevance is 'low', although BAT-AELs were set in the OFC BREF. It is not covered by the IED, Annex II.
- There are no E-PRTR data available to assess the significance. The ECHA brief substance profile indicates that releases to the environment of this substance is likely to occur as an intermediate step in further manufacturing of another substance. Manufacture/import of the hydrogen bromide is low compared with the manufacture/import of hydrogen chloride and hydrogen fluoride indicating **low significance**:
  - hydrogen bromide 10 000–100 000 t/yr;
  - hydrogen fluoride 100 000–1 000 000 t/yr;
  - hydrogen chloride 1 000 000–10 000 000 t/yr.
- The likely availability of emission data is 'low':
  - VCI report: no data.
  - UBA(DE) report: 9 measurements, for the activity 'organic chemicals and pharmaceutical products'.
- No EN or ISO standard is available, national/industry standards are available.

### **EIPPCB** proposal

• Not to include hydrogen bromide as a KEI.

# 4.2.9.8 Hydrogen sulphide (H<sub>2</sub>S)

### **Original EIPPCB proposal**

There was no proposal for inclusion or exclusion of hydrogen sulphide as a KEI.

### Summary of initial positions

- 6 out of 12 IPs supported the inclusion of  $H_2S$  as a KEI:
  - there are considerable emissions from existing installations, e.g. viscose production (AT);
  - it is relevant due to acute toxicity and major accidents hazards (SE).
- 6 did not support the inclusion as a KEI:

- it could be only relevant regarding sulphur-product processes (FR).

### EIPPCB assessment

- The TWG is divided in its opinion on the inclusion of hydrogen sulphide as a KEI.
- The relevance is 'high' because BAT-AELs were set in the LVIC-S and SIC BREFs.
- There are no E-PRTR data available to assess the significance. The ECHA brief substance profile indicates that releases to the environment of this substance are likely to occur from an intermediate step in further manufacturing of another substance.
- The likely availability of emission data is 'low':
- UBA(DE): 2 measurements.
- No EN or ISO standard available, national/industry standards are available.

# EIPPCB proposal

• Not to include hydrogen sulphide as a KEI.

# 4.2.9.9 Carbon disulphide (CS<sub>2</sub>)

### **Original EIPPCB proposal**

There was no proposal for inclusion or exclusion of carbon disulphide as a KEI.

### Summary of initial positions

- 5 out of 13 IPs supported the inclusion of  $CS_2$  as a KEI:
  - there are considerable emissions from existing installations, e.g. viscose production (AT);
  - carbon disulphide is classified as a SVHC/CMR (AT, EEB);
  - carbon disulphide has a high chronic toxicity (SE).
- 2 partly supported the inclusion as a KEI:
  - carbon disulphide can be covered by the parameter TVOC (CEFIC).
- 6 did not support the inclusion as a KEI:
  - few sites, mainly production of viscose and technical fibres (FR).

### **EIPPCB** assessment

- The TWG is divided in its opinion on the inclusion of carbon disulphide as a KEI.
- The relevance is 'high':
  - BAT-AELs are set in the LVIC-S and SIC BREFs;
  - harmonised classification, CMR properties: toxic to reproduction 2.
- There are no E-PRTR data available to assess the significance. The ECHA brief substance profile indicates that releases to the environment of this substance are likely to occur in chemical activities from an intermediate step in further manufacturing of another substance.
- The likely availability of emission data is 'low':
  - UBA(DE): 3 measurements.
- Emissions of carbon disulphide are covered by the parameter TVOC (see Section 4.2.8.1).
- No EN or ISO standard is available, national/industry standards are available.

# **EIPPCB** proposal

• Not to include carbon disulphide as a KEI.

# 4.2.9.10 Hydrogen cyanide (HCN)

### **Original EIPPCB proposal**

There was no proposal for inclusion or exclusion of hydrogen cyanide as a KEI.

### Summary of initial positions

- 5 out of 8 IPs supported the inclusion of HCN as a KEI:
  - emitted in not insignificant quantities in the chemical industry 20 % of the total emissions (SE).
- 1 partly supported the inclusion as a KEI:
  - it could be only relevant for specific processes, few sites report emissions (FR).
- 2 did not support the inclusion as a KEI.

# EIPPCB assessment

- The TWG supported the inclusion of HCN as a KEI.
- The relevance is 'high' because BAT-AELs are set in the OFC and SIC BREFs.
- The significance is 'high' because chemical facilities accounted for 21.3 % of all industrial emissions in the E-PRTR (4<sup>th</sup> rank of all industrial activities) (reporting threshold 200 kg/yr).
- The likely availability of emission data is 'medium':
  - 12 chemical facilities reported emissions to air to the E-PRTR, mainly 'basic organic chemicals' (9 activities, 82.9 % of total chemical industry emissions).
  - UBA(DE): 8 measurements, mainly from 'basic organic chemicals' (4).
- No EN or ISO standard is available, national/industry standards are available.

# **EIPPCB** proposal

• To include hydrogen cyanide as a KEI.

# 4.2.10 Other metals

# 4.2.10.1 Metals class I (mercury, thallium and their compounds)

Original EIPPCB proposal
There was no proposal for inclusion or exclusion of metals class I as a KEI group.
Summary of initial positions
<ul> <li>5 out of 13 IPs supported the inclusion of metals class I as a KEI group: <ul> <li>alternatively as single substances (EEB).</li> </ul> </li> <li>3 partly supported the inclusion as a KEI group: <ul> <li>SVHCs should be treated separately (ePURE, NL).</li> </ul> </li> <li>5 did not support the inclusion as a KEI group: <ul> <li>share of total industrial emissions is 1.1 % (CEFIC);</li> </ul> </li> </ul>
- metals can be covered by the parameter dust (except Hg) (EUROMETAUX).
EIPPCB assessment
<ul> <li>The TWG is divided in its opinion on the inclusion of metals class I as a KEI group.</li> <li>Mercury is discussed in Section 4.2.5.1.</li> <li>The relevance is 'high'. Although thallium and its compounds are not classified as CMR substances, they are classified as fatal if inhaled.</li> <li>The significance is 'low'. There are no E-PRTR data available to assess the significance. Thallium is not a registered substance under REACH.</li> <li>The likely availability of emission data is 'low': the E-PRTR and UBA(DE) report no data.</li> <li>If thallium and its compounds are present as particulates in the waste gas, their emissions are covered by the parameter dust (see Section 4.2.3.3).</li> <li>A European monitoring standards is available: EN 14385:2004.</li> </ul>
EIPPCB proposal
• Not to include metals class I (mercury and thallium) as a KEI group.
# 4.2.10.2 Metals class II (lead, cobalt, nickel, selenium, tellurium and their compounds)

Original EIPPCB proposal
There was no proposal for inclusion or exclusion of metals class II as a KEI group.
Summary of initial positions
<ul> <li>5 out of 13 IPs supported the inclusion of metals class II as a KEI group (AT, DE, DK, EEB, ES): <ul> <li>alternatively as single substances (EEB);</li> <li>include in data collection to consider relation to dust (DK).</li> </ul> </li> <li>3 partly supported the inclusion as a KEI group (ePURE, NL, SE): <ul> <li>SVHCs should be treated separately.</li> </ul> </li> <li>5 did not support the inclusion as a KEI group (CEFIC, EUROMETAUX, Fertilizers Europe, FR):</li> </ul>
- metals can be covered by the parameter dust (except Hg) (EUROMETAUX).
EIPPCB assessment
<ul> <li>The TWG is divided in its opinion on the inclusion of metals class II as a KEI group.</li> <li>Lead and nickel are discussed in Sections 4.2.3.7 and 4.2.3.8.</li> <li>The relevance for the metals cobalt and selenium is 'low'. No harmonised classifications as CMR, no properties of concern for the metals reported.</li> <li>The relevance for the metal tellurium is 'high'. As property of concern is reported toxic to reproduction.</li> <li>The significance is considered 'low' because the E-PRTR and UBA(DE) report do not report emissions of cobalt, selenium and tellurium as single substances.</li> <li>The likely availability of emission data is 'low': the E-PRTR and UBA(DE) report no data.</li> <li>If cobalt, selenium, tellurium and their compounds are present as particulates in the waste gas, their emissions are covered by the parameter dust (see Section 4.2.3.3).</li> <li>A European monitoring standards is available: EN 14385:2004.</li> </ul>
EIPPCB proposal
• Not to include metals class II (lead, cobalt, nickel, selenium, tellurium) and their compounds as a KEI group.

# 4.2.10.3 Metals class III (antimony, chromium, copper, manganese, vanadium, tin and their compounds)

Original EIPPCB proposal
There was no proposal for inclusion or exclusion of metals class III as a KEI group.
Summary of initial positions
• 5 out of 12 IPs supported the inclusion of metals class III as a KEI group:
– alternatively as single substances (EEB).
• 3 partly supported the inclusion as a KEI group:
- SVHCs should be treated separately (ePURE, NL).
• 4 did not support the inclusion as a KEI group
- metals can be covered by the parameter dust (except Hg) (EUROMETAUX).
EIPPCB assessment
• The TWG is divided in its opinion on the inclusion of metals class III as a KEI group.
• The relevance is 'low'. No indication for the relevance of the single metals antimony,
chromium, copper, manganese, vanadium, tin. No harmonised classifications, no properties
of concern for the metals reported.
• The significance is 'low' (chromium) or 'medium' (copper):
- Antimony, manganese, vanadium and tin are not reported by the E-PRTR.
- Chemical facilities accounted for 1.4 % of all industrial emissions of chromium in
the E-PRTR (4 <sup>th</sup> rank of all industrial activities) (reporting threshold 100 kg/yr).
- Chemical facilities accounted for 2.2 % of all industrial emissions of copper in the
E-PRTR (4 <sup>th</sup> rank of all industrial activities) (reporting threshold 100 kg/yr).
• The likely availability of emission data is 'medium':
<ul> <li>E-PRTR: 5 chemical facilities report chromium and copper emissions;</li> </ul>
– UBA(DE): copper 15 measurements; chromium 14 measurements.
• If metals (class III) and their compounds are present as particulates in the waste gas, their
emissions are covered by the parameter dust (see Section 4.2.3.3).
• A European monitoring standards is available: EN 14385:2004.
EIPPCB proposal
• Not to include metals class III (antimony, chromium, copper, manganese, vanadium,

• Not to include metals class III (antimony, chromium, copper, manganese, tin and their compounds) as a KEI group.

#### 4.2.10.4 Zinc and its compounds (as Zn)

#### **Original EIPPCB proposal**

There was no proposal for inclusion or exclusion of zinc and its compounds as a KEI.

#### **Summary of initial positions**

- 2 out of 13 IPs supported the inclusion of zinc and its compounds as a KEI:
  - zinc is classified as harmful (AT);
    - zinc is the metal most emitted in FR, but few sites.
- 2 partly supported the inclusion as a KEI.
- 9 did not support the inclusion as a KEI:
- address metals under dust (except Hg) (EUROMETAUX).

#### EIPPCB assessment

- The TWG did not support the inclusion of zinc and its compounds as a KEI.
- Relevance is 'low'. No indication for the relevance of zinc. No harmonised classification, no properties of concern for the metals reported.
- There are no E-PRTR data available to assess the significance. The ECHA brief substance does not indicate emissions from the chemical industry.
- The likely availability of emission data is 'low': the UBA(DE) reports 3 measurements.
- If zinc and its compounds are present as particulates in the waste gas, their emissions are covered by the parameter dust (see Section 4.2.3.3).
- A European monitoring standards is available: EN 14385:2004.

#### **EIPPCB** proposal

- Not to include zinc and its compounds as a KEI.
- This issue is not proposed for discussion at the KoM.

### 4.2.11 Phosphates

#### **Original EIPPCB proposal**

There was no proposal for inclusion or exclusion of phosphates as a KEI.

#### **Summary of initial positions**

- 3 out of 11 IPs supported the inclusion of phosphates as a KEI.
- 3 partly supported the inclusion as a KEI:
  - existing BAT-AEL has to be discussed (FR).
- 5 did not support the inclusion as a KEI:
  - Phosphates are used as fertilisers in the agricultural activity and are brought out in large quantities on purpose. Any emissions to air are marginal compared to the onpurpose use of phosphates (CEFIC).

#### **EIPPCB** assessment

- The TWG is divided in its opinion on the inclusion of phosphates as a KEI.
- The relevance is 'low', although BAT-AELs were set in the LVIC-S BREF. It is not covered by the IED, Annex II.
- There are no E-PRTR data available to assess the significance.
- The CEFIC rationale seems plausible.
- The likely availability of emission data is 'low': E-PRTR and UBA(DE) report no data.
- If phosphates are present as particulates in the waste gas, their emissions are covered by the parameter dust (see Section 4.2.3.3).
- No EN or ISO standard is available.

#### **EIPPCB** proposal

- Not to include phosphates as a KEI.
- This issue is not proposed for discussion at the KoM.

## 4.2.12 Other proposals for KEIs to be included

#### **Original EIPPCB request**

To add more KEI candidates if necessary.

#### Summary of initial positions

- To add the following additional substances, as it is necessary to include all harmful substances emitted by industry in the data collection (AT):
  - odour;
  - the metals thallium (metal class I), cobalt (metal class II) and vanadium (metal class III);
  - acrylonitrile;
  - amines;
  - isocyanates (class I-III).

#### EIPPCB assessment

- No specific rationale with regard to the relevance, significance, likely availability of monitoring data or monitoring method was provided.
- The substances proposed are regulated by some Member States under general binding rules (e.g. TA Luft (DE) or Netherlands Emission Guidelines for Air (NL)). However, the general binding rules also specify thresholds and emission limits for many other substances that were not proposed.
- Odour emissions are addressed in Section 2.2.2.3.
- Metals class I (e.g. thallium), class II (e.g. cobalt) and class III (e.g. vanadium) are addressed in Sections 4.2.10.1, 4.2.10.2 and 4.2.10.3, respectively.
- Acrylonitrile:
  - The relevance is 'high' because the harmonised classification is carcinogenic 1B.
  - There are no E-PRTR data available to assess the significance. The ECHA brief substance profile indicates that releases to the environment of the substance are likely to occur for thermoplastics manufacture and as an intermediate for the manufacture of other substances. The tonnage band for the substance manufactured and/or imported is 1 000 000–10 000 000 t/yr. The data indicate that significant emissions might occur.
  - The likely availability of emission data is medium: the UBA(DE) reports 11 measurements for the activity 'basic organic chemicals', mainly the production of polymers.
  - The LVOC BREF reports that emissions of acrylonitrile may originate from the production of acrylamide and from the production of the substance itself (see Sections 2.1.4.3.1 and 2.1.4.5 of the LVOC BREF). There may be other emissions sources, as acrylonitrile is also used for the production of adiponitrile, an intermediate for the production of nylon (see Section 2.1.4.5 of the LVOC BREF). Although the initial intention was to describe acrylonitrile production in an illustrative chapter of the LVOC BREF, no questionnaires were developed and thus no plant-specific data were collected. Consequently, no BAT-AELs for acrylonitrile emissions were set in the LVOC BREF.
  - Emissions of acrylonitrile are covered by the parameter TVOC (see Section 4.2.8.1).
  - A European technical specification for monitoring is available: CEN/TS 13649:2014.
- Amines:
  - The chemical group of amines covers a very wide range of substances.
  - Some amines are CMR substances (e.g. some pigments) and some amines are toxic (e.g. ethylamine) so if they are individually assessed as candidate KEIs their relevance will be classified as 'high'. For other amines, the relevance will be 'medium' or 'low'.
  - There are no E-PRTR data available to assess the significance. REACH data cannot be aggregated for groups of substances and were therefore not collected by the EIPPCB.

- The likely availability of emission data is 'medium': the UBA(DE) reports 4 measurement data for amines as a group as well as a number of measurements for individual amines for the activity 'basic organic chemicals'.
- The LVOC BREF addresses the production of ethanolamines in its Chapter 9, but no BAT or BAT-AELs to reduce emissions of amines were set. Thumbnail descriptions on the production of other amines are given in Section 2.1.4.2 of the LVOC BREF.
- Emissions of organic amines are covered by the parameter TVOC (see Section 4.2.8.1).
- A European technical specification for monitoring is available: CEN/TS 13649:2014.

#### • Isocyanates class I-III:

- The relevance is 'high' for toluene diisocyante (TDI) and methylene diphenyl diisocyanate (MDI), the two most commonly used isocyanates, because they are both CMR class 2 substances.
- There are no E-PRTR data available to assess the significance. REACH data cannot be aggregated for groups of substances and were therefore not collected by the EIPPCB. The UBA(DE) data indicate no significant emissions, because none of the emission data of TDI was reported with waste gas treatment and all mass flows were below the German threshold level of less than 10 g/h.
- The likely availability of emission data is 'medium': the UBA(DE) reports 18 measurement data for TDI and 1 for MDI for the activity 'basic organic chemicals', mainly the production of polymers (which was not in the scope of the LVOC BREF).
- The production of TDI and MDI is covered by the LVOC BREF (Chapter 10). BAT 64 is to use a combination of waste gas treatment systems (wet scrubbing, thermal reduction, catalytic reduction) in order to reduce the load of organic compounds and other pollutants; BAT 66 sets no specific BAT-AELs for isocyanates, but they are included as part of TVOC.
- Emissions of isocyanates are covered by the parameter TVOC (see Section 4.2.8.1).
  - The UBA(DE) reports the use of national standards.

#### **EIPPCB** proposal

- To include acrylonitrile as a KEI.
- Not to include amines and isocyanates as KEIs.

## 4.3 Identification of relevant mass flows

The chemical industry is covered by Section 4 of Annex I to the IED. The list of activities presented in Section 4 refers to the production of chemicals '... on an industrial scale by chemical or biological processing of substances or groups of substances ...'. This covers all chemical manufacturing installations irrespective of size, except for those carrying out research, development activities or the testing of new products and processes that are excluded from the scope of the IED by virtue of Article 2(2) of the IED (which will usually be very small-scale activities). Guidance on the meaning of 'production on an industrial scale' is available<sup>44</sup>.

There are many installations in the chemical sector that are likely to have small emissions of substances to air, particularly in the small-scale production of speciality chemicals. Excluding minor sources of channelled emissions to air from the WGC data collection would be in line with applying Criterion 2 for identifying KEIs (i.e. significance of activity e.g. number of installations, contribution to total emissions in the EU). The workload for the WGC data collection and analysis could be reduced by setting a numerical limit (e.g. in kg/yr or g/h) below which emissions of a substance, or group of substances, would not be considered relevant for the purpose of drawing up the WGC BREF.

#### Original EIPPCB proposal

EIPPCB Proposal 17: to specify emission thresholds for each KEI to avoid collecting data from minor emission sources.

The emission thresholds used for the data collection should be:

- for unabated emissions and for single emission sources, not for the installation as a whole;
- high enough to exclude trivial emissions that have little or no environmental impact; however, they should be low enough to ensure that possible emission thresholds used in the BAT conclusions/BAT-AELs can be set that are within the range of the data that are collected.

Request 6: TWG members are asked to provide their views on the emission thresholds that should be used for the data collection, for each substance proposed as a KEI. A rationale should be provided to support each proposed emission threshold.

#### **Summary of initial positions**

- 5 out of 12 IPs agreed with using emission thresholds for the data collection (CEFIC, ePURE, NL, FR and UK), but 7 disagreed (AT, BE, DE, DK, EEB, IT and SE).
- The main concerns of those who disagreed with using thresholds for most substances were as follows:
  - Introducing mass flow thresholds would contradict the IED Article 1 requirement to achieve a high level of protection of the environment taken as a whole (AT).
  - Any emission threshold should be based on a comprehensive set of emission data and could only be set after the data collection (BE, DE, DK, EEB, ES, IT, SE). Several arguments were put forward as supporting evidence, for example that the substance was a CMR substance or a SVHC, that it was mentioned in the UBA(DE) report (2016), that there was a substantial amount of monitoring data available or that it was listed in Directive 2008/50/EC on ambient air quality and cleaner air for Europe.
  - Any emission threshold would exclude the best performing plants from the data collection, because the abated emissions form these plants will be very low (DE).
  - The focus should be on linking KEIs to different production processes, rather than introducing general thresholds (BE).

<sup>•</sup> CEFIC provided an analysis comparing the thresholds used by some Member States and

<sup>&</sup>lt;sup>44</sup> <u>http://ec.europa.eu/environment/archives/air/stationary/ippc/general\_guidance.htm.</u>

the actual emissions of European installations. The analysis also suggested that by focusing on the 20 % of the outlets with the highest releases more than 80 % of the total emissions could be covered. Concrete proposals for the thresholds that could be used have not yet been provided.

• Some Member States proposed that the thresholds they already use in their domestic legislation could be used as thresholds for the WGC BREF data collection (CZ, NL (and ePURE who supported the use of the NL thresholds)). However, some Member States that use thresholds in their domestic legislation proposed that thresholds should not be used for the WGC BREF data collection (DE, IT).

• UK proposed that the thresholds could be set at 1 % of the E-PRTR reporting thresholds.

#### EIPPCB assessment

- The TWG is divided in its opinion on setting emission thresholds for the data collection of the WGC BREF.
- Setting thresholds for the data collection does not contradict the requirements of the IED to achieve a high level of protection of the environment as a whole. At the start of each BREF review, the TWG concerned takes decisions on major issues (i.e. KEIs) and minor issues, in line with the focused approach agreed by the IED Article 13 forum in 2015.
- Mass flow thresholds are frequently used in MS to exclude minor emissions to which the generally binding ELVs do not apply (e.g. in BE, CZ, DE, FR, IT, NL). Table 4.1 provides an overview of the mass flow thresholds that are used in E-PRTR and some MS. [Note: The table might contain inaccuracies due to the fact that the national binding rules are quite complex and that English translations are not always available.]
- Mass flow thresholds for emissions of substances are a regulatory tool used as a first tier to assess the relevance of emissions. When the total emission from a facility for a certain substance or group of substances is larger than the mass flow threshold, then the emission is considered to be relevant, ELVs are set and abatement techniques are used in accordance with BAT.
- Therefore, it does not seem unreasonable to use emission thresholds for the data collection in the WGC BREF. Otherwise, the data collection could lead to the submission of a lot of questionnaires reporting unabated emissions (i.e. of cases where no abatement techniques are used).
- The proposal to set emission thresholds for the data collection referred to unabated emissions. Therefore, best performers would not be excluded from the data collection. In general, the mass flow thresholds used by MS differ considerably, e.g. for dust,  $NO_X$  and  $SO_X$  (see Table 4.1). This indicates that there seem to be different national approaches/practices in what is considered to be a relevant emission source. However, there are also a few substances where the mass flow thresholds are very similar or even identical, e.g. for chloromethane and tetrachloromethane.
- The Dutch mass flow thresholds were analysed to determine if they are safe from a toxicological point of view. For this purpose, the toxicity of SVHCs was compared with an estimated worst-case air concentration based on the mass flow thresholds. The results of the analyses showed that negative effects could not be expected.<sup>45</sup>
- If mass flow thresholds were to be set for the WGC data collection, a safety factor might be required, as the applied mass flow thresholds refer to the whole installation rather than to single emission sources.

#### EIPPCB proposal

• Amend EIPPCB Proposal 17 as follows:

#### **EIPPCB** Proposal 17:

- to organise the plant-specific data collection in a way that ensures that only relevant emission sources are covered;
- to avoid the data collection and analysis becoming unmanageable due to a high number of questionnaires referring to minor emission sources where no abatement

<sup>&</sup>lt;sup>45</sup> R van Herwijnen, M.P.M. Janssen; Toxicological evaluation of mass flow limits for air emissions of substances of very high concern, RIVM Letter Report 601357014/2013.

techniques are used;

• to consider specifying emission thresholds for each KEI to avoid collecting data from minor emission sources.

If specified, the emission thresholds used for the data collection should be:

- for unabated emissions and for single emission sources, not for the installation as a whole;
- high enough to exclude trivial emissions that have little or no environmental impact; however, they should be low enough to ensure that possible emission thresholds used in the BAT conclusions/BAT-AELs can be set that are within the range of the data that are collected.

	E-PRTR	MS thresholds									
Candidate KEI	Annual mass flow (original value)	Equivalent hourly mass flow rate (calculated) ( <sup>1</sup> )	BE (Flanders)	CZ	DE	DK	FR	IT	NL		
Acrylonitrile	NT	NT	25 g/h	NI	1.5 g/h	NI	5 g/h	25 g/h	2.5 g/h		
Ammonia (NH <sub>3</sub> )	10 t/yr	1140 g/h	NT	500 g/h	150 g/h	5000 g/h	100 g/h	2000 g/h	150 g/h		
Benzene	1 t/yr	114 g/h	25 g/h	40 g/h	2.5 g/h ( <sup>2</sup> )	25 g/h ( <sup>3</sup> )	25 g/h	25 g/h	2.5 g/h		
Carbon monoxide (CO)	500 t/yr	57.1 kg/h	5 kg/h	5 kg/h	NT	NI	NT	NT	NT		
Chlorine (Cl <sub>2</sub> )	NT	NT	50 g/h	500 g/h	15 g/h	50 g/h	50 g/h ( <sup>4</sup> )	50 g/h	15 g/h		
Chloromethane	NT	NT	100 g/h	NI	100 g/h	NI	100 g/h	100 g/h	100 g/h		
Dichloromethane	1 t/yr	114 g/h	3000 g/h	NI	100 g/h	NI	100 g/h	100 g/h	500 g/h		
Dust ( <sup>5</sup> )	50 t/yr ( <sup>6</sup> )	5710 g/h	200 g/h ( <sup>7</sup> )	2500 g/h	200 g/h	500 g/h ( <sup>7</sup> )	1000 g/h ( <sup>7</sup> )	100 g/h	200 g/h		
Ethylene dichloride	1 t/yr	114 g/h	100 g/h	NI	2.5 g/h	NI	25 g/h	25 g/h	2.5 g/h		
Ethylene oxide	1 t/yr	114 g/h	25 g/h	NI	1.5 g/h	NI	25 g/h	25 g/h	2.5 g/h		
Formaldehyde	NT	NT	100 g/h	NI	12.5 g/h ( <sup>8</sup> )	25 g/h	100 g/h	100 g/h	0.15 g/h ( <sup>9</sup> )		
Gaseous chloride	10 t/yr	1140 g/h	300 g/h	500 g/h	150 g/h	500 g/h	1000 g/h	300 g/h	15 g/h ( <sup>10</sup> )		
Gaseous fluoride	5 t/yr	571 g/h	50 g/h	100 g/h	15 g/h	50 g/h ( <sup>11</sup> )	500 g/h	50 g/h	15 g/h ( <sup>11</sup> )		
Hydrogen cyanide (HCN)	200 kg/yr	22.8 g/h	50 g/h	NI	15 g/h	50 g/h	50 g/h	50 g/h	15 g/h		
Lead and its compounds	200 kg/yr	22.8 g/h	25 g/h	NI	2.5 g/h	5 g/h	10 g/h	25 g/h	0.15 g/h ( <sup>12</sup> )		
Nickel and its compounds	50 kg/yr	5.71 g/h	5 g/h	NI	2.5 g/h ( <sup>13</sup> )	$0.5 \text{ g/h} (^3)$	25 g/h ( <sup>13</sup> )	5 g/h ( <sup>13</sup> )	0.15  g/h ( <sup>12</sup> )( <sup>13</sup> )		
Nitrogen oxides (NO <sub>X</sub> )	100 t/yr	11.4 kg/h	5 kg/h	10 kg/h	1.8 kg/h	5 kg/h	25 kg/h	5 kg/h	2 kg/h		

 Table 4.1:
 Overview of thresholds in E-PRTR and MS legislation for candidate KEIs

Nitrous oxide (N <sub>2</sub> O)	10 t/yr	1140 g/h	NT	NI	NT	NI	NT	NT	NT
PCDD/F (dioxins + furans)	0.1 g I-TEQ/yr	11.4 μg I-TEQ/h	NT	NI	0.25 μg I-TEQ/h	1.14 μg I- TEQ/h ( <sup>14</sup> )	NT	20 mg/h ( <sup>15</sup> )	1.6 μg I- TEQ/h ( <sup>12</sup> )
Propylene oxide	NT	NT	25 g/h	NI	2.5 g/h	NI	25 g/h	NT	2.5 g/h
Sulphur oxides (SO <sub>X</sub> )	150 t/yr	17.1 kg/h	5 kg/h	20 kg/h	1.8 kg/h	5 kg/h ( <sup>16</sup> )	25 kg/h	5 kg/h	2 kg/h
Tetrachloromethane	100 kg/yr	11.4 g/h	100 g/h	NI	100 g/h	NI	100 g/h	100 g/h	NT
Toluene	NT	NT	2000 g/h	NI	100 g/h ( <sup>17</sup> )	6250 g/h ( <sup>18</sup> )	NT	3000 g/h	NT
Trichloromethane	500 kg/yr	57.1 g/h	100 g/h	NI	100 g/h	NI	100 g/h	100 g/h	100 g/h
туос	100 t/yr ( <sup>19</sup> )	11.4 kg/h ( <sup>19</sup> )	NT	3 kg/h	500 g/h	NI	2000 g/h ( <sup>19</sup> )	NT	100 g/h ( <sup>12</sup> )
Vinyl chloride monomer (VCM)	1 t/yr	114 g/h	25 g/h	NI	2.5 g/h	NI	5 g/h	25 g/h	2.5 g/h

(<sup>1</sup>) Assuming continuous production throughout the whole year (8760 hours).

 $\binom{2}{1.5}$  g/h in draft new TA Luft.

 $\binom{3}{3}$  Applies when emission limitation by means of absolute filtering or combustion is impossible.

(<sup>4</sup>) Expressed as HCl.

(5) General threshold for dust. Lower values for more hazardous particulate compounds.

(<sup>6</sup>) Refers to PM<sub>10</sub>.

 $(^{7})$  A higher ELVs applies for mass flows below this threshold.

(<sup>8</sup>) TA Luft gives 100 mg/h, but the value was lowered via a recommendation of the German Länder. 12.5 g/h is also the mass flow threshold in the draft new TA Luft.

 $\binom{9}{1}$  Threshold proposal by the NL. 100 g/h is the value given in the NeR emission database.

(<sup>10</sup>) Refers to HCl alone

(<sup>11</sup>) Refers to HF alone.

 $\binom{12}{12}$  Threshold proposal by the NL.

 $\binom{13}{1}$  Lower threshold values apply for carcinogenic Ni compounds.

 $(^{14})$  Calculated from 0.01 g I-TEQ/yr.

(<sup>15</sup>) Toxicity equivalents not specified.

 $\binom{16}{10}$  Refers to SO<sub>2</sub> alone. For SO<sub>3</sub>, the mass flow threshold is 500 g/h.

 $\binom{17}{1}$  Due to its classification as toxic to reproduction 2.

(<sup>18</sup>) Organic compound of class III.

(<sup>19</sup>) Refers to NMVOC.

 $\binom{21}{2}$  Calculated from 20 mg I-TEQ/yr.

 $(^{22})$  A threshold of 0.15 g/h is proposed by NL.

NB: NI = no information available; NT = no threshold.

Source: E-PRTR; BE(Flanders): Vlaarem II Bijlagen; CZ: IP; DE: TA Luft; DK: Guidelines for Air Emission Regulation; FR: Arreté du 02/02/98; IT: Allegati al Decreto legislativo 3 aprile 2006, n. 152; NL: NeR emission guidelines and database (<u>http://wetswegwijzer.nl/app/index.php</u>).

#### 5 DATA COLLECTION

#### 5.1 **Overview**

The main purpose of the WGC data collection is to provide a sound basis for setting BAT and BAT-AE(P)Ls for the identified KEIs. Due to the size and heterogeneity of the chemical sector, the EIPPCB proposes to focus the WGC data and information collection on relevant emissions to air (see Section 4) and on the techniques used to abate those emissions (i.e. 'BAT candidates') (see Section 6). This section addresses which data and information should be collected and how the WGC data collection should be carried out.

#### 5.2 NO<sub>x</sub> emission data collected during the LVOC BREF review

The final TWG meeting for the review of the LVOC BREF, held in April 2016, recommended that the information on NO<sub>X</sub> emissions to air from the use of thermal oxidisers, which was collected for the review of the LVOC BREF, should be used when drawing up the WGC BREF.

The challenge is that the information collected for the LVOC BREF was not always complete, especially regarding reference conditions (e.g.  $O_2$  content). Moreover, since the information was collected for the years 2010 to 2012, there may be more up-to-date information available.

Or	iginal EIPPCB proposal
EIF	PPCB Proposal 18: not to use the data on NO <sub>X</sub> emissions from thermal oxidisers that were
col	lected during the LVOC BREF review and instead to collect a new set of data.
Su	mmary of initial positions
• 1	12 out of 18 IPs agreed with the proposal, 4 partly agreed and 2 disagreed (PL answered that it partly agreed but its comments indicated agreement). The EEB raised the issue that the data collected in the LVOC BREE could not be verified
	due to excessive confidentiality claims, thereby not meeting the transparency requirements of the Sevilla Process.
	UK agreed with the proposal and asked for clarification on whether the plants included in the LVOC BREF would be invited to resubmit data or be excluded from the new data collection, and if plants were excluded what the consequences would be for the applicability of the BAT-AELs.
•	<ul> <li>The main concerns of those who partly agreed were as follows:</li> <li>The data collected for the review of the LVOC BREF has already been quality checked and should thus be used, where appropriate, and further data should be collected to fill any gaps, such as for processes with a total production capacity of less than 20 kt/yr (AT, DK, IT, NO). The same argument was put forward by the two TWG members who disagreed with the proposal (ePURE, NL).</li> </ul>
EI	PPCB assessment
• '	The TWG broadly supported the proposal
	The anonymisation of the questionnaires and their direct submission to the EIPPCB during the LVOC BREF review meant that Member States and environmental NGOs faced difficulties in verifying the submitted data, including on $NO_X$ emissions from thermal oxidisers. As some contextual information was also missing, the quality of these $NO_X$ emission data could be called into question.
• '	<ul> <li>The interface of the WGC BREF with the LVOC BREF is addressed in Section 2.2.3:</li> <li>Gaps related to the production capacity threshold of 20 kt/yr are proposed to be covered by the WGC BREF.</li> </ul>
	- Gaps related to NO <sub>X</sub> emissions from thermal oxidisers used in plants covered by
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the scope of the LVOC BREF are also proposed to be covered by the WGC BREF. The LVOC plants concerned could therefore submit updated data.

EIPPCB proposal

• Keep EIPPCB Proposal 18 unchanged:

EIPPCB Proposal 18: not to use the data on NO<sub>X</sub> emissions from thermal oxidisers that were collected during the LVOC BREF review and instead to collect a new set of data.
This issue is not proposed for discussion at the KoM.

# 5.3 Environmental performance levels

# 5.3.1 Expression of BAT-AEPLs in concentrations, abatement efficiencies and/or specific loads

As a consequence of adopting a generic approach, the WGC BREF will focus on recovery and abatement techniques, rather than on process-integrated techniques. Therefore, BAT-AELs will necessarily need to be expressed in concentrations, and not in specific loads. Alternatively, the performance of abatement techniques could be described by defining abatement efficiencies (which would be BAT-AEPLs but not BAT-AELs). Combinations of BAT-AELs expressed in concentrations and BAT-AEPLs expressed as abatement efficiencies also seem possible.

However, in the case of sulphuric acid production, BAT-AEPLs that are not BAT-AELs might need to refer to conversion efficiencies, potentially in combination with BAT-AELs expressed in concentrations. Deviations from the general approach to express BAT-AEPLs in concentrations and/or abatement efficiencies might also be appropriate in the case of other specific subsectors/products/processes, if the emissions depend significantly on process-integrated techniques.

#### **Original EIPPCB proposal**

EIPPCB Proposal 19: to *generally* express BAT-AEPLs for emissions to air in concentrations, abatement efficiencies, or in combinations thereof.

#### Summary of initial positions

- 9 out of 18 IPs agreed with the proposal, 9 partly agreed and none disagreed.
- 7 TWG members thought that abatement efficiencies should be used in specific circumstances, particularly when there is a high concentration of a pollutant at the inlet to abatement equipment (AT, CEFIC, DK, EB, ePURE, Fertilizers Europe, NL). However, DE thought that abatement efficiencies should not be used, without providing any supporting rationale.
- FR agreed with the proposal and stated that specific loads are not relevant for setting generic BAT-AELs concerning the whole chemical industry, but should be considered in relation to diffuse emissions. Moreover, FR asked to pay special attention to those BAT-AELs in the existing chemical BREFs that have been expressed as specific loads.
- NO partly agreed with the proposal and stated that the production capacity should be taken into consideration.
- UK partly agreed with the proposal and recognised that for combined waste gas streams it was the only practicable option. However, for single process gas streams BAT-AEPLs expressed as specific loads should be considered.
- There were no alternative proposals.

#### EIPPCB assessment

- The TWG broadly supported the proposal.
- For some parameters in the CWW BREF, BAT-AELs were expressed in concentrations in combination with an abatement efficiency to take into account that some waste water streams carry high pollutant loads (e.g. for COD/TOC). Similar solutions could be envisaged for waste gas streams with high pollutant loads, if supported by the data collection and deemed appropriate by the TWG.
- Diffuse emissions are addressed in Section 2.2.2.2. Setting BAT-AELs in specific loads for diffuse emissions requires looking at specific production processes; this would not be in line with the generic approach envisaged for the WGC BREF.
- A number of BAT-AEPLs in the existing chemical BREFs are expressed as specific loads. In some cases, there might be good reasons to express BAT-AEPLs as specific loads, but in the existing chemical BREFs it seems that this decision was sometimes taken solely on the basis of data availability.
- In principle, the production capacity seems of a lesser relevance for the WGC BREF, as the focus is on waste gas streams. Nevertheless, a positive correlation between the production

capacity and the pollutant load in the waste gases can usually be expected.

• The original EIPPCB proposal suggested **generally** expressing BAT-AEPLs for emissions to air in concentrations, abatement efficiencies, or in combinations thereof. This leaves room for a flexible approach to suit particular circumstances.

#### EIPPCB proposal

• Keep EIPPCB Proposal 19 unchanged:

**EIPPCB** Proposal 19: to *generally* express **BAT-AEPLs** for emissions to air in concentrations, abatement efficiencies, or in combinations thereof.

• This issue is not proposed for discussion at the KoM.

## 5.3.2 Averaging periods for BAT-AEPLs

The monitoring of emissions from chemical installations is often carried out on a periodic basis and ELVs often refer to short-term averages. Therefore, the BAT-AELs for emissions to air in the CAK and LVOC BREFs which are expressed in concentrations refer to short-term averages (i.e. as an average over the sampling period in the case of periodic measurements or as a daily average in the case of continuous measurement).

#### Original EIPPCB proposal

EIPPCB Proposal 20: to express BAT-AEPLs for emissions to air as short-term averages (i.e. as an average over the sampling period in the case of periodic measurements, or as a daily average in the case of continuous measurement).

#### Summary of initial positions

- 8 out of 18 IPs agreed with the proposal, 7 partly agreed and 3 disagreed.
- 3 TWG members raised the issue of giving special consideration to batch processes because emissions will vary during the batch cycle (CEFIC, ORGALIME, UK).
- 2 TWG members raised the issue that emission measurements taken over long time periods should not be used to set short-term BAT-AELs because the long time periods may have had the effect of smoothing out short-term fluctuations in emissions (Fertilizers Europe, CEFIC).
- The main concern of those who disagreed with the proposal was that BAT-AEPLs should generally be expressed as long-term averages, e.g. monthly or yearly averages. The use of monthly averages in the REF BREF was given as an example (FI, PL, UK).
- CZ partly agreed with the proposal and suggested expressing BAT-AEPLs as short-term averages for periodic measurements and long-term averages for continuous measurements.

#### EIPPCB assessment

- The TWG is divided in its opinion on the proposal.
- The OFC BREF for the batch production of organic chemicals sets BAT-AELs for emissions to air and specifies that the averaging period relates to the emission profile. A similar approach could be envisaged in the WGC BREF.
- Expressing BAT-AEPLs as short-term averages will require collecting short-term emission data. These data should refer to normal operating conditions.
- BAT-AEPLs expressed as long-term averages could be challenging for implementation, as measurements are usually only carried out periodically and with a low frequency. This is particularly relevant in the case of batch production.
- Expressing BAT-AEPLs as short-term averages for periodic measurements and as long-term averages for continuous measurements will increase the workload of the TWG, as two different ranges would need to be set. Moreover, the approach might lead to different levels of stringency, as the datasets of periodic versus continuous measurements might not be equivalent (e.g. when continuous measurements are more frequently used in combination with more advanced abatement techniques).
- Similarly to EIPPCB Proposal 19 (see Section 5.3.1), it might be desirable to leave some room for a flexible approach to suit particular circumstances.

**EIPPCB** proposal

• Amend EIPPCB Proposal 20 as follows:

EIPPCB Proposal 20: to *generally* express BAT-AEPLs for emissions to air as short-term averages (i.e. as an average over the sampling period in the case of periodic measurements or as a daily average in the case of continuous measurement). In the case of batch production, to consider the emission profile when deciding on the averaging periods of the BAT-AEPLs.

# 5.4 Grouping of substances and differentiation within groups of substances

The emissions to air from the chemical industry contain a significant number of individual inorganic substances and a very large number of individual organic substances. In many cases, these can be considered as groups of substances which present a similar environmental risk and require similar abatement techniques, because they have similar toxicological, physical and/or chemical properties.

The task of collecting data and setting BAT-AEPLs for the WGC BREF could be simplified by dealing with groups of substances, rather than individual substances. This approach will be particularly appropriate when an abatement technique is applicable to all of the individual substances in the group.

On the other hand, some differentiation might be needed for certain groups of substances depending on their toxicity. For example, more stringent BAT-AEPLs could be set for the surrogate parameters dust and TVOC, if very toxic substances such as CMR substances are present in the waste gas. This has been the case for dust emissions from lead oxide production, where a BAT-AEL of  $< 0.1-0.2 \text{ mg/Nm}^3$  has been set in the LVIC-S BREF<sup>5</sup>. Other examples can be found in the LVOC BREF, where the BAT-AELs for TVOC emissions to air from the production of TDI/MDI and EDC/VCM are considerably lower than those set for other processes.

#### **Original EIPPCB proposal and request**

EIPPCB Proposal 21: to collect data and set BAT-AEPLs for groups of substances, rather than individual substances, when it is possible and practicable to do so (e.g. for dust,  $NO_X$ ,  $SO_X$ , and TVOC).

EIPPCB Request 7: TWG members are asked to provide their views on which substances, if any, could be grouped together to simplify the data collection and the setting of BAT-AEPLs and how this could be done. A rationale should be provided to support each proposed group of substances.

EIPPCB Request 8: TWG members are asked to provide their views on whether and how BAT-AEPLs should be differentiated for certain groups of substances due to their toxicity (e.g. for dust and TVOC). A rationale should be provided to support each proposed differentiation.

#### Summary of initial positions

#### **EIPPCB Proposal 21 and EIPPCB Request 7:**

- 6 out of 18 IPs agreed with the proposal, 12 partly agreed and 1 disagreed.
- Most of those who partly agreed stated that they agreed with the grouping of some substances, but disagreed with the grouping of others.
- The main concerns of those who partly agreed with the proposal were as follows:
  - Grouping should only be used where there is a common method of abatement for the group (ePURE, NL).
  - Grouping should only be used where there is a standard monitoring method for the group (BE, ePURE, NL).
  - Data should also be collected for individual substances where it is available (DE). This concern was also raised by EEB who disagreed with the proposal.
  - Grouping should only be carried out after data collection (DE, IT).
  - Some substances or groups of substances should be treated separately (e.g. lead, CMR substances, SVHCs, PM<sub>10</sub> and PM<sub>2.5</sub>) (EEB, ePURE, FR, IT, NL, PL, UK).
  - Grouping of CMR, SVHC and heavy metals is not supported by CEFIC
- AT proposed to add criteria for the grouping of substances, i.e. when they present a similar environmental risk and require similar abatement techniques, because they have similar

physical and/or chemical properties.

#### **EIPPCB Request 8:**

- There was general support for the principle of differentiating BAT-AEPLs for certain substances/groups of substances based on their toxicity. A number of proposals were made, though none had a detailed rationale:
  - lead oxide dust should be differentiated from other dusty compounds (CEFIC);
  - benzene should be differentiated from TVOC (EEB);
  - PCDD/F should be differentiated from TVOC (EEB);
  - PCBs should be differentiated from TVOC (EEB);
  - CMR substances and SVHCs should be differentiated from TVOC (ePURE, ES, FR, NL);
  - Hg should be differentiated from metals class I (ES).
  - However, there was some disagreement with differentiation:
  - PM<sub>10</sub> and PM<sub>2.5</sub> should not be differentiated from total dust (CZ);
  - differentiation should be a decision for national legislation (apart from CMR substances) (FR).

#### EIPPCB assessment

#### **EIPPCB Proposal 21 and EIPPCB Request 7:**

- The TWG broadly supported the use of the well-established groupings of substances such as dust, NO<sub>X</sub>, PCDD/Fs, SO<sub>X</sub> and TVOC.
- Generally, the grouping of substances requires that similar or the same abatement techniques are used for all substances of the group. This is possible when the substances show similar physico-chemical properties.
- Moreover, the grouping of substances is facilitated if a common monitoring method is available. This method could consist of measuring a sum parameter such as TVOC or of summing up the concentrations of individual compounds obtained with a common method such as gas chromatography.
- The EIPPCB proposals for inclusion of substances as KEIs mostly refer to individual substances, with the exception of dust, gaseous chloride/fluoride, lead and its compounds, nickel and its compounds, NO<sub>X</sub>, SO<sub>X</sub>, PCDD/Fs and TVOC (see Section 4.2).
- It does not seem to make sense to collect separate data for well-established groups of substances (e.g. the concentrations of individual PCDD/F congeners instead of the toxic equivalents).

#### **EIPPCB Request 8:**

• The idea to potentially set differentiated BAT-AEPLs based on their toxicity was generally supported for the parameters dust and TVOC. In order to do so, relevant data would need to be collected (e.g. if the dust contains a significant proportion of metals such as lead or if the TVOC is composed to a significant degree of CMR substances). If this approach is followed, the proposed threshold values for dust and TVOC will probably also require some differentiation (see Section 4.3).

#### EIPPCB proposal

• Amend EIPPCB Proposal 21 as follows:

#### **EIPPCB Proposal 21:**

- to collect data and set BAT-AEPLs for well-established groups of substances, rather than for individual substances, when it is possible and practicable to do so (e.g. i.e. for dust, gaseous chloride/fluoride, lead and its compounds, nickel and its compounds,  $NO_X$ ,  $SO_X$ , PCDD/Fs and TVOC).

- in all other cases to collect data on individual substances and to decide at a later stage of the drawing up of the WGC BREF if BAT-AEPLs for other groups of substances could be set, taking into account whether the same or similar abatement techniques are used and whether a common monitoring method is available.

- to collect data on the composition and toxicity of the compounds included in the parameters dust and TVOC and to decide at a later stage of the drawing up of the WGC BREF if (and how) differentiated BAT-AEPLs should be set.

# 5.5 Questionnaire for gathering plant-specific data and information

#### **Original EIPPCB request**

EIPPCB Request 9: TWG members are asked to provide their views on the collection of data and information via plant-specific questionnaires by filling in the corresponding cells in Document 3. The views expressed should address:

- the process for developing the questionnaire;
- the content and format of the questionnaire;
- the process for collecting data via the questionnaire;
- the quality assurance of the collected data.

#### Summary of initial positions

- 17 TWG members submitted responses.
- The responses on the process for developing the questionnaire were:
  - after the KoM the data collection rules should be defined and a subgroup of the TWG should be set up to develop the questionnaire (EEB, FR, UK);
    - each installation should only have to submit one questionnaire (AT);
  - a draft questionnaire should be sent to the whole TWG for comment (UK);
  - the questionnaire should be tested by a small number of installations (AT, DK, UK).
  - The responses on the content and format of the questionnaire were as follows:
    - Some contextual data on plant capacities will be needed (perhaps as ranges) (AT).
    - Some contextual data on the production process and products will be needed (AT).
    - Cross-media effects associated with the use of techniques should be included (AT, BE).
    - The statistical methods that are used should be clearly defined so that the influence of various factors can be understood (e.g. the number of emission points). The six sigma methodology could be used (CEFIC, Fertilizers Europe).
    - Reference conditions should be clearly defined (CZ, DE).
    - Only data for normal operating conditions should be collected (DE).
    - Focus on abatement technique, efficiency and final emission. Include any non-operational time) (ePURE, NL).
    - It should be specified if the data relate to a source with an abatement technique and, if so, which. Focus on setting BAT-AELs for processes that do not have abatement equipment fitted (ES).
    - Data on process/plant-specific BAT should be collected (IT).
    - Mass balance data may be needed in addition to emission monitoring data for large sites that are geographically spread out (NO, ORGALIME).
    - Which operating conditions are OTNOC should be defined before the data collection is started (DE, CEFIC).
- The responses on collecting data via the questionnaire were:
  - the process set out in the BREF Guidance should be followed (UK);
  - sufficient time should be allowed (i.e. 6 months) for the data collection due to the complexity of the WGC BREF and the many involved players and installations (DE, CEFIC).
- The responses on the quality assurance of the collected data were:
- Member States should distribute and collect questionnaires and carry out a quality assurance check before loading data onto BATIS (AT, UK).

#### EIPPCB assessment

- The process of using a questionnaire to collect plant-specific information has become a wellestablished practice in the Sevilla process. This includes the preparation of a draft questionnaire and the commenting on it by the TWG, the testing of the questionnaire by a number of participating plants, as well as the distribution, collection, quality check and submission by Member States' representatives.
- The comment on the statistical tools seems to refer more to the data analysis than to the questionnaire development and the data collection.
- Data should be collected from plants with and without abatement equipment. BAT-AELs will be set at a later stage of the drawing up of the WGC BREF.
- The proposed approach for the WGC BREF is to focus on channelled emissions from individual emission sources where end-of-pipe abatement techniques are used (see Section 2.2.2.1). Mass balances typically refer to an installation as a whole and often aim at including diffuse emissions.
- Section 4.1 of Document 2 of the call for IPs contained a list of contextual information to be

collected, following Section 5.4.4 of the BREF Guidance<sup>10</sup>. This list, enlarged with the suggestions from the TWG members mentioned in this and other sections of the BP, could serve as starting point for the development of the questionnaire.

- 3 months should be sufficient for operators to complete the questionnaire and 1 month for MSs for cross-checking and validation of the information.
- OTNOC and batch cycle times will also have to be taken into account.

#### EIPPCB proposal

- To follow the established BREF process for the collection of plant/installation-specific data via questionnaires including the following:
  - the preparation of the draft questionnaire by the EIPPCB followed by the commenting of the whole TWG, if necessary in several iterations;
  - the organisation of a questionnaire development workshop to finalise the questionnaire;
  - the testing of the draft final questionnaire by a selected (small) number of plants/installations;
  - the preparation of the final questionnaire by the EIPPCB;
  - the distribution of the final questionnaire by Member States' representatives to the participating plants/installations;
  - the filling in of the questionnaires by the plants/installations;
  - the collection of the filled-in questionnaires by Member States' representatives;
  - the quality check of the filled-in questionnaires by Member States' representatives (possibly with the help of a checklist that the TWG/EIPPCB could have developed);
  - the submission of the quality-checked questionnaires to the TWG via BATIS.
- To agree on the following tentative time schedule:
  - <u>31 October 2017</u>: TWG to provide proposals of well-performing plants/installations for the identified subsectors/products/processes for the data collection.
  - <u>30 November 2017</u>: EIPPCB to finalise the list of subsectors/products/processes that require complementary worksheets to the generic questionnaire and the list of well-performing plants/installations and to check their completeness.
  - <u>22 December 2017</u>: EIPPCB to issue the first draft questionnaire.
  - End-January 2018: Workshop on the questionnaire finalisation.
  - <u>End-February 2018</u>: EIPPCB to issue the final questionnaire and distribution to the participating plants/installations by Member States.
  - <u>End-May 2018</u>: Participating plants/installations to submit filled-in questionnaires to Member States for cross-checking and validation.
  - <u>End-June 2018</u>: Member States to post validated questionnaires onto BATIS.
- To design the questionnaire to target individual emission sources.
  - To collect information via questionnaire, *inter alia*, on the following:
  - the origin of the waste gas stream (i.e. sources);
    - the characteristics of the untreated waste gas stream (e.g. flow rate, pollutant load, presence of substances that may interfere with the waste gas treatment technique/system);
    - the waste gas treatment technologies and the way they are designed, built, maintained, and operated;
    - cross-media effects related to the use of waste gas treatment techniques (e.g.  $NO_X$  emissions from the use of thermal oxidisers);
    - the emission levels in concentrations (e.g. minimum/maximum values, averages, percentiles, emission profiles);
    - the abatement efficiency of the waste gas treatment techniques;
    - the monitoring (e.g. analytical methods, frequency, sampling period, averaging period);
    - the relevant reference conditions (e.g. oxygen content, humidity, temperature, flow rate) for the abated/unabated emissions;
    - the plant/process conditions (e.g. normal or other than normal operating conditions, percentage of capacity at which the plant/process is operating, number of operating hours per year, continuous or batch production).

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# 5.6 Confidentiality issues

BAT-AEPLs must be based on information that is available to the whole TWG. The review of the LVOC BREF was complicated by the fact that many operators claimed that some of the provided data was commercially confidential, in particular data on the process conditions and the production volumes, as well as the consumption of energy and raw materials. The EIPPCB expects that confidential business information and sensitive information under competition law will generally not be an issue for the WGC BREF because the information exchange will focus on emission data that are in the public domain according to the Aarhus Convention (see Section 5.3 of the BREF Guidance<sup>10</sup>). Some of the relevant contextual information might not necessarily be in the public domain (see Section 5.1), but experience from previous BREF reviews shows that confidentiality should not be a major issue for the drawing up of the WGC BREF, as the focus is on abatement techniques and emission levels.

Information on the actual production volumes, capital costs and running costs of the chemical production processes should generally be excluded from the data collection, so that operators do not have to supply any confidential data. This will allow all questionnaire responses to be posted directly onto BATIS (after the appropriate quality checks carried out by Member States), including the names of the plants (though plant names will generally be anonymised in the BREF itself, except for example plants mentioned in the chapter on 'Techniques to consider in the determination of BAT'). However, there may still be some confidential business information and sensitive information under competition law that is needed and useful for the drawing up the WGC BREF and these will deserve special considerations.

#### **Original EIPPBC proposal and request**

EIPPCB Proposal 22: to design the questionnaire(s) in a way that avoids requesting confidential data so that all data provided by operators can be posted directly onto BATIS.

EIPPCB Request 10: TWG members were asked to provide examples of information that might be necessary for the drawing up of the WGC BREF and that might also be considered confidential/sensitive information.

#### Summary of initial positions

- 11 out of 15 IPs agreed with the proposal, 3 partly agreed and 1 disagreed (2 TWG members disagreed but their comments indicate that they actually agreed (ePURE, NL)).
- The main arguments put forward by those who partly agreed were as follows:
  - The data should be coded so that the operator cannot be identified (PL). The same issue was raised by CZ, who disagreed with the proposal, and who also proposed that the Member State should not be identified.
  - Although confidential data will generally not be needed, they might be needed for some specific sectors/substances (BE, FR). The same issue was raised by UK who agreed with the proposal.
- 2 TWG members mentioned that the experience of handling confidentiality issues in the STS BREF review might be applied to the WGC BREF review (i.e. by marking relevant cells) (EEB, UK).

#### EIPPCB assessment

- The TWG broadly supported the proposal.
- The transparency of the information exchange was discussed by the IED Article 13 forum on 6 June 2013. Since then, the established practice in the Sevilla process is to post the non-confidential questionnaire versions in BATIS including the plant name and location (e.g. for the FDM, STS, WI and WT BREF reviews). This ensures transparency and allows the cross-checking of the quality of the information provided.
- Although none of the TWG responses gave any examples where confidential data might be needed, at this stage it may not be possible to rule this out completely for **some specific subsectors/products/processes**.
- In some cases, it might be possible to avoid the collection of confidential data by using

drop-down menus with predefined ranges for the relevant parameter.

- During the review of the FDM and STS BREFs, the respective TWGs agreed to collect data with questionnaires in which cells with confidential data were marked with a different background colour. The non-confidential version of the questionnaire was subsequently posted in BATIS while the confidential version was submitted directly to the EIPPCB.
- The TWG should be well aware that confidential information is of limited value when deciding on BAT, and in particular on BAT-AEPLs.

#### EIPPCB proposal

• Amend EIPPCB Proposal 22 as follows:

EIPPCB Proposal 22: to design the questionnaire in a way that avoids requesting confidential data so that all data provided by operators can be posted directly onto BATIS. If the TWG agrees during the questionnaire development that confidential data are exceptionally necessary in the case of some specific subsectors/products/processes, the corresponding cells in the questionnaire will be marked with a different background colour. The questionnaire version including confidential data will be submitted directly to the EIPPCB and not posted in BATIS.

## 5.7 Other proposals for the data collection

Original EIPPCB request
In addition to the EIPPCB Proposals 18-22 and to the EIPPCB Requests 7-10, the TWG was asked
if they had any other proposals for the data collection including a rationale.

#### **Summary of initial positions**

- 6 TWG members provided additional proposals, including CEFIC and UK providing information in background documents posted on BATIS:
  - Forum > Common Waste GAS Treatment in the Chemical Sector > Call for initial positions ... > CEFIC > CEFIC opinion on certain topics;
  - Forum > Common Waste GAS Treatment in the Chemical Sector > Call for initial positions ... > United Kingdom > Covering letter.
- DE, FR, UK, CEFIC, and EUROMETAUX provided proposals regarding the development of the questionnaire. These are assessed in Section 5.5.
- DE and CEFIC suggested that which operating conditions are OTNOC should be defined before data collection is started. This is assessed in Section 5.5.
- DE and CEFIC suggested giving sufficient time (i.e. 6 months) for the data collection due to the complexity of the WGC BREF and the many involved players and installations. This is assessed in Section 5.5.
- DE and CEFIC suggested holding a workshop on the data evaluation.
- CEFIC suggested to issue two formal drafts of the WGC BREF (and not only one) (CEFIC);
- EEB suggested collecting information on techniques to reduce the levels of cadmium and other heavy metals in fertilisers.

#### **EIPPCB** assessment

- The proposals on the development of the questionnaire are addressed in Section 5.5.
- The proposal to collect information on techniques to reduce the levels of cadmium and other heavy metals in fertilisers is assessed in Section 2.4.
- A big data collection is expected including at least several hundred installations. Issues such as the generic versus more specific approaches to set BAT-AELs, batch/continuous production, and combined waste gas treatment systems will likely need detailed technical discussions to reach a consensus in the TWG. A workshop on data evaluation may facilitate the process to draft and comment on the WGC BREF and the BAT conclusions.
- A second draft might be an option. Ideally, the workshop on data evaluation will help to clarify the most important issues, so that a second draft might no longer be necessary.

#### **EIPPCB** proposal

• To organise a workshop on data evaluation.

# 5.8 Selection of plants/installations for the plant-specific data collection

The experience gained from other BREF reviews has shown that the drawing up of a list of plants/installations that could take part in the data collection via questionnaire takes time, e.g. due to the need to send requests to operators, waiting for responses, and finally selecting the most suitable plants/installations. For this reason, and in the spirit of front-loading the work, it was therefore recommended that TWG members start the process of preselecting plants/installations for the data collection in advance of the KoM.

Due to the size of the chemical sector and the number of emission sources, it will not be feasible to collect and analyse data from all emission sources. The challenge will thus be to select a representative sample of 'well-performing' plants/installations.

# Original EIPPCB request EIPPCB Request 11: TWG members are asked to propose plants/installations operating wellperforming waste gas treatment systems for the data collection. Summary of initial positions 7 TWG members proposed 348 plants/installations: AT (62), BE (163), CZ (32), DK (39), ES (11), IT (7), NL (1), PL (15) and SE (18). The proposed plants/installations cover all of the IED Annex I chemical activities: 4.1 Production of organic chemicals (202); 4.2 Production of inorganic chemicals (88); 4.3 Production of N-, P-, K-based fertilisers (16); 4.4 Production of plant protection products or of biocides (14); 4.5 Production of pharmaceuticals products including intermediates (43); 4.6 Production of explosives (6). The proposals from CZ and PL do not contain information on the plant/installation name and location.

• Some TWG members indicated that they would provide a list of plants/installations at a later date, for example after the KoM when the scope has been clearly defined (BE, DE, FR, NL, UK).

#### EIPPCB assessment

- The TWG has already provided some of the information that was requested and has agreed to provide more information later.
- The information provided by CZ and PL will be of limited use without information on the plant name and location (see Section 5.6).
- The selection of the plants/installations for the data collection depends to a significant extent on the decisions taken at the KoM with respect to the scope (see Section 2) and the KEIs (including the emission thresholds) (see Section 4).
- The selection of the plants/installations for the WGC data collection should take into account the list of subsectors/products/processes involving the use of process furnaces/heaters (see Annex 2 in Section 7.2) and the list of candidate subsectors/products/processes that might require a dedicated approach (see Annex 3 in Section 7.3).

#### EIPPCB proposal

- TWG members to complete their proposals of plants/installations operating wellperforming waste gas treatment systems (including best performing waste gas treatment systems) to be included in the data collection by 31 October 2017.
- EIPPCB to finalise the list and to check its completeness by 30 November 2017. This might imply further requests for information to individual TWG members.

## 6 TECHNIQUES TO CONSIDER IN THE DETERMINATION OF BAT AND EMERGING TECHNIQUES

As a starting point, the EIPPCB proposes to review the information in Chapter 3 of the CWW BREF on 'Techniques to consider in the determination of BAT' (i.e. 'BAT candidates') and particularly the information contained in Section 3.5.1 on 'Individual waste gas treatment techniques'. Moreover, the information in Section 5.2 of the CWW BREF on emerging techniques for waste gas treatment should also be reviewed.

The CWW BREF provides detailed information on individual waste gas treatment techniques, including:

- technical descriptions;
- abatement efficiencies and emission levels;
- consumption levels;
- applicability issues;
- economics.

CEFIC has provided information on the most relevant abatement techniques used within the chemical industry<sup>46</sup>. The UBA(DE) report summarises the most frequent types of waste gas treatment systems installed in chemical installations in Germany.

#### **Original EIPPCB request**

Request 12: TWG members are asked to evaluate the techniques to consider in the determination of BAT and the emerging techniques in the current CWW BREF and to indicate:

- any obsolete techniques, i.e. that are not (or no longer) used in the chemical sector;
- which techniques are considered to be the most important;
- which techniques require updating (and which part of the information, e.g. description, emission/consumption levels, applicability, economics);
- what information can be provided;
- any relevant technique that is missing ('BAT candidate' or emerging technique).

#### **Summary of initial positions**

- No obsolete techniques were identified.
- CEFIC indicated the 10 most common waste gas treatment techniques, out of a list of 38 techniques.
- DE proposed to check and update all information on the waste gas treatment techniques of the CWW BREF based on the results of the data collection.
- Several TWG members indicated a need to update specific chapters in the CWW BREF (CZ, EPURE, NL, NO, ORGALIME).
- Several TWG members proposed BAT candidates or emerging techniques, but no specific information has been provided yet:
  - low-NO<sub>X</sub> and ultra-low-NO<sub>X</sub> burners (CEFIC, ES);
  - catalytic filtration using GORE micropollutant membranes (EEB);
  - adsorption modules using GORE SPC (mercury) modules (EEB);
  - fuel gas systems burning hydrocarbon by-products (UK).
- DE proposed a number of (management) techniques that are required as a precondition to achieve an efficient operation of the abatement techniques.

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<sup>&</sup>lt;sup>46</sup> BATIS Forums > Waste Gas Treatment in the Chemical Sector > 03 Call for initial positions > 02 TWG members initial positions for the drawing up of the WGC BREF > CEFIC > Cefic evaluations on abatement techniques <u>http://eippcb.jrc.ec.europa.eu/batis/console/forumIndex.jsp?fuseAction=forum\_showPost&forumID=120312&postID=121717</u> &readPost.

#### **EIPPCB** assessment

- The waste gas treatment techniques described in Section 3.5.1 of the CWW BREF seem to be a good starting point for the drawing up of the WGC BREF.
- The information on emerging techniques for waste gas treatment described in Section 5.2 of the CWW BREF is almost 10 years old and might be outdated.
- The information and data collection should help in updating the techniques described in the CWW BREF, in particular on the achieved environmental performance and operational data.
- In general, the EIPPCB proposes to use as far as possible cross-references to the CWW BREF and other more specific chemical BREFs and to only include updates where necessary (see EIPPCB Proposal 14 in Section 3).
- The additional techniques proposed by the TWG can be considered. Related information should be submitted in the standard 10-heading format.
- The BREF Guidance foresees a general timeline of 6 months after the KoM for submitting information (see Section 1.2.3 of the BREF Guidance)<sup>10</sup>. However, a list of candidate techniques is needed at an earlier stage to develop the questionnaire (e.g. for their use in drop-down menus).

#### **EIPPCB** proposal

- To include in the information collection the 4 following techniques as potential BAT candidates:
  - low-NO<sub>X</sub> and ultra-low-NO<sub>X</sub> burners;
  - catalytic filtration using GORE micropollutant membranes;
  - adsorption modules using GORE SPC (mercury) modules;
  - fuel gas systems burning hydrocarbon by-products.
- To review the information on emerging techniques in Section 5.2 of the CWW BREF.
- TWG members to supply a list of candidate BAT and emerging techniques by 31 October 2017.
- EIPPCB to consolidate the list of candidate BAT and emerging techniques by 30 November 2017.
- TWG members to supply information on candidate BAT and emerging techniques using the standard 10-heading format by the end of March 2018.

# 7 ANNEXES

# 7.1 Annex 1: Overview of IPs on the scope of the WGC BREF

No.	scope proposal	AT	BE	CEFIC	cz	DE	DK	EEB	EPURE	ES	EUROALLI AGES	EUROFER	EUROMET AUX	Fertilizers Europe	FI	FR	π	NL	NO	ORGALIME	PL	PT	SE	ик	countif yes	countif partly	countif no	:
	To cover all chemical installations falling under the scope of the IED (unless specifically excluded by other proposals). However, depending on the decisions taken by the TWG on KEIs as well as on the quality and quantity of the data and	partly	yes	yes	partly	yes	partly	partly	partly	partly		partly		yes	partly	partly	partly	partly	yes	yes	partly	partly	yes	partly		7 :	14	0
	2 To exclude CAK activities.	yes	yes	yes	yes	yes	yes	partly	partly	yes				yes	yes	yes	yes	partly	yes	partly	yes	yes	partly	yes	:	15	5	0
	To include channelled emissions to air except for those substances for which BAT-AELs have been set during the review of other chemical BREFs under the IED. This includes emissions from individual and combined waste gas	partly	yes	yes	yes	yes	partly	partly	no	partly			yes	yes	yes	yes	partly	no	yes	yes	yes	partly	partly	partly	:	11	8	2
	To exclude the prevention/reduction of diffuse emissions to air.	no	no	yes	yes	partly	no	no	no	partly				yes	partly	no	partly	no	yes	yes	yes	yes	no	no		7	4	9
	5 To exclude emissions of noise and odour.	partly	yes	yes	yes	yes	yes	partly	yes	partly				yes	yes	yes	yes	yes	yes	yes	yes		yes	yes		16	3	0
	To include channelled emissions to air from the large volume production of organic chemicals except for the substances produced in those processes for which BAT-AELs have been set during the review of the LVOC BREF.	partly	yes	yes	yes	partly	yes	partly	partly	no				yes	yes	partly	partly	partly	yes	yes	yes	partly	partly	partly		9 :	10	1
	To exclude emissions from the storage, transfer and handling of materials.	partly	partly	yes	yes	yes	no	no	partly	partly				yes	yes	no	yes	partly	yes	partly	yes	yes	no	partly		9	7	4
	To exclude emissions from the combustion of fuels covered by the LCP BREF or the MCP Directive.	partly	yes	yes	yes	yes	yes	partly	yes	yes				partiy	yes	yes	yes	yes	yes	yes	yes	yes	partly	yes	:	16	4	0
	To include emissions from process furnaces/heaters used in the chemical industry, with the exception of the process furnaces/heaters used in lower olefins and ethylene dichloride crackers, which are covered by the LVOC BREF.	partly	partly	yes	yes	yes	partly	partly	partly	partly				partly	yes	yes	yes	partly	yes	yes	partly		yes	partly		9 :	10	0
1	To exclude emissions from the incineration of waste covered by the WI BREF.	yes	yes	yes	yes	yes	yes	partly	yes	yes				yes	yes	partly	yes	yes	yes	yes	yes	yes	yes	yes	:	18	2	0
1	1 To include the thermal treatment of gaseous effluents.	partly	yes	partly				no	yes	yes	yes	yes	yes	yes	partly	partly	partly	yes	:	14	5	1						
1	2 To exclude emissions from cooling systems.	yes	yes	yes	yes	yes	partly	partly	yes	yes				yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	partly	:	17	3	0
1	To include the production of sulphuric acid, including when sulphuric acid is produced in NFM plants.	partly	yes	partly	yes	по	yes	yes	yes	yes	по	no	partly	partiy	partly	partly	yes	yes	yes	yes	yes		yes	no	:	12	6	4

NB: green (yes), yellow (partly), red (no)

# 7.2 Annex 2: List of subsectors/products/processes involving the use of process furnaces/heaters

NO.	TWG	CONSOLIDATED PROPOSAL 'PRODUCT'	CONSOLIDATED PROPOSAL 'PROCESS'	PROCESS/ PRODUCT TYPE	BREF	BREF CHAPTER/SE CTION	REMARKS
1.	ePURE	Acetaldehyde	NI	Product	LVOC	2.1.2.2.1	Thumbnail description
2.	Fertilizers Europe, IT, NL, PL, UK	Ammonia	Steam reforming	Product	LVIC-AAF	2	NI
3.	CEFIC, PL	Aromatics	Heating (e.g. benzene/toluene fractionation)	Product	LVOC	4.2.2.3	Xylene fractionation
4.	CZ	Aromatics	Direct heating process: anthraquinone, anthracene	Product	N	NI	Description of the product not covered by the LVOC BREF: anthraquinone, anthracene
5.	UK	Calcium carbide	Furnaces, drying and oxygen heating	Product	LVIC-S	7.2	Illustrative chapter
6.	CEFIC	Carbon black	Drying, preheating	Product	LVIC-S	4	ΝΙ
7.	ES	Explosives	Drying	Sector	SIC	6.4	Additionally covered by the OFC BREF
8.	ES, IT	Fertilizers	Drying	Product	LVIC-AAF	7, 8, 9, 10	Fertilisers
9.	CEFIC	Fluorspar	Drying, kiln	Product	LVIC-S	7.1	Illustrative chapter

Consolidated list of processes/products which involve the use of process furnaces/heaters, ordered by 'Consolidated Proposal Product'

10.	CEFIC. UK	Hydrofluoric acid	Kiln	Product	LVIC-AAF	6	NI
11.	CEFIC, CZ	Hydrogen	Steam reforming	Process	NI	NI	Intermediate
12.	CEFIC	Hydrogen peroxide	Steam reforming	Product/proces s	LVOC	12	NI
13.	CEFIC	Lower olefins	Preheating (steam cracker naphtha hydrofining), catalyst regeneration/drying unit	Product	LVOC	3	NI
14.	Fertilizers Europe, NL, UK	Nitric acid	NI	Product	LVIC-AAF	3	NI
15.	PL	Olefin metathesis?	NI	Process	LVOC	3.5	Lower olefins (emerging techniques)
16.	ES, IT, UK	Phosphates	Drying	Product	LVIC-AAF	7, 10	NPK, superphosphates; additionally covered by LVIC-S BREF Chapter 6 'Inorganic phosphates'
17.	UK	Phosphoric acid	NI	Product	LVIC-AAF	5	NI
18.	CEFIC, CZ, ES, IT	Pigments	Drying, calcination	Product	SIC	6.1	Except titanium dioxide (LVIC-S)
19.	UK	Polymers	Drying	Sector	POL	NI	NI
20.	CEFIC, CZ	Polymers/polycarbonate	Preheating, heating	Product	POL	NI	Polycarbonate, polyester; description of process/product not covered by the POL BREF

21.	CEFIC	Polymers/polyethylene	Catalyst activation furnace	Product	POL	3.2.3	High-density polyethylene (HDPE)
22.	UK	Polymers/polyphenyls	NI	Product	POL	NI	Polyphenyls; description of process/product not covered by the POL BREF
23.	CEFIC, ES, PL, UK	Sodium silicate	Melting, tank furnaces and revolving hearth furnaces	Product	LVIC-S	7.8	Illustrative chapter
24.	Fertilizers Europe	Potassium sulphate	NI	Product	LVIC-S	7.16	Illustrative chapter
25.	UK	Precious metal salts	NI	Product	SIC	NI	Description of process/product not covered by the SIC BREF
26.	UK	Silicon carbide	Furnaces, dryers and oxygen heaters	Product	LVIC-S	7.9	Illustrative chapter
27.	UK	Soda ash	NI	Product	LVIC-S	2	NI
28.	CEFIC, UK	Sulphuric acid	Sulphur combustion or roasting of sulphidic minerals in the manufacturing of sulphuric acid	Product	LVIC-AAF	4	NI
29.	CEFIC	Synthesis gas	Steam reforming	Process	LVOC	2.1. 177 measuremen ts. Main activities are 'basic organic chemicals' and 'basic inorganic chemicals'.	Oxygen-containing compounds (thumbnail description)

						Only few data are available other 2	
30.	PL	Carboxylic acids, terephthalic acid	Process furnaces/heaters	Product	LVOC	2.1.2.3.8	Thumbnail description
31.	CEFIC, UK	Titanium dioxide	Drying	Product	LVIC-AAF	3	Illustrative chapter
32.	CEFIC	NI	Preheating toluene disproportionation	Process	LVOC	4.2.2.3 4.2.2.4.2	Xylene fractionation toluene disproportionation
33.	PL	NI	Steam cracking: naphtha hydrofining	Process	LVOC	4.2.2	NI
NB: NI = No	) information provi	ided.	·	·			

# 7.3 Annex 3: List of candidate subsectors/products/processes that might require a dedicated approach

Consolidated list of candidate subsectors/products/processes that might require a dedicated approach when defining BAT and BAT-AEPLs (which include BAT-AELs), ordered by 'IED activity name'. TWG members used various different names to describe the same subsectors, product or process. The list has been consolidated by using the name that is used in an existing BREF. 'Generic' means that no rationale was provided.

NO.	TWG	Consolidated proposal	Consolidated justification	Process/product type	IED activity name	IED	BREF (in the scope)	BREF section	BREF heading: Product
1.	AT	Cement additives	Higher emission levels and/or loads: UBA(DE)	Product class	NI	NI	NI	NI	NI
2.	AT	Flame retardants	Higher emission levels and/or loads: UBA(DE)	Product class	NI	NI	NI	NI	NI
3.	AT	Cyclohexane oxidation	Specific provisions in MS legislation (benzene)	Process	Oxygen-containing hydrocarbons	4.1b	LVOC	2.12.2.3	Cyclohexanone/ol
4.	ES, CEFIC	Urea	Generic	Product	Amides	4.1d	LVIC-AAF	8	Urea
5.	CEFIC	Aniline	Generic	Product	Nitrogenous compounds	4.1d	LVOC	2.1.4.2. 4	Aniline
6.	CEFIC	Melamine	Generic	Product	Nitrogenous compounds	4.1d	LVOC	2.1.4.2. 5	Melamine

7.	AT	Nitrogenous hydrocarbons	Higher emission levels and/or Ioads UBA(DE): Ammonia	Product class	Nitrogenous compounds	4.1d	LVOC	2.1.4.4	Nitrogenous hydrocarbons
8.	ES, CEFIC	Nitro-compounds	Generic	Product class	Nitrogenous compounds	4.1d	LVOC	NI	Nitrogenous hydrocarbons
9.	AT, EEB	Aromatic hydrocarbons containing fluorine	Higher emission levels and/or loads UBA(DE): Ammonia	Product class	Halogenic hydrocarbons	4.1f	NI	NI	NI
10.	EEB	Organometallic compounds	Higher emission levels and/or loads UBA(DE): HCl	Product class	Organometallic compound	4.1g	NI	NI	NI
11.	AT, IT	Cellulose nitration	Specific provisions in MS legislation: NO <sub>x</sub>	Process	Cellulose-based fibres	4.1h	NI	NI	NI
12.	CZ, IT, CEFIC	Viscose	The activity has very specific production and emissions characteristics (IT: H <sub>2</sub> S, CS <sub>2</sub> ).	Product	Cellulose-based fibres	4.1h	POL	11	Viscose fibres
13.	IT	Polyamide fibre production	Specific provisions in MS legislation: (e.g. caprolactam)	Product	Polymers	4.1h	POL	9	Polyamide
14.	AT, IT, EEB	PVC polymers	Higher emission levels and/or loads UBA(DE): Ammonia Specific provisions in MS legislation: Vinyl chloride monomer, TVOC	Product	Polymers	4.1h	POL	5	Polyvinylchloride

15.	т	Polyester production [4.1(h)]	Specific provisions in MS legislation: TVOC	Product	Polymers	4.1h	POL	6	Unsaturated polyester
16.	IT	Acrylic fibres production [4.1(h)]	Specific provisions in MS legislation: N,N- Dimethylacetamide, N,N- Dimethylformamide	Product	Polymers	4.1h	POL	3, 4, 6, 7, 8	Copolymer
17.	іт	Cellulose acetate production [4.1(h)]	Specific provisions in MS legislation: Acetone	Product	Polymers	4.1h	POL	NI	Product not covered by POL
18.	AT, DE, ES, CEFIC	Polymers and Specific plastic materials	Higher emission levels and/or loads UBA(DE): TVOC; Specific provisions in MS legislation	Activity	Plastic materials	4.1h	POL	NI	NI
19.	IT	Polymers based on acrylonitrile production	Specific provisions (i.e. ELVs) provided by IT legislation: Acrylonitrile	Activity	Polymer	4.1h	POL	4, 7, 8	Polystyrene, emulsion polymerised styrene butadiene rubber, emulsion polymerised rubber containing butadiene
20.	IT	Polycarbonate production	Specific provisions provided in legislation: Dichloromethane	Product	Polymer	4.1h	POL	NI	Product not covered by the POL BREF
21.	IT	Synthetic rubbers		Activity	Synthetic rubbers	4.1i	POL	7, 8	NI

22.	AT	Surface-active agents and surfactants (4.1(k) Annex I, IED)	Higher emission levels and/or loads UBA(DE): TVOC	Activity	Surface-active agents and surfactants	4.1k	NI	NI	NI
23.	CEFIC	CO reformer	H <sub>2</sub> , CO and their mixtures may be co-produced through any one of a number of chemical processes that use hydrocarbon - mainly CH <sub>4</sub> feedstock. In addition to H <sub>2</sub> , CO and syngas, these processes also produce steam and CO <sub>2</sub> . Steam generation results from heat recovery downstream of the fired reactor and from hot flue- gas (as described in MCP and LCP plants). The H <sub>2</sub> /CO varies drastically from installation to installation. In the case of a CO reformer, partial oxidation is used.	Process	Hydrogen	4.2a	LVOC, LVIC-AAF, REF	NI	NI
24.	AT, DE, IT, ES, NO, CEFIC, Fertilizers Europe	Ammonia (4.2(a) Annex I, IED)	Different process routes; high importance of energy efficiency for the whole activity; use of CO <sub>2</sub> for other productions.	Product	Ammonia	4.2a	LVIC-AAF	2	Ammonia
25.	DE	Hydrofluoric acid	Generic	Product	Hydrofluoric acid	4.2a	LVIC-AAF	6	Hydrofluoric acid
26.	AT, IT	Nitrosylsulphuric acid	Specific provisions in MS legislation: SO <sub>x</sub> , NO <sub>x</sub>	Product	Inorganic acid: Nitrosylsulphuric acid	4.2b	NI	NI	NI
27.	AT, DE, ES, CEFIC, Fertilizers Europe	Nitric acid	Specific provisions in MS legislation: NO <sub>x</sub> , N <sub>2</sub> O; Additionally, process parameters (in particular higher pressure) might result in a higher removal efficiency compared to the generic case. Combined abatement techniques for NO <sub>x</sub> and N <sub>2</sub> O achieve significantly lower emissions than the generic case. High integration in other productions (fertiliser). Energy efficiency (use of waste heat).	Product	Nitric acid	4.2b	LVIC-AAF	3	Nitric acid
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28.	DE	Phosphoric acid	generic	Product	Phosphoric acid	4.2b	LVIC-AAF	5	Phosphoric acid
29.	AT, DE, ES, IT, CEFIC, EEB, EUROALLIAGES, EUROMETAUX	Sulphuric acid (4.2(b) Annex I, IED)	Specific provisions in MS legislation; higher emission levels UBA(DE): SO <sub>2</sub> ; emissions depend on sulphur source and their fluctuations	Product	Sulphuric acid	4.2b	LVIC-AAF	4	Sulphuric acid
30.	AT	Sodium hydrogen sulphate (4.2(d) Annex I, IED)	Higher emission levels and/or loads: UBA(DE) SO <sub>X</sub>	Product	Inorganic salt	4.2d	NI	NI	NI
31.	CEFIC	Sodium carbonate	Generic	Product	Sodium carbonate	4.2d	LVIC S	2	Soda ash
32.	IT	Salts (e.g. potassium chlorate, sodium carbonate) [4.2(d)]	NI	Product class	Inorganic salts	4.2d	LVIC-AAF, LVIC-S	NI	Soda ash

33.	AT, EEB	Non-metals, metal oxides or other inorganic compounds	Higher emission levels and/or loads: UBA(DE) HCl	Activity	Non-metals, metal oxides or other inorganic compounds	4.2e		NI	NI
34.	CEFIC	Pigments	Generic	Activity	Pigments	4.2e	LVIC-AAF, LVIC S, OFC	NI	NI
35.	CEFIC	Aluminium fluoride plants	BAT-AELs of the existing BREF are not realistic	Product	Inorganic compounds	4.2e	LVIC S	7.1	Aluminium fluoride
36.	CZ	Ferric oxide from copperas by dehydration and calcination with simultaneous production of sulphuric acid from waste gases of the iron oxides production	Interconnected production of iron oxide pigments and sulphuric acid, the need for their synchronisation. Specific technologies applicable only to production of iron oxide pigments connected with production of sulphuric acid, where gases containing sulphur oxides from calcination of iron oxides may be processed.	Product	Inorganic compounds	4.2e	LVIC S	7.5.6	Iron oxide pigment
37.	DE, PL, CEFIC	Production of sodium silicates	As different production methods	Product	Inorganic compounds	4.2e	LVIC S	7.8	Sodium silicate
38.	AT	Sulphur	Specific provisions in MS legislation: SO <sub>x</sub> , CS <sub>2</sub> , H <sub>2</sub> S, dust, benzene	Product	Inorganic compounds	4.2e	REF	4.23.5.2	Sulphur recovery units
39.	AT, CZ, DE, IT	Titanium dioxide	Specific provisions in MS legislation: Cl <sub>2</sub> , dust, SO <sub>X</sub>	Product	Inorganic compounds	4.2e	LVIC S	3	Titanium dioxide

40.	AT, CEFIC, DE, IT	Carbon black	Specific provisions in MS legislation: SO <sub>X</sub> , TVOC, NO <sub>X</sub> , dust, benzene	Product class	Inorganic compounds	4.2e	LVIC-S	4	Carbon black
41.	AT, DE, ES, IT, CEFIC, EEB, Fertilizers Europe	Fertilisers (4.3 Annex I, IED)	Specific provisions in MS legislation; higher emission levels UBA(DE): NH <sub>3</sub> , NO <sub>X</sub>	Activity	Fertilisers	4.3	LVIC-AAF	7, 8, 9, 11	NPK and CN, AN and CAN, Urea and UAN, Superphosphates
42.	AT, IT	Plant protection products or of biocides	Specific provisions in MS legislation (dust); higher emission levels	Activity	Plant protection products or of biocides	4.4	OFC	NI	NI
43.	IT, NO, ORGALIME	Production of pharmaceutical products including intermediates	Batch operations, often small and medium scale	Activity	Pharmaceutical products	4.5	OFC	NI	NI
44.	ES	Explosives	Generic	Activity	Explosives	4.6	OFC	NI	NI
			NI: No Info	mation provided.			•		

## 7.4 Annex 4: Overview of IPs on KEIs



Figure 7.1: Overview of IPs for candidate KEIs that are proposed for inclusions by the EIPPCB





## 7.5 Annex 5: REACH data on candidate KEI substances

	KEI identification o	data	ECHA C&L II	nvento	ory				ECHA Briefs	substance profile	
No.	KEI candidates	CAS	Harmonized Classification	с	м	R	Substances restricted under REACH, (Annex XVII)	SVHC	Properties of concern (CMR, PBT)	Uses at industrial sites / Release to environment	Tonnage band - tonnes per year.
1	1,1,1- Trichloroethane (CH <sub>3</sub> CCl <sub>3</sub> )	71-55-6	H332, H420							This substance is manufactured and/or imported in the European Economic Area for industrial use resulting in the manufacture of another substance (use of intermediates) ECHA has no public registered data on the routes by which this substance is most likely to be released to the environment.	
2	Acetic acid	64-19-7	H314, H226							Release to the environment of this substance is likely to occur from industrial use: in processing aids at industrial sites, as an intermediate step in further manufacturing of another substance (use of intermediates), manufacturing of the substance, as processing aid, in the production of articles, of substances in closed systems with minimal release, for thermoplastic manufacture and as processing aid.	1 000 000 - 10 000 000
3	Ammonia (NH <sub>3</sub> )	7664-41-7	H221, H314, H331, H400							Release to the environment of this substance is likely to occur from industrial use: as processing aid, in processing aids at industrial sites, in the production of articles, of substances in closed systems with minimal release and as an intermediate step in further manufacturing of another substance (use of intermediates).	10 000 000 - 100 000 000

4	Arsenic and compounds (as As)	7440-38-2	H301, H331, H400, H410				yes			No BP, pre-registration	
5	Benzene	71-43-2	H225, H315, H319, H340, H350, H372	1A	18		yes		С, М	Release to the environment of this substance is likely to occur from industrial use: formulation of mixtures, as an intermediate step in further manufacturing of another substance (use of intermediates) and as processing aid.	1 000 000 - 10 000 000
6	Cadmium and compounds (as Cd)	7440-43-9	H250, H330, H341, H350, H372, H400, H410, H361fd	18	2	2	yes	SVHC, CMR, Equivale nt level of concern	с	Release to the environment of this substance is likely to occur from industrial use: in the production of articles, formulation of mixtures, as an intermediate step in further manufacturing of another substance (use of intermediates), manufacturing of the substance and in processing aids at industrial sites.	1 000 -10 000
7	Carbon dioxide (CO <sub>2</sub> )	124-38-9								no BP, pre-registration	
8	Carbon disulphide (CS <sub>2</sub> )	75-15-0	H225, H315, H319, H372, H361fd			2				Release to the environment of this substance is likely to occur from industrial use: as an intermediate step in further manufacturing of another substance (use of intermediates).	100 000 - 1 000 000
9	Carbon monoxide (CO)	630-08-0	H220, H331, H372, H360D			1A			R	Release to the environment of this substance is likely to occur from industrial use: as an intermediate step in further manufacturing of another substance (use of intermediates), as processing aid, for thermoplastic manufacture and manufacturing of the substance.	1 000 - 10 000

10	Chlorine (Cl <sub>2</sub> )	7782-50-5	H270, H315, H319, H331, H335, H400				Release to the environment of this substance is likely to occur from industrial use: formulation of mixtures and manufacturing of the substance.	1 000 000 - 10 000 000
11	Chlorine and inorganic compounds (as total Cl)	sum parameter					see Chlorine	
12	Chlorofluorocarbons (CFCs)	group of substances						
13	Chloromethane	74-87-3	H220, H351, H373	2			Release to the environment of this substance is likely to occur from industrial use: as an intermediate step in further manufacturing of another substance (use of intermediates), in processing aids at industrial sites and manufacturing of the substance.	1 000 000 - 10 000 000
14	Chromium and compounds (as Cr)	7440-47-3					Release to the environment of this substance is likely to occur from industrial use: in the production of articles and industrial abrasion processing with low release rate (e.g. cutting of textile, cutting, machining or grinding of metal).	1 000 000 - 10 000 000
15	CMR substances	group of substances						
16	Copper and compounds (as Cu)	7440-50-8					Release to the environment of this substance is likely to occur from industrial use: in the production of articles,, as an intermediate step in further manufacturing of another substance (use of intermediates), as processing aid and manufacturing of the substance.	1 000 000 - 10 000 000

17	Di-(2-ethyl hexyl) phthalate (DEHP)	117-81-7	H360FD			18	yes	SVHC Annex XIV	R	Release to the environment of this substance is likely to occur from industrial use: as an intermediate step in further manufacturing of another substance (use of intermediates), in the production of articles and in processing aids at industrial sites.	10 000 - 100 000
18	Dichloromethane (DCM), (CH <sub>2</sub> Cl <sub>2</sub> )	75-09-2	H351	2			yes			Release to the environment of this substance is likely to occur from industrial use: in processing aids at industrial sites, as an intermediate step in further manufacturing of another substance (use of intermediates) and of substances in closed systems with minimal release.	100 000 - 1 000 000
19	Dust [Particulate matter (PM10, PM2.5)]	sum parameter									
20	EDC; Ethylene dichloride 1,2- Dichloroethane	107-06-2	H225, H302, H315, H319, H335, H350	18				SVHC Annex XIV	C	Release to the environment of this substance is likely to occur from industrial use: as an intermediate step in further manufacturing of another substance (use of intermediates), of substances in closed systems with minimal release, in processing aids at industrial sites and manufacturing of the substance.	1 000 000 - 10 000 000
21	Ethylene oxide	75-21-8	H220, H315, H319, H331, H335, H340, H350	18	1B				C, M, PBT	Release to the environment of this substance is likely to occur from industrial use: manufacturing of the substance, as an intermediate step in further manufacturing of another substance (use of intermediates) and for thermoplastic manufacture.	1 000 000+

22	Fluorine and inorganic compounds (as total F)	7782-41-4	H270, H314, H330				С, М, РВТ	no	
23	Formaldehyde	50-00-0	H301, H331, H314, H317, H331, H341, H350	18	2		C	Release to the environment of this substance is likely to occur from industrial use: in the production of articles, as processing aid, formulation of mixtures, formulation in materials, for thermoplastic manufacture and as an intermediate step in further manufacturing of another substance (use of intermediates).	1 000 000+
24	Halogens and their compounds	group of substances							
25	Halons	group of substances							
26	Hexachlorobenzene (HCB)	118-74-1	H350, H372, H400, H410	1B				no	
27	Hydrochlorofluoroc arbons (HCFCs)	group of substances							
28	Hydrofluorocarbons (HFCs)	group of substances							
29	Hydrogen bromide (HBr)	10035-10-6	H314, H315					Release to the environment of this substance is likely to occur from industrial use: as an intermediate step in further manufacturing of another substance (use of intermediates), in processing aids	10 000 - 100 000

							at industrial sites, as processing aid, manufacturing of the substance and in the production of articles.	
30	Hydrogen chloride (HCl)	7647-01-0	H314, H335			R	Release to the environment of this substance is likely to occur from industrial use: in processing aids at industrial sites, as processing aid and as an intermediate step in further manufacturing of another substance (use of intermediates).	1 000 000 - 10 000 000
31	Hydrogen cyanide (HCN)	74-90-8	H224, H330, H400, H410				This substance is manufactured and/or imported in the European Economic Area for industrial use resulting in the manufacture of another substance (use of intermediates). Release to the environment of this substance is likely to occur from industrial use: as an intermediate step in further manufacturing of another substance (use of intermediates).	
32	Hydrogen fluoride (HF)	7664-39-3	H300, H310, H314, H330				Release to the environment of this substance is likely to occur from industrial use: as processing aid, in processing aids at industrial sites, as an intermediate step in further manufacturing of another substance (use of intermediates), of substances in closed systems with minimal release and in the production of articles.	100 000 - 1 000 000
33	Hydrogen sulphide (H <sub>2</sub> S)	7783-06-4	H220, H330, H400				Release to the environment of this substance is likely to occur from industrial use: of substances in closed systems with minimal release, as an intermediate step in further manufacturing of another substance (use of intermediates) and as processing aid.	10 - 100

34	Lead and compounds (as Pb)	7439-92-1	H362, H360FD	1A	yes	R, PBT	Release to the environment of this substance is likely to occur from industrial use: manufacturing of the substance, in the production of articles, as an intermediate step in further manufacturing of another substance (use of intermediates), formulation of mixtures and formulation in materials.	1 000 000 - 10 000 000
35	Mercury and compounds (as Hg)	7439-97-6	H330, H360D, H372, H400, H410	18	yes	R	Release to the environment of this substance is likely to occur from industrial use: manufacturing of the substance, formulation in materials, as an intermediate step in further manufacturing of another substance (use of intermediates) and of substances in closed systems with minimal release.	100 - 1 000
36	Metals class I (mercury, thallium)	group of substances						
37	Metals class II (lead, cobalt, nickel, selenium, tellurium)	group of substances						
38	Metals class III (antimony, chromium, copper, manganese, vanadium, tin)	group of substances						
39	Methane (CH <sub>4</sub> )	74-82-8	H220				Release to the environment of this substance is likely to occur from industrial use: as an intermediate step in further manufacturing of another substance (use of intermediates), in processing aids at industrial sites, manufacturing of the substance, in the production of articles and for thermoplastic manufacture.	100 000 - 1 000 000

40	Methanol	67-56-1	H225, H301, H331, H370			PBT	Release to the environment of this substance is likely to occur from industrial use: in processing aids at industrial sites, of substances in closed systems with minimal release, as an intermediate step in further manufacturing of another substance (use of intermediates), as processing aid and manufacturing of the substance.	10 000 000 - 100 000 000
41	More harmful organic substances	group of substances						
42	Naphthalene	91-20-3	H302, H351, H400, H410	2	yes		Release to the environment of this substance is likely to occur from industrial use: as an intermediate step in further manufacturing of another substance (use of intermediates), in processing aids at industrial sites and manufacturing of the substance.	100 000 - 1 000 000
43	Nickel and compounds (as Ni)	7440-02-0	H317, H351, H372, H412	2	yes	С	Release to the environment of this substance is likely to occur from industrial use: in the production of articles, as an intermediate step in further manufacturing of another substance (use of intermediates),	100 000+
44	Nitrogen oxides (NO <sub>X</sub> /NO <sub>2</sub> )	sum parameter						
45	Nitrous oxide (N <sub>2</sub> O)	10024-97-2					Release to the environment of this substance is likely to occur from industrial use: as processing aid, in processing aids at industrial sites and of substances in closed systems with minimal release.	1 000 - 10 000

46	Non-CMR halogenated organic compounds	group of substances								
47	PCDD/F (dioxins + furans)2	sum parameter								
48	Perfluorocarbons (PFCs)	group of substances								
49	Phenol	108-95-2	H301, H311, H314, H331, H341, H373		2				Release to the environment of this substance is likely to occur from industrial use: as processing aid, in processing aids at industrial sites, in the production of articles, formulation of mixtures, as processing aid, for thermoplastic manufacture and as an intermediate step in further manufacturing of another substance (use of intermediates).	1 000 000 - 10 000 000
50	Phosphates	sum parameter								
51	Polycyclic aromatic hydrogencarbons (PAH); group member benzo[e]pyrene	group of substances, 192-97-2	H350, H400, H410	1B		yes			no	
52	Propylene oxide	75-56-9	H224, H302, H311, H319, H331, H335, H340, H350	18	18		SVHC	С, М	Release to the environment of this substance is likely to occur from industrial use: for thermoplastic manufacture, as an intermediate step in further manufacturing of another substance (use of intermediates), manufacturing of the substance and formulation of mixtures.	1 000 000 - 10 000 000

53	Sulphur hexafluoride (SF <sub>6</sub> )	2551-62-4								Release to the environment of this substance is likely to occur from industrial use: of substances in closed systems with minimal release, in processing aids at industrial sites and as processing aid.	1 000 - 10 000
54	Sulphur oxides (SO <sub>x</sub> )	sum parameter									
55	Tetrachloroethylene (PER)	127-18-4	H351, H411	2						Release to the environment of this substance is likely to occur from industrial use: in processing aids at industrial sites, of substances in closed systems with minimal release and as an intermediate step in further manufacturing of another substance (use of intermediates).	100 000 - 1 000 000
56	Tetrachloromethane	56-23-5	H301, H311, H331, H351, H372, H412, H420	2					C	Release to the environment of this substance is likely to occur from industrial use: as an intermediate step in further manufacturing of another substance (use of intermediates) and in processing aids at industrial sites.	1 000 - 10 000
57	Toluene	108-88-3	H225, H304, H315, H336, H361d, H373			2	yes			Release to the environment of this substance is likely to occur from industrial use: in processing aids at industrial sites, of substances in closed systems with minimal release, as an intermediate step in further manufacturing of another substance (use of intermediates), as processing aid, formulation of mixtures and manufacturing of the substance.	1 000 000 - 10 000 000
58	Trichloroethylene	79-01-6	H315, H319, H336, H341, H350, H412	1B	2			SVHC Annex 14	С	Release to the environment of this substance is likely to occur from industrial use: of substances in closed systems with minimal release, in processing aids at	10 000 - 100 000

								industrial sites, as an intermediate step in further manufacturing of another substance (use of intermediates) and manufacturing of the substance.	
59	Trichloromethane	67-66-3	H302, H315, H319, H331, H351, H372, H361d	2	 2	yes		Release to the environment of this substance is likely to occur from industrial use: as an intermediate step in further manufacturing of another substance (use of intermediates), in processing aids at industrial sites and manufacturing of the substance.	100 000 - 1 000 000
60	TVOC [NMVOC,TOC, VOC]	Sum parameter							
61	Vinyl chloride monomer (VCM)	75-01-4	H220, H350	1a		yes	С	Release to the environment of this substance is likely to occur from industrial use: manufacturing of the substance and for thermoplastic manufacture.	1 000 000 - 10 000 000
62	Zinc and compounds (as Zn)	7440-66-6	H250, H260, H400, H410					Release to the environment of this substance is likely to occur from industrial use: in the production of articles, formulation of mixtures, formulation in materials, manufacturing of the substance, in processing aids at industrial sites and as processing aid.	1 000 000 - 10 000 000
AT, DE	Thallium (metals class I)	7440-28-0	H300, H330, H373, H413					no, pre-registration	
AT, DE	Cobalt (metals calss II)	7440-48-4	H317, H334, H413				C, R	Release to the environment of this substance is likely to occur from industrial use: in the production of articles, as an intermediate step in further manufacturing of another substance (use of intermediates), manufacturing of the substance, in processing aids at industrial sites,	10 000+

							as processing aid, formulation of mixtures and formulation in materials.	
AT, DE	Selenium (metals class II)	7782-49-2	H301, H331, H373, H413				Release to the environment of this substance is likely to occur from industrial use: as processing aid, in the production of articles, as an intermediate step in further manufacturing of another substance (use of intermediates) and industrial abrasion processing with low release rate (e.g. cutting of textile, cutting, machining or grinding of metal).	1 000 - 10 000
AT, DE	Tellurium (metals class II)	13494-80-9				R	Release to the environment of this substance is likely to occur from industrial use: in the production of articles and as an intermediate step in further manufacturing of another substance (use of intermediates).	100 - 1 000
AT, DE	antimony (metals class III)	7440-36-0					Release to the environment of this substance is likely to occur from industrial use: in the production of articles, as an intermediate step in further manufacturing of another substance (use of intermediates), formulation in materials, manufacturing of the substance, formulation of mixtures and in processing aids at industrial sites.	10 000 - 100 000
AT, DE	manganese (metals class III)	7439-96-5					Release to the environment of this substance is likely to occur from industrial use: in the production of articles, in processing aids at industrial sites, of substances in closed systems with minimal release and as an intermediate step in further manufacturing of another substance (use of intermediates).	1 000 000+

AT, DE	vanadium (metals class III)	7440-62-2						Release to the environment of this substance is likely to occur from industrial use: in the production of articles, formulation of mixtures, formulation in materials, industrial abrasion processing with low release rate (e.g. cutting of textile, cutting, machining or grinding of metal) and industrial abrasion processing with high release rate (e.g. sanding operations or paint stripping by shot-blasting).	10 000 - 100 000
AT, DE	tin (metals class III)	7440-31-5							10 000 - 100 000
AT	acrylonitrile	107-13-1	H225, H301, H311, H315, H318, H317, H331, H335, H350, H411	18			C	Release to the environment of this substance is likely to occur from industrial use: for thermoplastic manufacture, as an intermediate step in further manufacturing of another substance (use of intermediates) and as processing aid.	1 000 000 - 10 000 000