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Subject: Best Available Techniques Reference Document for the Slaughterhouses and Animal By-Products Industry (the SA BREF) – Call for initial positions, Document 2

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GLOSSARY OF ACRONYMS

Acronym	Meaning
AOX	Adsorbable organic halides
AT	Austria
BAT	Best Available Techniques (as defined in Article 3(10) of the IED)
BAT-AEL	Emission level associated with the BAT (as defined in Article 13(3) of the IED)
BAT-AEPL	BAT-associated environmental performance level (as described in Section 3.3 of Commission Implementing Decision 2012/119/EU). BAT-AEPLs include BAT-AELs
BATIS	BAT Information System
BOD	Biological oxygen demand
BREF	BAT reference document (as defined in Article 3(11) of the IED)
COD	Chemical oxygen demand
DE	Germany
EBRD	European Bank for Reconstruction and Development
EHS	Environmental, Health, and Safety Guidelines
EIPPCB	European IPPC Bureau
EL	Greece
EN	European Standard adopted by CEN (European Committee for Standardisation, from its French name Comité Européen de Normalisation)
ENE BREF	BAT reference document for Energy Efficiency
E-PRTR	European Pollutant Release and Transfer Register
ES	Spain
EU	European Union
FDM BREF	BAT reference document in the Food, Drink and Milk Industries
FI	Finland
FR	France
HCFCs	Hydrochlorofluorocarbons
HFCs	Hydrofluorocarbons
ICS BREF	BAT reference document on Industrial Cooling Systems
IE	Ireland
IED	Industrial Emissions Directive (2010/75/EU)
IPPC	Integrated Pollution Prevention and Control
ISO	International Organisation for Standardisation. Also international standard adopted by this organisation
KEI	Key environmental issue
LCP BREF	BAT reference document for Large Combustion Plants
MCP	Medium Combustion Plants (as defined in Directive (EU) 2015/2193)
MS	Member State(s)
NH ₃	Ammonia
NM VOC	Non-methane volatile organic compound
PT	Portugal
SA BREF	BAT reference document in the Slaughterhouses and Animal By-products Industries
TN	Total nitrogen, expressed as N, includes free ammonia and ammonium nitrogen (NH ₄ -N), nitrite nitrogen (NO ₂ -N), nitrate nitrogen (NO ₃ -N) and organically bound nitrogen
TOC	Total organic carbon (in water)
TP	Total phosphorus, expressed as P, includes all inorganic and organic phosphorus compounds, dissolved or bound to particles
TSS	Total suspended solids
TVOC	Total volatile organic carbon
TWG	Technical Working Group
UK	United Kingdom
VOC	Volatile organic compound (as defined in Article 3(45) of the IED)
WI BREF	BAT reference document on Waste Incineration
WT BREF	BAT reference document for Waste Treatment
WWTP	Waste water treatment plant

1 SCOPE OF THE SA BREF

1.1 Overview

The activities covered by the SA BREF review are mentioned in IED Annex I, namely:

- 6.4 (a). *Operating slaughterhouses with a carcass production capacity greater than 50 tonnes per day.*
- 6.5. *Disposal or recycling of animal carcasses or animal waste with a treatment capacity exceeding 10 tonnes per day.*

The scope of the current SA BREF, which was published in 2005 (http://eippcb.jrc.ec.europa.eu/reference/BREF/sa_bref_0505.pdf), covers industrial activities specified in points 6.4 (a) and 6.5 of Annex I to Directive 96/61/EC (IPPC Directive), which was worded almost identically:

- 6.4. (a) *Slaughterhouses with a carcase production capacity greater than 50 tonnes per day.*
- 6.5. *Installations for the disposal or recycling of animal carcasses and animal waste with a treatment capacity exceeding 10 tonnes per day.*

In the current SA BREF, the slaughter activity is considered to end with the making of standard cuts for large animals and cuts for poultry. The animal by-products activities include treatments for entire bodies or parts of animals and those for products of animal origin. These activities also include treatments of animal by-products not intended for human consumption. Integration of both activities is possible, although these often take place in separate installations.

Proposal 1: The EIPPCB proposes to include in the scope of the SA BREF the activities listed in points 6.4 (a) and 6.5 of Annex I to the IED.

1.2 Independently operated waste water treatment plants and combined treatment of waste water

With regard to the treatment of waste water arising from slaughterhouses and animal by-products activities, there may be cases where:

- this treatment is carried out by independently operated waste water treatment plants (point 6.11 of Annex I to the IED);
- other waste water generated off site is treated by the on-site waste water treatment plant (WWTP).

Proposal 2: The EIPPCB proposes to include in the scope of the SA BREF the IED Annex I point 6.11 activity (i.e. independently operated treatment of waste water not covered by Directive 91/271/EEC) when the main pollutant load originates from IED Annex I point 6.4 (a) and/or point 6.5 activities.

Proposal 3: The EIPPCB proposes to include in the scope of the SA BREF the combined treatment of waste water from different origins provided that the main pollutant load originates from IED Annex I point 6.4 (a) and/or point 6.5 activities and that the waste water treatment is not covered by Directive 91/271/EEC.

1.3 Interface with other BREFs

1.3.1 FDM BREF

The Food, Drink and Milk (FDM) BREF¹ covers meat processing downstream of slaughterhouses covered by the SA BREF.

The draft BAT conclusions of the final draft of the FDM BREF mention:

"These BAT conclusions do not address the following activities or processes:

- *The making of standard cuts for large animals and cuts for poultry. This may be covered by the BAT conclusions for Slaughterhouses and Animal By-products Industries (SA)."*

Proposal 4: The EIPPCB proposes to exclude the treatment and processing of animal materials for the production of food after the making of standard cuts for large animals and cuts for poultry from the scope of the SA BREF.

1.3.2 LCP BREF and MCP Directive

The BAT conclusions for Large Combustion Plants (LCP) were published in the Official Journal of the EU in August 2017². The LCP BAT conclusions concern the following activities specified in Annex I to Directive 2010/75/EU:

- 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 non-hazardous 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, 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.

Directive (EU) 2015/2193 on the limitation of emissions of certain pollutants into the air from Medium Combustion Plants (the MCP Directive)³ 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, it does not apply to combustion plants in which the gaseous products of combustion are used for the direct heating, drying, or any other treatment of objects or materials (Articles 2(3)(d) and (k) of the MCP Directive).

¹ European Commission, Reference Document on Best Available Techniques for Food, Drink and Milk Industries, http://eippcb.jrc.ec.europa.eu/reference/BREF/FDM/FDM_02-10-2018BW.pdf

² Commission Implementing Decision (EU) 2017/1442 of 31 July 2017 establishing best available techniques (BAT) conclusions, under Directive 2010/75/EU of the European Parliament and of the Council, for large combustion plants, <http://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1503383091262&uri=CELEX:32017D1442>

³ Directive (EU) 2015/2193 of the European Parliament and of the Council on the limitation of emissions of certain pollutants into the air from medium combustion plants, Official Journal of the European Union, L 313, 28.11.2015, p. 1-19, <http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32015L2193>.

Proposal 5: The EIPPCB proposes to exclude, from the scope of the SA BREF, on-site combustion plants generating hot gases that are not used for direct contact heating, drying or any other treatment of objects or materials.

Request 1: TWG members are asked to provide a list of processes in which combustion gases are used for direct contact heating, drying or any other treatment of objects or materials.

1.3.3 WT BREF

The BAT conclusions for the Waste Treatment BREF contain the following reference to the SA BREF:

"This BREF does not address the following:

- *Disposal or recycling of animal carcasses or of animal waste covered by the activity description in Section 6.5 of Annex I to Directive 2010/75/EU when this is covered by the BREF on the Slaughterhouses and Animal By-products Industries (SA)."*

Request 2: TWG members are asked to identify activities related to disposal or recycling of animal carcasses or of animal waste that could be covered by the scope of the WT BREF.

1.3.4 WI BREF

The revised draft BAT conclusions for Waste Incineration (as included in the final draft of the BREF) do not address plants covered by Article 42(2) of Directive 2010/75/EU, which include plants treating only animal carcasses.

Request 3: TWG members are asked to provide examples of IED installations for incineration of animal by-products mixed with other type of wastes.

2 STRUCTURE OF THE SA BREF AND OF ITS BAT CONCLUSIONS

2.1 Overview

The current BREF generally follows the structure as described in the BREF Guidance⁴:

- Preface
- Scope
- Chapter 1: General information
- Chapter 2: Applied processes and techniques
- Chapter 3: Current emission and consumption levels
- Chapter 4: Techniques to consider in the determination of BAT
- Chapter 5: BAT conclusions
- Chapter 6: Emerging techniques
- Chapter 7: Concluding remarks and recommendations for future work
- References
- Glossary of terms and abbreviations
- Annexes.

The only exception is the Executive Summary which is no longer used in the most recent BREFs. The current BAT conclusions are structured in three sections:

- General BAT conclusions for slaughterhouses and animal by-products installations
- Additional BAT conclusions for slaughterhouses
- Additional BAT conclusions for animal by-products installations.

For consistency reasons, it is recommendable to follow the same structure for the BREF and for the BAT conclusions.

Proposal 6: The EIPPCB proposes to use the following structure for the SA BREF:

- **Preface**
- **Scope**
- **Chapter 1: General information**
- **Chapter 2: General processes and techniques**
 - o **General current emission and consumption levels**
 - o **General techniques to consider in the determination of BAT**
 - o **General emerging techniques**
- **Chapter 3: Slaughterhouses**
 - o **Current emission and consumption levels**
 - o **Techniques to consider in the determination of BAT**
 - o **Emerging techniques**
- **Chapter 4: Animal by-products installations**
 - o **Current emission and consumption levels**
 - o **Techniques to consider in the determination of BAT**
 - o **Emerging techniques**
- **Chapter 5: BAT conclusions**
- **Chapter 6: Concluding remarks and recommendations for future work**
- **References**
- **Glossary of terms and abbreviations**
- **Annexes**

Proposal 7: The EIPPCB proposes to use the structure of the current BAT conclusions.

⁴ 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>.

3 POTENTIAL KEY ENVIRONMENTAL ISSUES (KEI)

3.1 Overview

TWG members are asked to express their initial position on the key environmental issues (KEIs) to be considered for the review of the SA BREF. These key issues could refer for example to emissions to air and water, diffuse emissions, odour and noise emissions, water and energy consumption, waste generation. The key environmental issues will be the focus of the BAT conclusions.

A key environmental issue is caused by a process that emits a pollutant, for example, and is described and characterised by the monitoring of the pollutant and there are techniques able to prevent and/or reduce the emissions of the given pollutant. The availability of data is crucial for the development of the BREF and **TWG members are therefore asked to provide an initial indication of the availability of data for the key pollutants.**

It is expected that a consensus on the KEIs will be achieved at the kick-off meeting. This agreement will be used to build a detailed questionnaire to gather the data needed for the derivation of BAT and to prevent the collection of scattered non-essential information.

With a view to a targeted data collection, the so-called focused approach and front-loading of the information exchange were presented to stakeholders by the Commission at the IED Article 13 forum meeting in June 2013⁵.

At the forum meeting in 2015⁶, the Commission presented criteria for defining KEIs at the earliest possible stage of the information exchange for reviewing a BREF:

- **Criterion 1: environmental relevance of pollution** caused by the activity or process, i.e. whether it may cause an environmental problem;
- **Criterion 2: significance of activity** (number of installations, geographical spread, contribution to total (industrial) emissions in the EU);
- **Criterion 3:** potential of BREF review for identifying **new or additional techniques** that would further significantly reduce pollution;
- **Criterion 4:** potential of BREF review to set **BAT-AELs** that would significantly improve the level of environmental protection compared to current emission levels.

Based on the information currently available and on the initial positions that will be provided by the TWG, the EIPPCB will use these four criteria to propose candidate KEIs in the Background Paper that will be prepared to support discussions at the Kick-off Meeting.

Other relevant environmental performance and operational data which were addressed by the SA BREF are:

- consumption of water and energy in the relevant processes;
- water and energy use (inputs/outputs).

It is therefore crucial that the initial positions provide information and data related to these criteria to allow a knowledge-based selection of KEIs at the Kick-off Meeting.

3.2 Information sources on pollutants from slaughterhouses and animal by-products installations

This section gives an overview of the different sources used to identify pollutants which may be of relevance for the SA sector (Criterion 1 mentioned in the previous section). Most of these documents (except the

⁵ IED Article 13 forum meeting of 6 June 2013, <https://circabc.europa.eu/w/browse/77c81228-4492-4348-9b3f-299ee5ecca93>.

⁶ IED Article 13 forum meeting of 19 October 2015, <https://circabc.europa.eu/w/browse/33cff69c-bfd0-49e7-8f19-f75a9e062745>.

permits of IED installations) can be found in BATIS (BATIS>Forum> the Slaughterhouses and Animal By-Products >02 First SA BREF review 2018->04 Information collection).

3.2.1 Current SA BREF (SA BREF)

According to the current BREF, the key environmental issues in the slaughterhouses and animal by-products installations are the amount of waste water discharged and the organic load it carries. Other key environmental issues are energy consumption (especially from refrigeration and heating water) and emissions to air. Odours can also be a significant nuisance in certain treatments.

In general, the applied processes and their environmental impact are quite similar for all animals in slaughterhouses. Therefore, no distinction of KEI is made in this case. Different processes can be applied for the disposal or recycling of animal carcasses or animal waste, thus leading to different environmental issues.

A detailed list of key environmental issues as identified by the SA BREF is presented in Annex 2.

3.2.2 The European Pollutant Release and Transfer Register (E-PRTR)

The E-PRTR is a database of real emission (release and transfer) data from IED installations across Europe. Data have been collected from the E-PRTR for the period from 2014 to 2016. During this period, releases of 5 pollutants to air and 7 pollutants to water were reported from slaughterhouses (activity 8(a) Slaughterhouses, see Table 3.1.) Animal by-products installations is an activity not included in the E-PRTR.

Table 3.1: List of the pollutants reported in the E-PRTR (2014-2016) for slaughterhouses with respective reporting thresholds

	Threshold for reporting annual releases (kg/year)
Releases to water	
Total organic carbon (TOC) (as Total C or COD/3)	50 000
Total nitrogen (TN)	50 000
Total phosphorus (TP)	5 000
Chlorides (as total Cl)	2 million
Nickel and compounds (as Ni)	20
Lead and compounds (as Pb)	20
Zinc and compounds (as Zn)	100
Releases to air	
Hydro-fluorocarbons (HFCs)	100
Nitrous oxide (N ₂ O)	10 000
Nickel and compounds (as Ni)	50
Hydrochlorofluorocarbons (HCFCs)	1
Ammonia (NH ₃)	10 000
Nitrogen oxides (NO _x /NO ₂)	100 000

In order to assess the relative significance of individual pollutants, the following figures could be used:

- number of slaughterhouses reporting emissions to air/water of a certain pollutant and relative share in the total number of industrial installations reporting to the E-PRTR;
- quantity of the pollutant released to air/water by all slaughterhouses and the relative share in the total quantity of pollutants released by industrial installations reporting to the E-PRTR.

3.2.2.1 Emissions to air

Figure 3.1 shows the number of slaughterhouses reporting emissions to air of a certain pollutant and the relative share in the total number of industrial installations reporting to the E-PRTR.

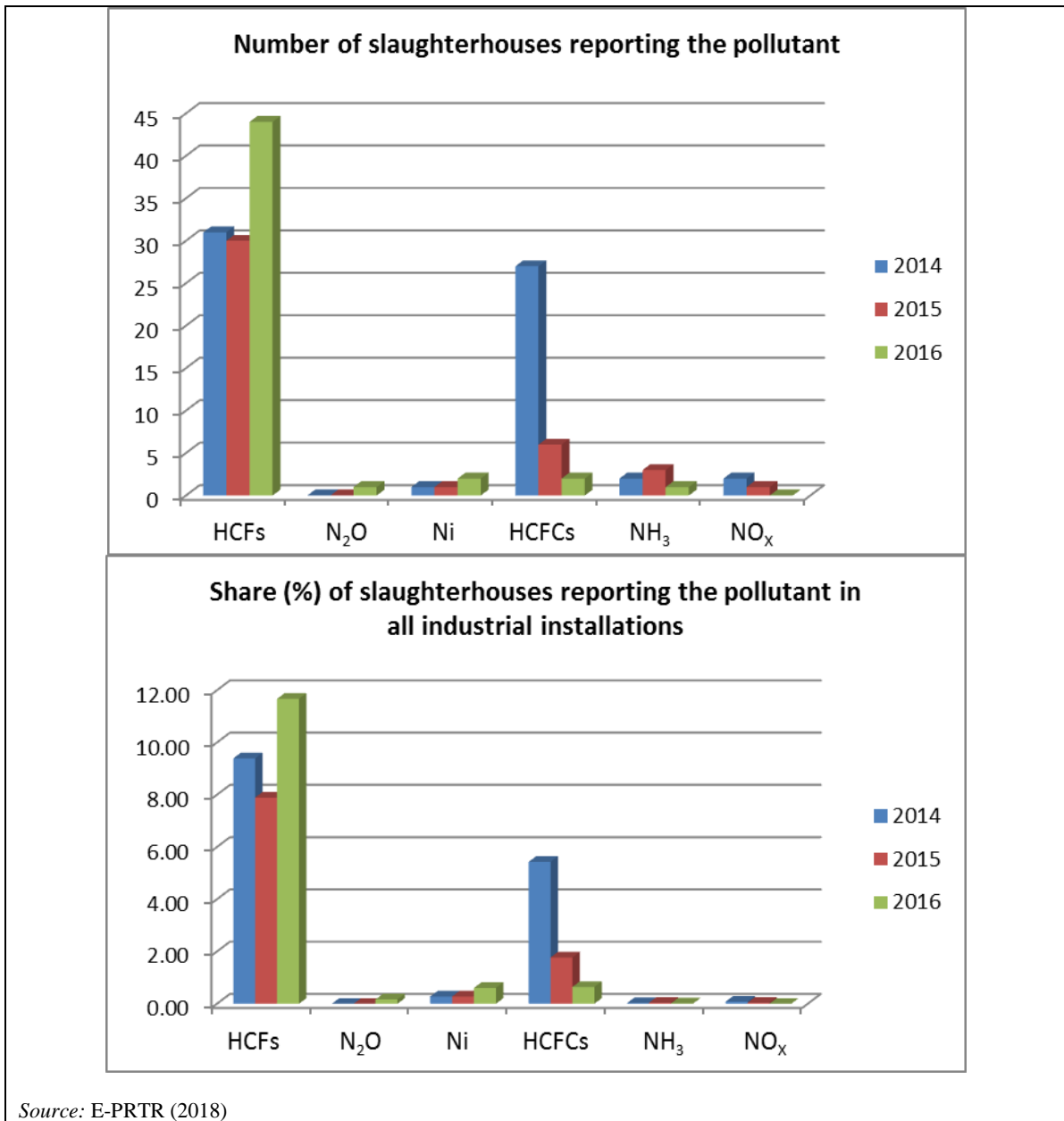


Figure 3.1: Number of slaughterhouses reporting emissions to air of a certain pollutant in the E-PRTR (October 2018) and relative share in the total number of industrial installations

Figure 3.2 shows the quantity of the pollutant emitted to air by all slaughterhouses and the relative share in the total quantity of pollutants released by industrial installations reporting to the E-PRTR.

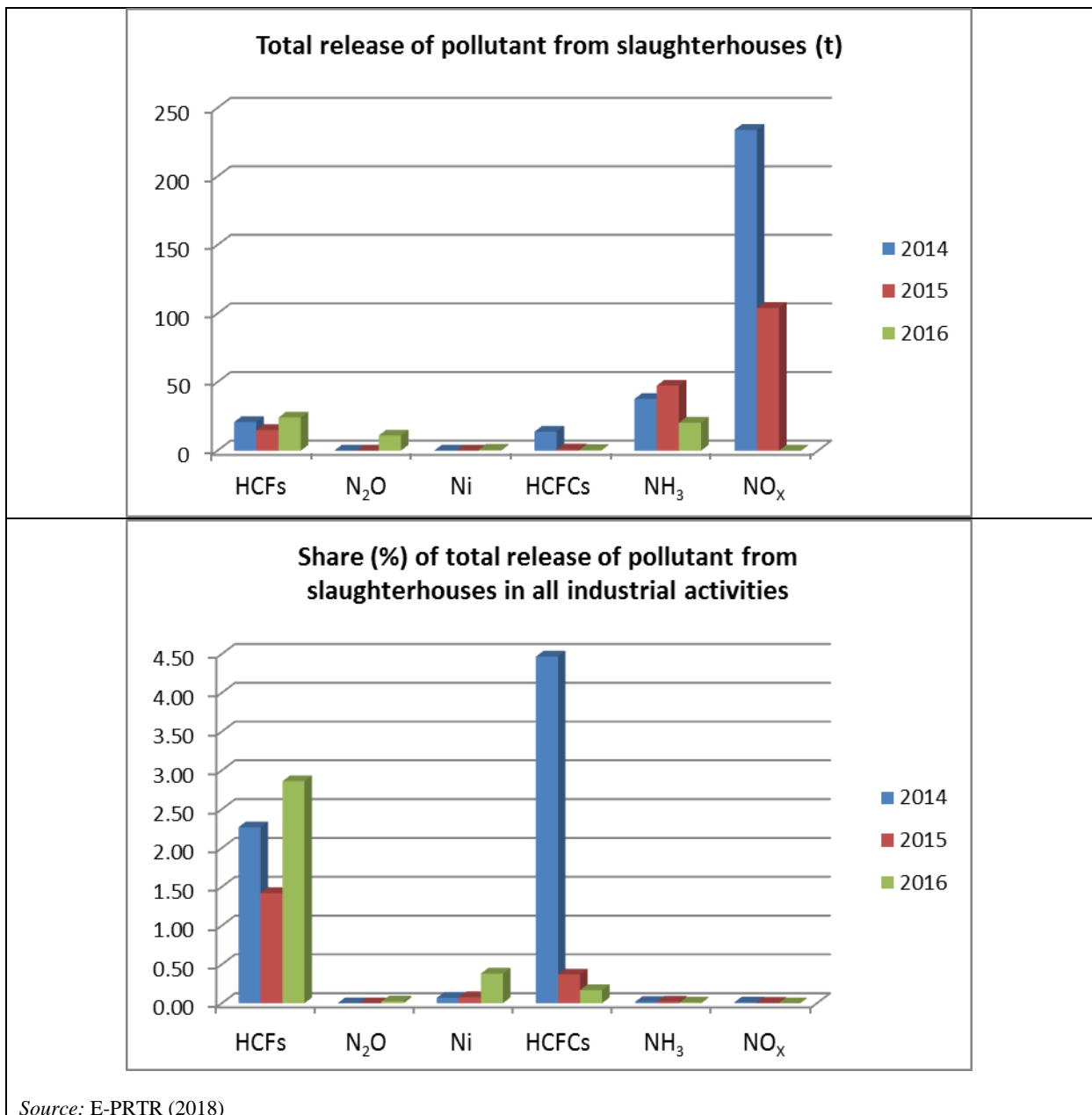


Figure 3.2: Total release of the pollutant emitted to air from all slaughterhouses in the E-PRTR (October 2018) and relative share in the total release from all industrial installations

3.2.2.2 Emissions to water

Figure 3.3 shows the number of slaughterhouse installations reporting emissions to water of a certain pollutant and the relative share in the total number of industrial installations reporting to the E-PRTR.

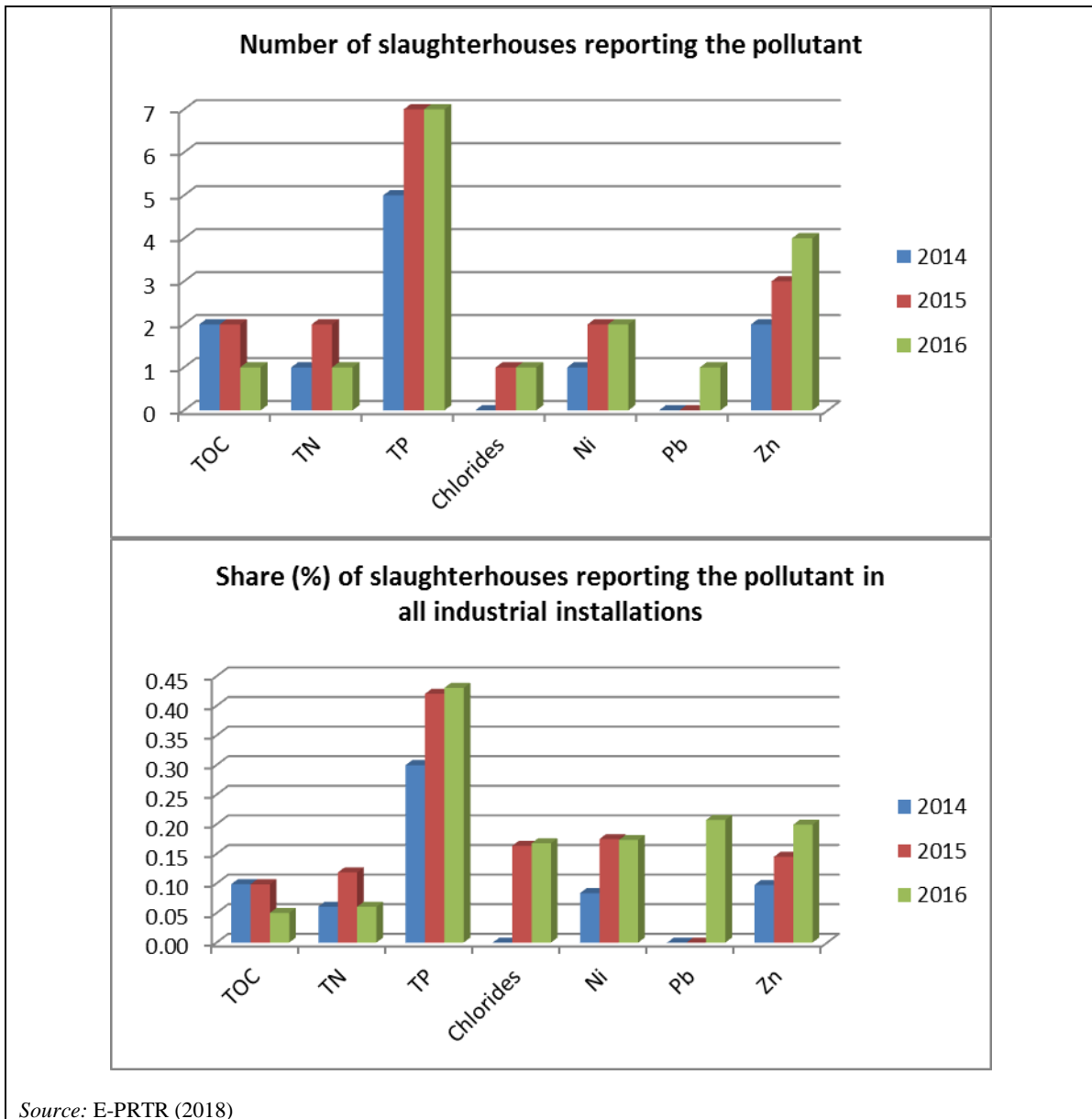
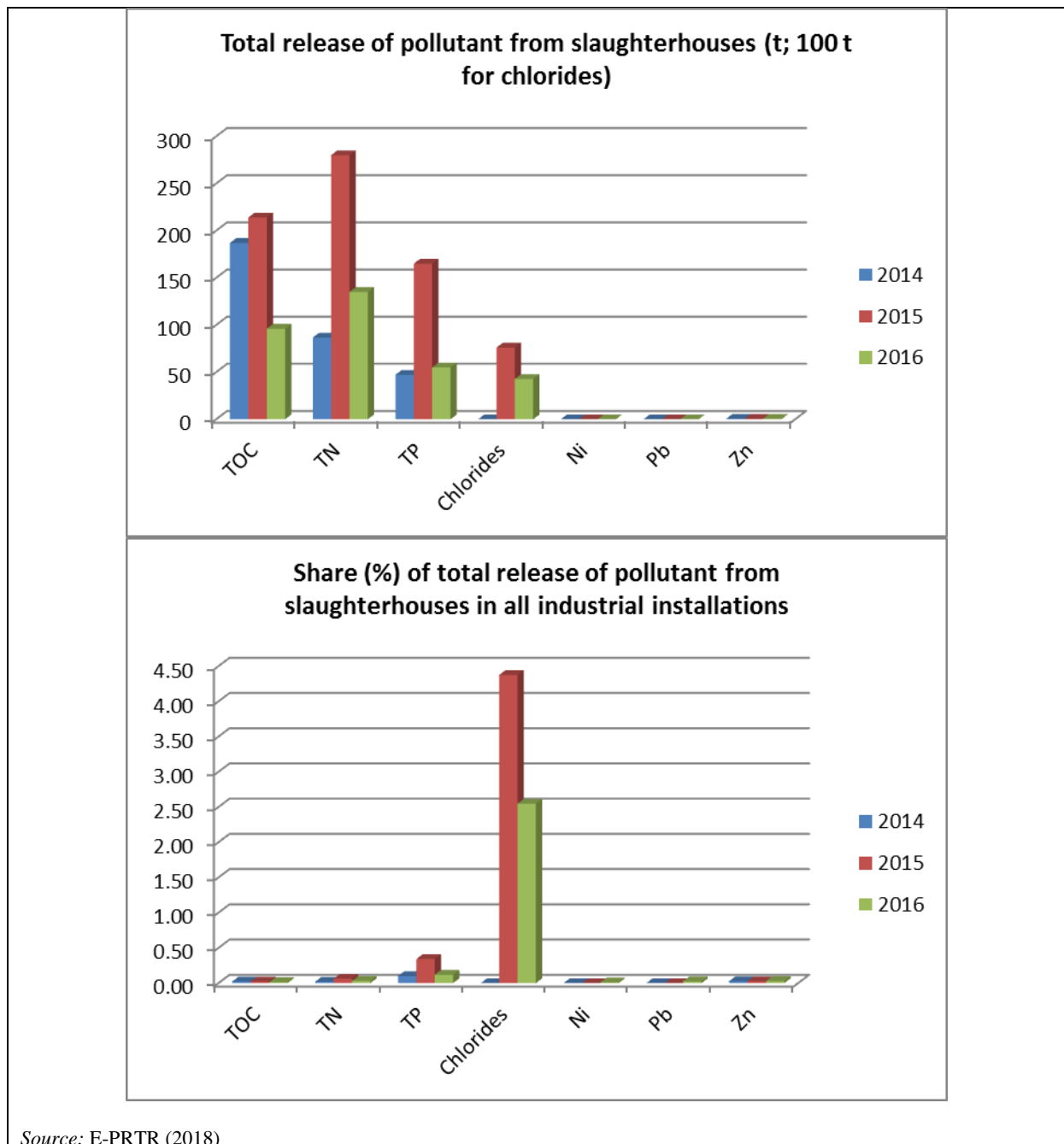


Figure 3.3: Number of slaughterhouses reporting emissions to water of a certain pollutant in the E-PRTR (October 2018) and relative share in the total number of installations

Figure 3.4 depicts the quantity of the pollutant emitted to water by all slaughterhouses and the relative share in the total quantity of pollutants emitted by industrial installations reporting to the E-PRTR.



Source: E-PRTR (2018)

Figure 3.4: Quantity of the pollutant emitted to water by all slaughterhouses in the E-PRTR (October 2018) and relative share in the total quantity released by industrial installations

Figure 3.1 and Figure 3.3 show that only 44 slaughterhouses reported to the E-PRTR emissions to air and water, out of the 533 slaughterhouses registered in the E-PRTR, and out of the 936 installations permitted under activity 6.4 (a) in the EU (see Section 4.2). Figure 3.2 and Figure 3.4 show that slaughterhouses represent a very small share of the total industrial emissions for most of the pollutants reported (below 0.5 %), with the exception of HCFs and HCFCs emissions to air, and chlorides emissions to water, which represent up to 4.5 % of the total emissions.

However, the number of installations and substances identified by this approach needs to be treated with caution because it is strongly influenced by the E-PRTR reporting thresholds. For example, there may be substances which are emitted by a large number of slaughterhouse installations but at levels just below the E-PRTR reporting threshold (see Table 3.1 above) so those installations will not appear in the E-PRTR.

3.2.3 Preliminary determination of KEIs (KEI study)

The European Commission contracted a study aiming to define an approach to identify KEIs for the drawing up and review of BREFs. One of the deliverables of the contract is the application of this approach to the review of the SA BREF. This deliverable (i.e. "Preliminary determination of Key Environmental Issues for the Slaughterhouses and Animal By-products Industry") is available in CIRCABC⁷. It is an initial proposal for the selection of KEIs to be used for the SA BREF review. This document does not constitute a final decision for selecting the KEIs for the SA BREF, but rather is intended to be used as background information by the SA TWG for taking decisions on KEIs at the Kick-off Meeting.

According to the document, for emissions to air, suggested key environmental issues are odour in general and dust from incineration processes, which are also possible KEIs for specific processes. Parameters suggested as possible KEIs in general, and for some specific processes, are: ammonia, carbon monoxide, dust, noise/vibration, nitrogen compounds and volatile organic compounds.

Additional parameters suggested as possible KEIs for specific processes only are: chlorine compounds, dioxins and furans, and sulphur compounds (from incineration), and greenhouse gases (from slaughterhouses).

Emissions to water of volatile lipophilic substances, materials in suspension, salts, substances contributing to eutrophication and TOC/COD/BOD are suggested as key environmental issues in general, and also as KEIs, or possible KEIs, for specific processes. Parameters suggested as possible KEIs in general, and for some specific processes, are organohalogen compounds and substances harmful or toxic to aquatic life. No additional parameters are identified as possible KEIs for specific processes only.

Water and energy consumption are suggested to be KEIs in general: KEIs for slaughterhouses and possible KEIs for most animal by-products installation processes. Generation of both hazardous and non-hazardous wastes are suggested to be KEIs for slaughterhouses and possible KEIs in general for the sector.

⁷<https://circabc.europa.eu/sd/a/ce4c9173-174c-44d9-aa1e-6ac1fb2937cf/Preliminary%20determination%20of%20Key%20Environmental%20Issues%20-%20Slaughterhouses.pdf>.

3.2.4 National legislation and/or studies

A number of permits of IED installations (from Greece (EL), Spain (ES), France (FR), Ireland (IE), Italy (IT) and Portugal (PT)) were analysed to identify candidate KEIs. In addition, the following national regulations and/or studies (available in BATIS) were used to identify candidate KEIs:

Austria (AT)

- "State of the art of the Slaughter and Animal By-products industries. Description of Austrian Plants" (2016). Based on real emission and consumption data of the Austrian slaughter and animal by-products industries, techniques and emission values are described as state of the art.

Germany (DE)

- First General Administrative Regulation Pertaining the Federal Immission Control Act (Technical Instructions on Air Quality Control – TA Luft 2002).
- Ordinance on Requirements for the Discharge of Waste Water into Waters.

Finland (FI)

- "Finnish Expert Report on Best Available Techniques in Slaughterhouses and Installations for the Disposal or Recycling of Animal Carcasses and Animal Waste" (2002). Processes and techniques applied in the sector in Finland are reviewed and the consumption of energy and water by the installations as well as their emissions to air, water, and soil and the management of solid waste and by-products are described and quantified.

France (FR)

- Hazardous substances for the aquatic environment in industrial waste water releases. National Action for Research and the Reduction of Releases of Hazardous Substances into Water Bodies (RSDE) by Classified Facilities – Second Phase.

Ireland (IE)

- "BAT Guidance Note on Best Available Techniques for the Slaughtering Sector" (2008).
- "BAT Guidance Note On Best Available Techniques for the Disposal or Recycling of Animal Carcasses and Animal Waste" (2008).

Spain (ES)

- "Guía de Mejores Técnicas Disponibles en España del Sector Matadero y de los Transformados de Pollo y Gallina" (2006).

United Kingdom (UK)

- "Sector Guidance Note IPPC SG 8 Integrated Pollution Prevention and Control (IPPC) – Secretary of State's Guidance for the A2 Rendering Sector" (2008). This note constitutes statutory guidance under regulation 64 of the Environmental Permitting (England and Wales) Regulations 2007, SI 3538 (Ref 3) on the integrated pollution control standards appropriate for the generality of new and existing A2 (rendering) installations in the processing of animal remains and by-products sector.
- "Guidance for the Red Meat Processing – (Cattle, Sheep and Pigs) Sector" (2003). This guidance covers slaughtering animals at installations with a carcass production capacity greater than 50 tonnes per day.

Nordic countries (Nordic)

- Slaughterhouses and producers of Animal By-products in the Nordic Countries (2016).

3.2.5 Other sources

3.2.5.1 USA regulations

The United States Environment Protection Agency (EPA) initially promulgated the "Meat and Poultry Products (MPP) Effluent Guidelines and Standards" in 1974, and amended the regulation in 2004. The regulation (40 CFR Part 432) covers waste water directly discharged by slaughterhouses, further processors, independent renderers and poultry processors. The "Technical Development Document for the Final Effluent Limitations Guidelines and Standards for the Meat and Poultry Products Point Source Category (40 CFR 432)" provides the technical basis for this regulation.

The EPA also published in 1995 the "Stationary sources air pollution guideline Chapter 9.5.3 Meat Rendering Plants", which contains emission factors from rendering installations.

3.2.5.2 European Bank for Reconstruction and Development (EBRD) Guidelines

The "Sub-sectoral Environmental and Social Guideline: Slaughterhouses" has been designed to be used by EBRD Financial Intermediaries (FIs) to understand the nature of environmental and a social (E&S) risk associated with existing operations in this sector, and suggests actions for businesses to manage these E&S risks.

3.2.5.3 Environmental, Health, and Safety Guidelines (EHS)

The World Bank published:

- Environmental, Health, and Safety Guidelines for Meat Processing (2007). Its applicability is the bovine and porcine slaughtering and processing from reception of the animals until the carcasses are ready for sale or further processing.
- Environmental, Health, and Safety Guidelines for Poultry Processing (2007). Its applicability is the poultry slaughtering, covering process steps from the reception of live birds, slaughter, evisceration, and simple rendering.

3.3 Initial EIPPCB proposals

3.3.1 Emissions to water and to air

It seems feasible to already assess at this stage Criterion 1 for determination of KEIs (see Section 3.1) as various sources are available (see Section 3.2) to assess the environmental relevance of pollutants emitted to air and to water. The EIPPCB has carried out this screening, which has resulted in a preliminary list presented in Annex 3.

The assessment of Criterion 2 is likely to be more difficult as little information is available so far about the quantitative nature of the emissions to air and to water. For instance, only a limited number of slaughterhouse installations have reported emissions to the E-PRTR database (see Section 3.2.2), possibly because the emissions are below the reporting thresholds, which implies E-PRTR data need to be interpreted carefully.

The assessment of Criteria 3 and 4 may be feasible before and during the Kick-off Meeting. Some information is already available, e.g. on national legislation (see Section 3.2).

In particular, as a first approach, the EIPPCB has identified pollutants which are on the preliminary list (i.e. satisfying Criterion 1) and which are also covered by several national legislations. This would imply that these pollutants are included in a monitoring scheme and that there is therefore potential to first collect data during the BREF review process and then to possibly set BAT-AELs. Those BAT-AELs would have the

potential to improve the current state-of-play at European level. The EIPPCB is therefore of the opinion that those pollutants may already at this stage be considered KEIs for the review of the SA BREF.

3.3.1.1 Emissions to water

The preliminary list of pollutants presented in Annex 3 shows that emissions to water from slaughterhouses and animal by-products installations are almost identical, and thus most of the waste water treatment techniques are applicable to both activities. All pollutants can typically be treated in an urban WWTP so there is no merit in setting BAT-AELs for indirect discharges. The list of proposed KEIs is presented in Table 3.2 below.

Table 3.2: List of pollutants for direct emissions to a receiving water body proposed as KEIs by the EIPPCB

KEI	IED activity	Type of installation
Chemical oxygen demand (COD) and/or total organic carbon (TOC)	Slaughterhouses and animal by-products installations	
Total suspended solids (TSS)		
Total nitrogen (TN)		
Total phosphorus (TP)		
Zinc	Slaughterhouses	Pigs

Apart from gathering data on pollutants that may be considered KEIs, the EIPPCB also proposes to gather information on other pollutants and waste water parameters such as pH, temperature, BOD₅, ammonium-N, chlorides (only from slaughterhouses performing hides/skins salting), and fats, oil and grease (FOG), which would provide useful contextual information of the waste water treatment and would be useful for determining BAT.

The list of proposed KEIs is also available in Document 3.

Request 4: TWG members are asked to provide feedback on the EIPPCB's proposals for KEIs for emissions to water and contextual parameters (see Document 3). Information on emission limit values and monitoring on proposed KEIs is also expected.

Request 5: TWG members are asked to provide initial positions on additional candidate KEIs for emissions to water, if any, accompanied by a rationale addressing the criteria mentioned in Section 3.1. Information on emission limit values set in permits and monitoring (e.g. standards used) of these additional candidate KEIs is also expected.

3.3.1.2 Emissions to air

Odour and refrigerants are considered the main KEIs for emissions to air, usually associated with the management of animal by-products. Odour emissions are process-specific and can be either diffuse or channelled. Channelled odour emissions are commonly treated by an end-of-pipe abatement technique(s). Incineration of animal by-products is associated with specific parameters. The list of proposed KEIs is presented in Table 3.3 below.

Table 3.3: List of pollutants emitted to air proposed as KEIs by the EIPPCB together with their main sources

KEI	IED activity	Type of installation	Process
Odour	Slaughterhouses	All animals	Animal reception and lairage
			Scalding
			Storage and handling of animal by-products
		Pigs	Singeing
	Animal by-products installations	Rendering	Storage and handling of animal by-products
			Rendering process
		Fat melting	Storage and handling of animal by-products
			Dry melting process
		Fish meal and fish-oil production	Storage and handling of animal by-products
		Blood processing/Production of plasma	Storage and handling of animal by-products
			Blood tanks
		Bone processing	Storage and handling of animal by-products
		Gelatine manufacturing	
		Incineration of animal by-products	
		Dust	Slaughterhouses
Pigs	Singeing		
Animal by-products installations	Rendering		Rendering process
	Incineration of animal by-products		Incineration
	Fish meal and fish-oil production		Drying
	Blood processing/Production of plasma		Drying of plasma

KEI	IED activity	Type of installation	Process
NH ₃	Slaughterhouses	All animals	Animal reception and lairage
	Animal by-products installations	Rendering	Rendering process
		Incineration of animal by-products	Incineration
HCFs and HCFCs	Slaughterhouses	All animals	Cooling systems
	Animal by-products installations	All animal by-products installations	Cooling systems
TVOC	Animal by-products installations	Rendering	Rendering process
		Incineration of animal by-products	Incineration
NO _x	Animal by-products installations	Rendering	Rendering process
		Incineration of animal by-products	Incineration
SO _x		Rendering	Rendering process
		Incineration of animal by-products	Incineration
HCl		Incineration of animal by-products	Incineration
HF			
Dioxins and furans			
Cd+Tl			
Hg			
Sb+As+Pb+Cr+Co+Cu+Mn+Ni+V			

Apart from gathering data on pollutants that may be considered KEIs, the EIPPCB also proposes to gather information on carbon monoxide (CO) emissions as contextual information on the combustion efficiency of thermal oxidisers (rendering process) and incinerators.

The list of proposed KEIs is also available in Document 3.

Request 6: TWG members are asked to provide feedback on the EIPPCB proposals for KEIs for emissions to air and contextual parameters (see Document 3). Information on emission limit values and monitoring on proposed KEIs is also expected.

Request 7: TWG members are asked to provide initial positions on additional candidate KEIs for emissions to air, if any, accompanied by a rationale addressing the criteria mentioned in Section 3.1.

Information on emission limit values set in permits and monitoring (e.g. standards used) of these additional candidate KEIs is also expected.

3.3.2 Energy efficiency

3.3.2.1 Slaughterhouses

Cooling systems are the most relevant energy-consuming process. The current SA BREF mentions that the chilling and refrigeration of carcasses could account for approximately 50 % of the total energy consumption of slaughterhouses. Boilers are commonly used for the production of hot water and industrial steam, and also consume a significant amount of energy.

The current SA BREF contains BAT conclusions that aim to reduce the energy consumption mainly from the uses associated with cooling systems (e.g. blood refrigeration, chilling of carcasses), scalding, and pig singeing.

Proposal 8: The EIPPCB proposes to include energy efficiency as a KEI for slaughterhouses.

Request 8: TWG members are asked to provide initial positions on specific processes in slaughterhouses for which energy consumption is significant and consumption data can be obtained during the BREF review process (e.g. chilling/cooling/freezing systems, boilers, scalding, pig singeing, chilling of carcasses).

3.3.2.2 Animal by-products installations

Energy consumption varies according to the type of the animal by-products installation. The current SA BREF mentions that large amounts of energy are used for the evaporation/drying of animal by-products in installations for rendering, fish meal and fish-oil production, blood processing and gelatine manufacturing. The electrical and heat efficiency are crucial parameters for an incineration plant, commonly associated with energy recovery.

Proposal 9: The EIPPCB proposes to include energy consumption as a KEI for animal by-products installations.

Proposal 10: The EIPPCB proposes to include energy efficiency (electricity, heat) and boiler efficiency as a KEI for installations incinerating animal by-products.

Request 9: TWG members are asked to provide initial positions on specific processes in animal by-products installations for which energy consumption is significant and consumption data can be obtained during the BREF review process (e.g. drying processes).

3.3.3 Water consumption and waste water discharge

3.3.3.1 Slaughterhouses

In general, significant quantities of water are consumed in slaughterhouses for cleaning operations in multiple (specific) processes. Consequently, the amount of waste water discharged is also relevant.

Proposal 11: The EIPPCB proposes to include water consumption and the amount of waste water discharged as KEIs for slaughterhouses.

Request 10: TWG members are asked to provide their initial positions on specific processes in slaughterhouses for which water consumption is significant and consumption data can be obtained during the BREF review process (e.g. cleaning of floor areas and equipment, vehicle washing, lairage washing, carcass washing, de-feathering, scalding).

3.3.3.2 Animal by-products installations

Water is consumed in animal by-products installations for cleaning operations, as well as in boilers and condensers.

Proposal 12: The EIPPCB proposes to include water consumption and the amount of waste water discharged as KEIs for animal by-products installations.

Request 11: TWG members are asked to provide initial positions on specific processes in animal by-products installations for which water consumption is significant and consumption data can be obtained during the BREF review process (e.g. cleaning of floor areas and equipment, boilers and condensers).

4 DATA COLLECTION

4.1 Overview

According to Chapter 7 of the current SA BREF on Concluding remarks, the consumption and emission data provided for drawing up the current BREF were not well explained in terms of operating conditions and analytical methods, and their relationship with the techniques used was not always made clear. This chapter recommends in particular that measurement of consumption and emission levels are carried out at unit operation level. More specifically, a number of issues are summarised as follows:

- energy-saving techniques (e.g. for refrigeration in slaughterhouses, for drying in animal by-products installations): very little data or information was submitted;
- lack of consistency in the data on measurement of odour and the identification of the options for keeping odour streams separate for treatment;
- little information was received about bone processing, glue manufacture, gasification of meat and bone meal, landspreading/injection, shellfish shell cleaning and the manufacture of fertiliser from animal meal;
- insufficient information was provided to compare the cleaning properties and methods of use of substances, taking into account other issues such as water consumption, water temperature and use of physical work to remove dirt.

The data collection for the SA BREF review will be performed in a systematic manner by collecting the following information, which should avoid the data shortages mentioned above (see also Section 5.4 of the BREF Guidance):

- consumption of raw and auxiliary materials/feedstocks;
- water use;
- energy use;
- emissions to water;
- emissions to air;
- residues/waste;
- monitoring;
- averages, ranges and distributions of emission values;
- other contextual information (for instance on variability of material processed, on the processes used).

In general, all data and information submitted by TWG members will be directly posted into BATIS by the TWG member providing the data and information. General information can be given in whatever format it is available. For information on 'BAT candidates' and emerging techniques, TWG members should use the standard 10-heading format laid down in the BREF Guidance (see Section 2.3.7.2 of the BREF Guidance). For plant-specific information, a dedicated questionnaire template will be developed involving the whole SA TWG (see Section 4.5).

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

The following table shows the number of installations permitted for activities under points 6.4 (a) and 6.5 of Annex I to the IED.

Member State	Activity 6.4 (a)	Activity 6.5
France	146	39
Germany	132	39
Spain	120	68
Poland	90	47
United Kingdom	90	29
Italy	72	54
Belgium	46	11
Ireland	36	5
The Netherlands	30	14
Denmark	26	11
Czech Republic	24	17
Portugal	23	7
Austria	19	4
Hungary	18	38
Romania	15	7
Sweden	14	10
Finland	9	15
Slovenia	9	11
Greece	8	10
Slovakia	4	1
Bulgaria	2	3
Cyprus	2	3
Estonia	1	1
Latvia	-	1
EU-27	936	442
<i>Source: Reporting of Member States according to the IED (for 2016)</i>		

Request 12: TWG members are asked to provide the total number of installations permitted for IED activities under points 6.4 (a) and 6.5 of Annex I to the IED in each Member State.

A wide range of animal by-products installations (related to activities under point 6.5 of Annex I to the IED) are covered in the current SA BREF. These include: fat melting; rendering; fish-meal and fish-oil production; bone processing; blood processing; gelatine manufacturing; incineration of animal by-products; burning of tallow; landfill and landspreading/injection; biogas production; composting. It would be useful for the TWG to provide information about the number of each dedicated by-products activity.

Some types of animal by-products installations of the current SA BREF could be merged given that they include very similar processes (e.g. fat melting, bone processing and rendering). Other activities do not seem to be relevant at EU level or can be integrated within other animal by-products installations, e.g. glue manufacturing, landfilling, landspreading, biogas production, composting.

Proposal 13: The EIPPCB proposes to focus the data collection for the review of the SA BREF on the following types of animal by-products installations:

- rendering (of bones, feathers, carcasses, fats, blood, skins, ...);
- fish meal and fish-oil production;
- blood processing (plasma and dried red cells production);
- gelatine manufacturing;
- incineration of animal by-products.

Request 13: TWG members are asked to provide the number of installations permitted for IED activities under point 6.5 of Annex I to the IED according to the type of animal by-products installation in each Member State.

The experience from other BREF reviews has shown that the reviewing of a list of plants that could take part in the data collection via a questionnaire takes time, e.g. due to the need to send requests to operators, wait for responses, and finally select the most suitable plants. For this reason, and in the spirit of front-loading the work, it is therefore recommended that TWG members start the process of selecting plants for the data collection **as early as possible** with the aim of having a draft list available in time for the Kick-off Meeting.

Each TWG member's organisation is therefore invited to propose an initial list of **well-performing** plants (including best performers) for the data collection via questionnaires. While there is no formal definition of a 'well-performing plant' in the work on BREFs, it is clear that this refers to plants that are considered to reflect good environmental performances in one or more environmental aspects, e.g. low pollutant emissions, low usage or high recovery/recycling of energy/water/material.

Criteria for selecting plants for the plant-specific data collection through questionnaires include:

- environmental performance;
- the use of 'BAT candidates';
- production capacity – both small and large;
- age – both newer and older;
- processes – single and multi-product, continuous and batch;
- plant categories – representative of all plant categories once decided upon (see Section 2.2);
- geographical distribution – representative for all Member States that have plants in a given subsector, especially when climatic conditions are relevant;
- products/processes that might require a dedicated approach;
- availability of data (including on data confidentiality considerations).

Request 14: TWG members are asked to propose an initial list of well-performing plants for the data collection by filling in Document 3.

4.3 Environmental performance levels

According to the BREF Guidance, the collected data will be used to derive 'environmental performance levels associated with BAT' (i.e. the so-called BAT-AEPLs, which include BAT-AELs), where there is a sound basis for doing so (see Section 3.3. of the BREF Guidance). The TWG should therefore decide at an early stage of the BREF process for which KELs information should be collected (see Section 3) and which units (e.g. mg/Nm³, mg/l, g/t) and averaging periods (e.g. daily average, yearly average, average over the sampling period) should be used (for more information on averaging periods, see Table 3.2 in Section 3.4.4.2 of the JRC Reference Report on [Monitoring of Emissions to Air and Water from IED installations](#)). This will enable the questionnaire template(s) (see Section 4.5) to be tailored to provide the necessary data for the assessment of techniques (i.e. 'BAT candidates') and for the appropriate derivation of BAT conclusions including the setting of relevant BAT-AEPLs (including BAT-AELs).

Proposal 14: The EIPPCB proposes:

- to *generally* express BAT-AEPLs for emissions to air and to water in concentrations, if deemed appropriate coupled with abatement efficiencies;
- during the drafting of the questionnaire(s), to clearly define all parameters influencing emission levels expressed as concentrations and abatement efficiencies (e.g. type of products/raw materials, boundaries of the process, flows of materials, product, pollutants and waste waters, specific operating conditions associated with the manufacture of products).

Proposal 15: For channelled emissions to air, the EIPPCB proposes to *generally* express BAT-AELs as short-term averages, i.e. as daily averages (for continuous measurements) or as averages over the sampling period (for periodic measurements). For emissions to water, the EIPPCB proposes to *generally* express BAT-AELs for direct discharges as daily averages, obtained via 24-hour flow-proportional composite samples.

With regard to potential BAT-associated environmental performance levels (i.e. BAT-AEPLs, including BAT-AELs), other TWGs have commented (in other BREF reviews) that, for the energy-related performance indicators, the same units should be used for energy consumption (for electricity and fossil fuel) when collecting data (e.g. total consumption and specific/production-related consumption in kWh/t of product).

Request 15: TWG members are asked to provide their opinion for specific waste water discharge, energy and water consumption, on which units would be suitable for collecting data for the SA sector (differentiating by process if necessary), e.g. consumption of energy/water per unit of mass of products/materials generated or processed.

4.4 Monitoring of emissions

The JRC Reference Report on Monitoring of Emissions to Air and Water from IED installations (ROM)⁸ summarises information on the monitoring of emissions to air and water from IED installations. It provides practical guidance for the application of the BAT conclusions on monitoring in order to help competent authorities to define monitoring requirements in the permits of IED installations. Moreover, the information and recommendations provided by this document are intended to help the TWG to derive BAT conclusions during the review of BREFs. Chapter 3 of the ROM describes the use of standardised monitoring methods, while Chapter 4 is dedicated to the monitoring of emissions to air including the description of air pollutants and continuous/periodic measurement methods. Finally, Annex A.1 lists European (EN) and international (ISO) standards as well as methods for the measurement of emissions to air for parameters or substances, where these are available.

During the plant-specific data collection via questionnaires, information on monitoring will be collected including on:

- the parameters monitored;
- the monitoring standards used (EN, ISO, other standards);
- the purpose of monitoring (e.g. compliance monitoring, operational control);
- who carries out the monitoring (e.g. operator self-monitoring, regulatory authority);
- monitoring frequencies (continuous, once every year, once every day, etc.);
- units and averaging periods;
- issues regulated by permit conditions, e.g. emission limit values (ELVs).

4.5 Questionnaire(s) for gathering plant-specific data and information

In order to be able to derive BAT-AEPLs (including BAT-AELs), it will be necessary to collect new and updated, representative, reliable and plant-specific real-life data. Typically, a general questionnaire will be used. Depending on the decisions taken by the TWG at the Kick-off Meeting, it might also be necessary to develop tailor-made questionnaire worksheets for specific subsectors.

The format and extent of the questionnaire(s) should ensure that the data and information submitted are relevant to the determination of BAT and that all relevant contextual information necessary to evaluate and compare the data is collected.

In order to ensure data comparability, the following criteria should be fulfilled:

- Data should be obtained using a common methodology/approach.

⁸ European Commission, JRC Reference Report on Monitoring of emissions to air and water from IED installations, 2018)
http://eippcb.jrc.ec.europa.eu/reference/BREF/ROM/ROM_2018_08_20.pdf

- Data should be clearly related to units, relevant reference conditions (e.g. O₂ content in the case of combustion/incineration), and averaging periods.
- Data should be clearly related to applied sampling and monitoring standards. Information on the use of EN/ISO or (other) monitoring standards will be part of the information requested and will be further used in the determination of BAT conclusions, especially with respect to monitoring aspects.
- Data should be expressed in a manner that fully relates the performance to the operating context, distinguishing in particular normal operating conditions from other than normal operating conditions (e.g. start-ups, shutdowns, malfunctions, incidents).

The TWG will contribute to the development of the questionnaire templates by providing proposals for issues to cover and formats, as well as by commenting on draft templates using the BATIS platform.

The draft questionnaire template may be tested on a small number of plants to provide a quality check before the distribution of the final version to all participating plants/installations. To do this, it will be necessary to prepare in advance a list of plants willing to participate in the plant-specific data collection via questionnaires (see Section 4.2).

The final questionnaire will be sent to and collected from operators, followed by a first quality check of the filled-in data and information by the TWG Member State representatives. **This quality check by Member States (foreseen in Section 4.4.2 of the BREF Guidance) is of paramount importance for a correct setting of BAT and BAT-AEPLs and we take this opportunity to stress it.**

For each completed questionnaire from a plant located in its country, the corresponding TWG Member State representative(s) will specifically be asked to:

- ensure the completeness, quality and consistency of the data;
- check the validity of any confidentiality claims, (noting that data should only be considered confidential in exceptional circumstances, see Section 4.6): if some data/information is claimed to be confidential, the Member State representative extracts the confidential part of the questionnaire and sends this separately to the EIPPCB by email together with a justification as to why the information is indeed to be considered confidential;
- upload non-confidential questionnaires directly onto BATIS.

A further quality check of the submitted data and information is the responsibility of all TWG members, including the EIPPCB. All TWG members will be encouraged to participate in the assessment of the submitted data and information.

Request 16: The TWG members are invited to provide their initial positions regarding content and format for questionnaires and/or considerations they deem important with regard to drafting the questionnaire templates.

According to the Chapter 7 of the current SA BREF, the SA TWG attempted to collect data “per tonne of carcase produced” and “per tonne of animal by-product treated” for each unit operation, to allow direct comparisons to be made and to identify the areas with high consumption and emission levels, so that these could be targeted. Large gaps remain in this data.

Request 17: The TWG members are invited to provide their initial positions on collecting data at process level with a view to evaluating the environmental performance of this process. In particular:

- **is monitoring carried out at process level (for instance scalding, chilling)?**
- **for which parameter? (e.g. consumption of energy, water, raw materials, carcase produced, animal by-product treated, etc.)**
- **for which processes?**

Proposal 16: The EIPPCB proposes:

- **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(s) by the EIPPCB followed by the commenting of the whole TWG, if necessary in several iterations;**
 - **the organisation of a questionnaire(s) workshop to finalise the questionnaire(s);**
 - **the testing of the draft final questionnaire(s) by a selected (small) number of plants/installations;**
 - **the preparation of the final questionnaire(s) by the EIPPCB;**
 - **the distribution of the final questionnaire(s) by Member States' representatives, if deemed necessary in cooperation with the other stakeholders, to the participating plants/installations;**
 - **the filling in of the questionnaire(s) 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 and the EIPPCB could have developed);**
 - **the submission of the quality-checked questionnaires to the TWG via BATIS by Member States' representatives.**
- **That the TWG decide on the content and format of the questionnaires during the preparation of the questionnaire as described above.**
- **To collect data over the last three years or for the last three measurement campaigns.**

4.6 Confidentiality issues

It is important to identify and discuss the type of potentially confidential data in advance of launching the data collection, so that the questionnaire can be designed to minimise the collection of confidential data.

Proposal 17: The EIPPCB proposes to design the questionnaire(s) in a way that avoids requesting confidential data as much as possible so that data provided by operators can be posted directly onto BATIS and shared with the whole TWG.

5 TECHNIQUES TO CONSIDER IN THE DETERMINATION OF BAT AND EMERGING TECHNIQUES

5.1 Existing techniques

As a starting point, the EIPPCB proposes to review the 185 techniques to consider in the determination of BAT ('BAT candidates') and 2 emerging techniques which are described in the current BREF.

In the current SA BREF, information in the '*Techniques to consider in the determination of BAT*' and '*Emerging techniques*' chapters was organised under a 9-heading structure. This will need to be expanded to 10 headings as is done for all new and revised BREFs under the IED, namely:

Description*
Technical description*
Achieved environmental benefits
Environmental performance and operational data
Cross-media effects
Technical considerations relevant to applicability
Economics
Driving force for implementation
Example plants
Reference literature

The Description is now split (marked by *). The (first) 'Description' is a brief description of the technique intended to be repeated (copy-pasted) in the BAT conclusions of the revised SA BREF. The 'Technical description' is a more detailed (yet still concise) technical description using, as appropriate, chemical or other equations, pictures, diagrams and flowcharts.

One of the conclusions of the current BREF was that very little data or information was submitted concerning energy-saving techniques (e.g. refrigeration in slaughterhouses, drying in animal by-products installations). Indeed, Chapter 4 of the current BREF contains some techniques to increase energy efficiency that are already covered either by the ENE BREF or the ICS BREF.

Proposal 18: The EIPPCB proposes to collect information on techniques to increase energy efficiency which are SA sector-specific, and avoid duplication of techniques already covered by the ENE BREF and the ICS BREF by making appropriate cross-references to these BREFs in the SA BREF.

Request 18: TWG members are asked to evaluate the 'Techniques to consider in the determination of BAT' and the 'Emerging techniques' in the current SA BREF and to indicate:

- any obsolete techniques, i.e. that are no longer used;
- 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 emerging techniques which could now be considered BAT candidates.

5.2 Additional techniques

Request 19: TWG members are asked to propose any additional technique (not included in the current SA BREF) that could be considered as a BAT candidate or emerging technique.

According to Section 7.6 (*Recommendations for future work*) of the current SA BREF there was a great deal of incomplete information provided about some techniques. It was decided that although there was

insufficient information on some of the techniques to help with the determination of BAT, they should still be included in the document. The incomplete techniques are appended in Section 7.7 (*Techniques not included in Chapter 4, “Techniques to consider in the determination of BAT”, due to lack of sufficient information*) of the SA BREF.

Request 20: TWG members are asked to evaluate the techniques included in the Section 7.7 (*Techniques not included in Chapter 4, “Techniques to consider in the determination of BAT”, due to lack of sufficient information*) of the SA BREF and to indicate:

- **which techniques may be considered as BAT candidates in the BREF review;**
- **what information can be provided.**

The European Commission is currently implementing an external 'innovation observatory' for the SA BREF review. This project is contacting the main EU stakeholders playing a role in the field of technological innovation. This study should highlight a number of emerging techniques, which will be taken into account for the SA BREF review in due time.

6 ANNEX 1: SUMMARY OF PROPOSALS AND REQUESTS

Proposals / requests made in this document (Document 2)	Corresponding part in the Excel template (Document 3)
1. SCOPE	
Proposal 1: The EIPPCB proposes to include in the scope of the SA BREF the activities listed in points 6.4 (a) and 6.5 of IED Annex I.	Worksheet 1. Scope
Proposal 2: The EIPPCB proposes to include in the scope of the SA BREF the IED 6.11 activity (i.e. independently operated treatment of waste water not covered by Directive 91/271/EEC) when the main pollutant load originates from IED 6.4 (a) or 6.5 activities.	
Proposal 3: The EIPPCB proposes to include in the scope of the SA BREF the combined treatment of waste water from different origins provided that the main pollutant load originates from IED 6.4 (a) or 6.5 activities and that the waste water treatment is not covered by Directive 91/271/EEC.	
Proposal 4: The EIPPCB proposes to exclude the treatment and processing of animal raw materials for the production of food after the making of standard cuts for large animals and cuts for poultry from the scope of the SA BREF.	
Proposal 5: The EIPPCB proposes to exclude, from the scope of the SA BREF, on-site combustion plants generating hot gases that are not used for direct contact heating, drying or any other treatment of objects or materials.	
Request 1: The TWG is asked to provide a list of processes in which combustion gases are used for direct contact heating, drying or any other treatment of objects or materials.	
Request 2: TWG members are asked to identify activities related to disposal or recycling of animal carcasses or of animal waste that could be covered by the scope of the WT BREF.	
Request 3: TWG members are asked to provide examples of IED installations for incineration of animal by-products mixed with other type of wastes.	
2. STRUCTURE OF THE BREF AND BAT CONCLUSIONS	

<p>Proposal 6: The EIPPCB proposes to use the following structure for the SA BREF:</p> <ul style="list-style-type: none"> - Preface - Scope - Chapter 1: General information - Chapter 2: General processes and techniques <ul style="list-style-type: none"> o General current emission and consumption levels o General techniques to consider in the determination of BAT o General emerging techniques - Chapter 3: Slaughterhouses <ul style="list-style-type: none"> o Current emission and consumption levels o Techniques to consider in the determination of BAT o Emerging techniques - Chapter 4: Animal by-products installations <ul style="list-style-type: none"> o Current emission and consumption levels o Techniques to consider in the determination of BAT o Emerging techniques - Chapter 5: BAT conclusions - Chapter 6: Concluding remarks and recommendations for future work - References - Glossary of terms and abbreviations - Annexes 	<p>Worksheet 2. BREF structure</p>
<p>Proposal 7: The EIPPCB proposes to use the structure of the current BAT conclusions.</p>	
<p>3. POTENTIAL KEIs</p>	
<p>Request 4: TWG members are asked to provide feedback on the EIPPCB's proposals for KEIs for emissions to water and contextual parameters (see Document 3). Information on emission limit values and monitoring on proposed KEIs is also expected.</p>	<p>Worksheet 3. KEI water</p>
<p>Request 5: TWG members are asked to provide initial positions on additional candidate KEIs for emissions to water, if any, accompanied by a rationale addressing the criteria mentioned in Section 3.1. Information on emission limit values and monitoring of these additional candidate KEIs is also expected.</p>	
<p>Request 6: TWG members are asked to provide feedback on the EIPPCB's proposals for KEIs for emissions to air and contextual parameters (see Document 3). Information on emission limit values and monitoring on proposed KEIs is also expected.</p>	<p>Worksheet 3. KEI air</p>
<p>Request 7: TWG members are asked to provide initial positions on additional candidate KEIs for emissions to air, if any, accompanied by a rationale addressing the criteria mentioned in Section 3.1. Information on emission limit values and monitoring of these additional candidate KEIs is also expected.</p>	
<p>Proposal 8: The EIPPCB proposes to include energy efficiency as a KEI for slaughterhouses.</p>	<p>Worksheet 3. KEI consumption</p>
<p>Request 8: TWG members are asked to provide initial positions on specific processes in slaughterhouses for which energy consumption is significant and consumption data can be obtained (e.g. cooling systems, boilers, scalding, pig singeing, chilling of carcasses).</p>	
<p>Proposal 9: The EIPPCB proposes to include energy consumption as a KEI for animal by-products installations.</p>	
<p>Proposal 10: The EIPPCB proposes to include energy efficiency (electricity, heat) and boiler efficiency as a KEI for installations incinerating animal by-products.</p>	

<p>Request 9: TWG members are asked to provide initial positions on specific processes in animal by-products installations for which energy consumption is significant and consumption data can be obtained during the BREF review process (e.g. drying processes).</p>	
<p>Proposal 11: The EIPPCB proposes to include water consumption and the amount of waste water discharged as KEIs for slaughterhouses.</p>	
<p>Request 10: TWG members are asked to provide their initial positions on specific processes in slaughterhouses for which water consumption is significant and consumption data can be obtained during the BREF review process (e.g. cleaning of floor areas and equipment, vehicle washing, lairage washing, carcase washing, de-feathering, scalding).</p>	
<p>Proposal 12: The EIPPCB proposes to include water consumption and the amount of waste water discharged as KEIs for animal by-products installations.</p>	
<p>Request 11: TWG members are asked to provide initial positions on specific processes in animal by-products installations for which water consumption is significant and consumption data can be obtained during the BREF review process (e.g. cleaning of floor areas and equipment, boilers and condensers).</p>	
<p>4. DATA COLLECTION</p>	
<p>Request 12: TWG members are asked to provide the total number of installations permitted for IED activities under points 6.4 (a) and 6.5 of Annex I to the IED in each Member State.</p>	<p>Worksheet 4. Selection of plants</p>
<p>Proposal 13: The EIPPCB proposes to focus the data collection for the review of the SA BREF on the following types of animal by-products installations:</p> <ul style="list-style-type: none"> - Rendering (of bones, feathers, carcasses, fats, blood, skins, ...); - Fish meal and fish-oil production; - Blood processing (plasma and dried red cells production); - Gelatine manufacturing; - Incineration of animal by-products. 	
<p>Request 13: TWG members are asked to provide the number of installations permitted for IED activities under point 6.5 of Annex I to the IED according to the type of animal by-products installation in each Member State.</p>	
<p>Request 14: TWG members are asked to propose an initial list of well-performing plants for the data collection by filling in Document 3.</p>	
<p>Proposal 14: The EIPPCB proposes:</p> <ul style="list-style-type: none"> • to <i>generally</i> express BAT-AEPLs for emissions to air and to water in concentrations, if deemed appropriate coupled with abatement efficiencies; • during the drafting of the questionnaire(s), to clearly define all parameters influencing emission levels expressed as concentrations and abatement efficiencies (e.g. type of products/raw materials, boundaries of the process, flows of materials, product, pollutants and waste waters, specific operating conditions associated with the manufacture of products). 	<p>Worksheet 4. Data collection issues</p>
<p>Proposal 15: For channelled emissions to air, the EIPPCB proposes to generally express BAT-AELs as short-term averages, i.e. as daily averages (for continuous measurements) or as averages over the sampling period (for periodic measurements). For emissions to water, the EIPPCB proposes to generally express BAT-AELs as daily averages, obtained via 24-hour flow-proportional composite samples.</p>	

<p>Request 15: TWG members are asked to provide their opinion for specific waste water discharge, energy and water consumption, on which units would be suitable for collecting data for the SA sector (differentiating by process if necessary), e.g. consumption of energy/water per unit of mass of products/materials generated or processed.</p>	
<p>Request 16: The TWG members are invited to provide their initial positions regarding content and format for questionnaires and/or considerations they deem important with regard to drafting the questionnaire templates.</p>	
<p>Request 17: The TWG members are invited to provide their initial positions on collecting data at process level with a view to evaluating the environmental performance of this process. In particular:</p> <ul style="list-style-type: none"> - is monitoring carried out at process level (for instance scalding, chilling)? - for which parameter? (e.g. consumption of energy, water, raw materials, carcase produced, animal by-product treated, etc.) - for which processes? 	
<p>Proposal 16: The EIPPCB proposes:</p> <ul style="list-style-type: none"> • To follow the established BREF process for the collection of plant/installation-specific data via questionnaires including the following: <ul style="list-style-type: none"> ○ the preparation of the draft questionnaire(s) by the EIPPCB followed by the commenting of the whole TWG, if necessary in several iterations; ○ the organisation of a questionnaire(s) workshop to finalise the questionnaire(s); ○ the testing of the draft final questionnaire(s) by a selected (small) number of plants/installations; ○ the preparation of the final questionnaire(s) by the EIPPCB; ○ the distribution of the final questionnaire(s) by Member States' representatives, if deemed necessary in cooperation with the other stakeholders, to the participating plants/installations; ○ the filling in of the questionnaire(s) 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 and the EIPPCB could have developed); ○ the submission of the quality-checked questionnaires to the TWG via BATIS by Member States' representatives. • That the TWG decide on the content and format of the questionnaires during the preparation of the questionnaire as described above. • To collect data over the last three years or for the last three measurement campaigns. 	
<p>Proposal 17: The EIPPCB proposes to design the questionnaire(s) in a way that avoids requesting confidential data as much as possible so that data provided by operators can be posted directly onto BATIS and shared with the whole TWG.</p>	

5. TECHNIQUES TO CONSIDER IN THE DETERMINATION OF BAT AND EMERGING TECHNIQUES	
<p>Proposal 18: The EIPPCB proposes to collect information on techniques to increase energy efficiency which are SA sector-specific, and avoid duplication of techniques already covered by the ENE BREF and the ICS BREF by making appropriate cross-references to these BREFs in the SA BREF.</p>	
<p>Request 18: TWG members are asked to evaluate the 'Techniques to consider in the determination of BAT' and the 'Emerging techniques' in the current SA BREF and to indicate:</p> <ul style="list-style-type: none"> • any obsolete techniques, i.e. that are no longer used; • 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 emerging techniques which could now be considered BAT candidates. 	<p>Worksheets</p> <ul style="list-style-type: none"> 5. General BAT cand, 5. Slaughterhouses BAT cand, 5. Animal By-Prod BAT cand and 5. Emerging techs
<p>Request 19: TWG members are asked to propose any additional technique (not included in the current SA BREF) that could be considered as a BAT candidate or emerging technique.</p>	<p>Worksheet</p> <ul style="list-style-type: none"> 5. Additional BAT candidates
<p>Request 20: TWG members are asked to evaluate the techniques included in the Section 7.7 (<i>Techniques not included in Chapter 4, "Techniques to consider in the determination of BAT", due to lack of sufficient information</i>) of the SA BREF and to indicate:</p> <ul style="list-style-type: none"> • which techniques may be considered as BAT candidates in the BREF review; • what information can be provided. 	<p>Worksheet</p> <ul style="list-style-type: none"> 5. Techniques-Section 7.7

7 ANNEX 2: OVERVIEW OF KEIS AS MENTIONED IN THE SA BREF

7.1 Slaughterhouses

<i>Emissions to water and water consumption</i>	<i>Emissions to air</i>	<i>Energy consumption</i>
<ul style="list-style-type: none"> • BOD, COD, TSS, nitrogen and phosphorus emissions to water from the slaughter process. Zinc from pig feed residues and chlorides from hides/skin salting. • Water consumption during cleaning and other processes, e.g. skin removal, carcase washing. 	<ul style="list-style-type: none"> • Dust emissions from the unloading of poultry and the hanging of live birds on the slaughter-line. • Odour emitted from storage and handling of by-products, animal reception. • Noise emissions from animal reception and carcase splitting, vehicle movements, compressors, air conditioners, ventilation fans, aerators in the WWTP. 	<ul style="list-style-type: none"> • For refrigeration and to heat water.

7.2 Animal by-products installations

<i>Process</i>	<i>Emissions to water and water consumption</i>	<i>Emissions to air and energy consumption</i>
Fat melting	<ul style="list-style-type: none"> • Not relevant 	<ul style="list-style-type: none"> • Energy consumption during the melting process and at decanters, centrifuges and crushers. • Odour emissions during the dry melting process. • Noise emissions from vehicles and refrigeration equipment.
Rendering	<ul style="list-style-type: none"> • Waste water generated from the vapour condensate. 	<ul style="list-style-type: none"> • Odour emissions associated with the handling and storage of raw material, products and solids, liquid effluents and process gases. • Energy consumption for drying
Fish meal and fish-oil production	<ul style="list-style-type: none"> • Waste water mixed with seawater. 	<ul style="list-style-type: none"> • Odour from the degradation of the fish. • Energy consumption for cooking and drying.
Blood and bone processing	<ul style="list-style-type: none"> • Waste water generated contains organic and nitrogen loads. • Water consumption for cleaning. 	<ul style="list-style-type: none"> • Odour emissions from blood tanks and the heat treatment of protein. • Energy consumption for spray drying and refrigeration. • Noise emissions from spray dryers in blood processing.
Gelatine manufacture	<ul style="list-style-type: none"> • Water consumption during the early stages of the extraction process. • Waste water generated contains organic and nitrogen loads. 	<ul style="list-style-type: none"> • Energy consumption for drying process.
Glue manufacture	<ul style="list-style-type: none"> • Not relevant 	<ul style="list-style-type: none"> • Odour emissions from the liming pit and from drying. • Energy consumption for drying process.

<i>Process</i>	<i>Emissions to water and water consumption</i>	<i>Emissions to air and energy consumption</i>
Dedicated incineration of carcasses/animal meal	<ul style="list-style-type: none"> • Not relevant 	<ul style="list-style-type: none"> • Emissions to air: particulate matter; hydrogen chloride; oxides of sulphur, nitrogen and carbon; organic compounds, such as dioxins. • Odour from handling, storing or processing of animal by-products.
Composting	<ul style="list-style-type: none"> • Risk of liquid run-off contaminating soil and groundwater. 	<ul style="list-style-type: none"> • Dust and bioaerosols emissions. • Odour from the raw materials and during the composting process, especially during windrow composting.
Landspreading of compost, biogas digestate	<ul style="list-style-type: none"> • Not relevant 	<ul style="list-style-type: none"> • Odour emissions.
Biogas production	<ul style="list-style-type: none"> • Not relevant 	<ul style="list-style-type: none"> • Accidental releases of CH₄. • Odour from raw materials and from the process.

8 ANNEX 3: PRELIMINARY LIST OF POSSIBLE POLLUTANTS FROM SLAUGHTERHOUSES AND ANIMAL BY-PRODUCTS INSTALLATIONS

The acronyms used for sources in the list below are those referred to in Section 3.2.

8.1 Emissions to water

8.1.1 Slaughterhouses

Substances / groups of substances and parameters		Referred to in sources
	pH	AT, EL, FI, FR, IE, IT, PT, Nordic, SA BREF
	Temperature	AT, EL, FI, FR, IE, IT, Nordic, EHS, SA BREF
	Conductivity	IE, SA BREF
Solids	Sedimentable solids	AT
	Total suspended solids (TSS)	AT, EL, ES, FI, FR, IE, IT, PT, Nordic, UK, EHS, EPA, SA BREF
Organic compounds	Chemical oxygen demand (COD)	AT, DE, EL, ES, FI, FR, IE, IT, PT, Nordic, UK, EHS, EPA, SA BREF
	Total organic carbon (TOC)	AT, Nordic, E-PRTR
	Biochemical oxygen demand (BOD ₅)	AT, DE, EL, ES, FI, FR, IE, IT, PT, Nordic, UK, EHS, EPA, SA BREF
	(Low) Volatile lipophilic substances	AT
	Mineral oil	IE
	Fats, oil and grease (FOG)	EL, ES, FI, FR, IE, IT, PT, UK, Nordic, EHS, EPA, SA BREF
	AOX	AT
Nitrogen	Total nitrogen (TN)	AT, DE, EL, ES, FI, FR, IE, PT, Nordic, EHS, EPA, E-PRTR, SA BREF
	Ammonium-N	AT, DE, IE, IT, EPA, SA BREF
	NO ₂ -N	IT, EPA
	NO ₃ -N	IE, IT, EPA, SA BREF
	Total Kjeldahl N	IE, EPA

Substances / groups of substances and parameters		Referred to in sources
Phosphorus	Total phosphorus (TP)	AT, DE, EL, ES, FI, FR, IE, IT, PT, Nordic, EHS, EPA, E-PRTR, SA BREF
	Orto-phosphate	IE, IT
Anions	Chloride	AT, IE, IT, E-PRTR, SA BREF
Microbes	Total coliform bacteria/Fecal coliforms	IE, EHS, EPA
Toxicity	Number of Toxicity Units (TU)	IE
Aluminium		IE
Detergents		IE
Mineral oil		IE
Chlorine		IE
Surfactants		IT
Ni		E-PRTR
Pb		E-PRTR
Zn		FR, E-PRTR, SA BREF

8.1.2 Animal by-products installations

Substances / groups of substances and parameters		Referred to in sources
	pH	AT, EL, ES, FR, IE, IT, Nordic, EPA, SA BREF
	Temperature	AT, EL, FR, IE, Nordic
	Conductivity	ES, SA BREF
Solids	Total suspended solids (TSS)	AT, EL, ES, FI, FR, IE, IT, Nordic, UK, EPA, SA BREF
Organic compounds	Chemical oxygen demand (COD)	AT, DE, EL, ES, FI, FR, IE, IT, Nordic, UK, EPA, SA BREF
	Total organic carbon (TOC)	AT, Nordic
	Biochemical oxygen demand (BOD ₅)	AT, DE, EL, ES, FI, FR, IE, IT, Nordic, UK, EPA, SA BREF
	(Low) Volatile lipophilic substances	AT

Substances / groups of substances and parameters		Referred to in sources
	Sum of hydrocarbons	AT, IT
	Mineral oil	IE
	FOG	ES, FI, FR, IE, IT, Nordic, UK, EPA, SA BREF
	AOX	AT, FR, SA BREF
Nitrogen	Total nitrogen (TN)	AT, DE, EL, FI, FR, IE, EPA, SA BREF
	Ammonium-N	AT, DE, ES, FI, IE, IT, UK, EPA
	NO ₂ -N	IT, EPA, SA BREF
	NO ₃ -N	FR, IE, IT, EPA, SA BREF
	Total Kjeldahl N	FR, EPA
Phosphorus	Total phosphorus (TP)	AT, DE, EL, FI, FR, IE, IT, Nordic, EPA, SA BREF
	Orto-phosphate	IE
Anions	Sulphide (S ²⁻)	AT, IT, SA BREF
	Sulphate (SO ₄ ²⁻)	IT, SA BREF
	Chloride	AT, IT
Microbes	Total coliform bacteria/Fecal coliforms	EL, IT, EPA
Toxicity	Fish toxicity	AT
	Number of Toxicity Units (TU)	IE
Mineral oil		IE
Phenols		IT
Iron		IT
Surfactants		IT

8.2 Emissions to air

8.2.1 Slaughterhouses

Substances groups / of substances and parameters	Process	Referred to in sources
Odour	Animal reception and lairage	DE, ES, Nordic, UK, EHS, SA BREF
	Scalding	DE, UK, EBRD, EHS
	Storage and handling of animal by-products	EL, ES, FI, IE, IT, UK, EBRD, SA BREF
	Pig singeing	FI, UK, EBRD, EHS
	Blood tanks	DE, IT, UK
	WWTP	ES, FI, Nordic, UK, EBRD, EHS
	Slaughter and dressing lines	DE
	Paunch manure collection point	UK
	Leaking ducts on rendering equipment	EBRD
	Stunning and de-bleeding	Nordic
	Cleaning of casing	Nordic
	Transport to and from facility	Nordic
	No specific process indicated	AT
Odour units	Immission level in the perimeter of the installation	ES, FR
Dust	Animal reception and lairage	ES, IE (poultry), UK, EBRD, EHS, SA BREF (poultry)
	Pig singeing	IT, PT, EBRD, EHS
	Hanging of live birds on the slaughter-line	SA BREF
PM ₁₀	Animal reception and lairage	ES
NH ₃	Animal reception and lairage	ES, UK, SA BREF
	Cooling systems	ES, FI, UK, EBRD
	No specific process indicated	IE, E-PRTR
CH ₄	Animal reception and lairage	ES

Substances groups / of substances and parameters	Process	Referred to in sources
N ₂ O	No specific process indicated	E-PRTR
Amines	No specific process indicated	IE
Noise	Animal reception and lairage	IT, UK, SA BREF
	Stunning	UK, EBRD, EHS
	Saws, pullers, blowers	UK, EBRD, EHS, SA BREF
	Cooling systems	IT, Nordic, UK
	Condensers, ventilation and pressurised air equipment	IT, Nordic, EBRD, EHS, SA BREF
	Vehicle movements	IT, Nordic, SA BREF
	Pig dehairing machine	UK
	No specific process indicated	AT
CFCs	Cooling systems	EL, EBRD
HFCs	Cooling systems	EL, E-PRTR
HCFCs	Cooling systems	ES, UK, EBRD, E-PRTR
NO _x /NO ₂	Pig singeing	ES, IT, PT
	No specific process indicated	E-PRTR
SO _x /SO ₂	Pig singeing	PT
CO	Pig singeing	ES, IT, PT
Ni	No specific process indicated	E-PRTR
H ₂ S	Pig singeing	PT
Total hydrogen sulphide, sulphides and mercaptans (expressed as S)	No specific process indicated	IE
VOC	Pig singeing	PT
NMVOC	Pig singeing	PT
TOC	Pig singeing	PT

Substances groups / of substances and parameters	Process	Referred to in sources
	No specific process indicated	IE
Alkaline substances	Car and trolley washing	IT
Phosphates	Car and trolley washing	IT

8.3 Animal by-products installations

Substances groups / of substances and parameters	Process	Referred to in sources
Odour	Rendering process	DE, EL, IT, UK (cooking of material, contaminated vehicles, surfaces and containers, odour arrestment plant), EHS, SA BREF
	Fat melting	DE, Nordic, SA BREF (dry melting process)
	Storage and handling of animal by-products	EL, FI, IT, Nordic (rendering), UK (rendering), SA BREF
	Fish meal and fish-oil production	SA BREF (degradation of the fish)
	Blood processing/Production of plasma	DE (blood tanks), UK (blood tanks), SA BREF (blood tanks, heat treatment of protein)
	Bone processing	SA BREF (heat treatment of protein)
	Biogas production	SA BREF (raw materials)
	Composting	EL (composting), SA BREF
	WWTP	FI, Nordic, UK, EHS
	Transport to and from facility	Nordic
	No specific process indicated	AT, IE
Odour units	Rendering	ES (perimeter of the installation), FR (biofilter), IT
	Biogas production	ES (perimeter of the installation), IT
	Composting	FR (perimeter of the installation)
Dust	Rendering	EL, FR, IE, IT, PT, UK, EPA (screw press, dryers), SA BREF
	Incineration of animal by-products	EL, FR, SA BREF

Substances groups of substances and parameters	Process	Referred to in sources
	Fish meal and fish-oil production	ES, PT (dryers)
	Blood processing/Production of plasma	SA BREF (dryers)
	Composting	SA BREF
	Biogas production	IT
PM ₁₀	Rendering	EPA (blood dryer)
NH ₃	Rendering	FR, IE, IT, EPA (blood dryer), SA BREF
	Incineration of animal by-products	FR, SA BREF
	Cooling systems	ES, FI, UK
	Biogas production	IT
Amines	Rendering	FR, IE
Aldehydes	Rendering	IT
	Biogas production	IT
VOC	Rendering	FR, IT, PT
	Incineration of animal by-products	EL, FR, SA BREF
	Fish meal and fish-oil production	PT (dryer)
	Biogas production	IT
TOC	Rendering	FR, IT
	Incineration of animal by-products	FR
	No specific process indicated	IE
	Biogas production	IT
NMVOC	Rendering	PT
	Fish meal and fish-oil production	PT
	Biogas production	IT

Substances groups of substances and parameters	Process	Referred to in sources
TOC	Rendering	ES, IT
	Fish meal and fish-oil production	ES
	Manure processing	ES
CO	Rendering	ES, FR, IT, PT, UK
	Incineration of animal by-products	EL, FR
	Fish meal and fish-oil production	ES, PT
	Biogas production	ES, IT, SA BREF
CH ₄	Rendering	FR
Noise	Dryers	EPA (rendering), SA BREF (blood processing)
	Rendering	EPA
	Biogas production	IT
	Cooling systems	Nordic, UK, SA BREF (fat melting)
	Condensers, ventilation and pressurised air equipment	Nordic, UK (rendering)
	Vehicle movements	Nordic, UK (rendering), SA BREF (fat melting)
	No specific process indicated	AT
CFCs	Cooling systems	EL
HFCs	Cooling systems	EL
HCFCs	Cooling systems	ES, UK
NO _x /NO ₂	Rendering	ES, EL, IE, IT, PT, UK, SA BREF
	Incineration of animal by-products	EL, FR, SA BREF
	Fish meal and fish-oil production	EL, PT
	Biogas production	ES, IT
SO _x /SO ₂	Rendering	EL, ES, FR, IE, IT, PT, UK, SA BREF

Substances groups of substances and parameters	Process	Referred to in sources
	Incineration of animal by-products	EL, FR, SA BREF
	Fish meal and fish-oil production	PT
	Biogas production	ES, IT
HCl	Rendering	ES, FR
	Incineration of animal by-products	EL, FR, SA BREF
HF	Rendering	ES, FR
	Incineration of animal by-products	EL, FR, SA BREF
Dioxins and furans	Rendering	FR
	Incineration of animal by-products	EL, FR, SA BREF
H ₂ S	Rendering	FR, IE, IT, PT, EPA (blood dryer)
	Fish meal and fish-oil production	PT
	Manure processing	PT
	Biogas production	IT
Mercaptans	Rendering	FR, IE
Cd+Tl	Rendering	ES, PT
	Incineration of animal by-products	EL, FR, SA BREF
	Fish meal and fish-oil production	PT
Hg	Rendering	ES, PT
	Incineration of animal by-products	EL, FR, SA BREF
	Fish meal and fish-oil production	PT
Sb+As+Pb+Cr+Co+Cu+Mn+Ni+V	Rendering	ES, PT
	Incineration of animal by-products	EL, FR, SA BREF
	Fish meal and fish-oil production	PT