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EVALUATION

of the Industrial Emissions Directive (IED)

DIRECTIVE 2010/75/EU OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 24 November 2010 on industrial emissions (integrated pollution prevention and control)

{SWD(2020) 182 final}

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Glossary

Term or acronym	*Meaning or definition*
Policies	
Circular Economy Action Plan	https://ec.europa.eu/environment/circular-economy/index_en.htm
Clean Air	https://ec.europa.eu/environment/air/index_en.htm
Industrial Emissions	https://ec.europa.eu/environment/industry/stationary/index.htm
Water	https://ec.europa.eu/environment/water/index_en.htm
Pollutants	
Cd	Cadmium
CO_2	Carbon Dioxide
Hg	Mercury
N	Nitrogen
NH_3	Ammonia
Ni	Nickel
NMVOC	Non-Methane VOC
NO_X	Nitrogen Oxides
P	Phosphorous
Pb	Lead
PM	Particulate Matter
SO_2	Sulphur Dioxide
TiO_2	Titanium Dioxide
TOC	Total Organic Carbon
TSS	Total Suspended Solids
VOC	Volatile Organic Compounds
Abbreviations	
ACCESSA	Association for Catalytic Control of Emissions from Stationary Sources
BAT	Best Available Techniques

BATc	BAT conclusions
BAU	Business as usual
BAT-AEL	BAT-Associated Emission Level
BAT-AEPL	BAT-Associated Environmental Performance Level
BREF	Best Available Techniques Reference Document
CER	Ceramic Manufacturing Industry
CIRCABC	Communication and Information Resource Centre for Administrations, Businesses and Citizens - a collaborative tool used to share information and resources on the internet
CLM	Cement, Lime and Magnesium Oxide Production
ECD	Environmental Crime Directive
EIPPCB	European Integrated Pollution Prevention and Control Bureau, part of the Joint Research Centre
ELV	Emission Limit Value
EPPSA	European Power Plants Suppliers Association
E-PRTR	European Pollutant Release and Transfer Register
ESWET	European Suppliers of Waste-to-Energy Technology
ETS	(EU) Emissions Trading System
FDM	Food, Drink and Milk Industries
FMP	Ferrous Metals Processing Industry
GHG	Greenhouse Gas
GBR	General Binding Rules
GLS	Manufacture of Glass
IA	Impact Assessment
IED	Industrial Emissions Directive
INSPIRE	Infrastructure for Spatial Information in the European Community
IPPCD	Integrated Pollution Prevention and Control Directive
IRPP	Intensive Rearing of Poultry or Pigs
IS (I&S)	Iron and Steel
LCP	Large Combustion Plant

LCPD	Large Combustion Plants Directive
LOD	Limit of Detection
LVIC	Large Volume Inorganic Chemicals
LVOC	Large Volume Organic Chemicals
MS	(EU) Member States
NECD	National Emission Ceilings Directive
NFM	Non-ferrous Metals Industries
NGO	Non-governmental organisations
OPC	Open Public Consultation
PP (P&P)	Production of Pulp, Paper and Board
RAINS	Regional Air Pollution Information and Simulation model
REACH	Registration, Evaluation, Authorisation and Restriction of Chemicals
REF	Refineries
RSB	Regulatory Scrutiny Board
SA	Slaughterhouses and Animals By-products Industries
SE	Solvent Using Activities
SF	Smitheries and Foundries
SED	Solvent Emissions Directive
STM	Surface Treatment of Metals and Plastics
STS	STS - Surface Treatment Using Organic Solvents
TAN	Tanning of Hides and Skins
TNP	Transitional National Plan
TWG	Technical Working Group
UWWTD	Urban Waste Water Treatment Directive
WI	Waste Incineration and Co-incineration Plant
WT	Waste Treatment
WID	Waste Incineration Directive
WWTP	Waste Water Treatment Plant

1. INTRODUCTION

This evaluation is being completed while the EU is working to implement the European Green Deal Communication adopted in December 2019[1]. This Staff Working Document (SWD) provides therefore important elements for informing this work, in particular with regard to the Zero Pollution ambition for a toxic-free environment.

The Industrial Emissions Directive[2] 2010/75/EU (IED) is the main instrument in place at the EU level to control and mitigate the environmental and human health impacts from industrial emissions in the EU. The IED regulates around 52 000 of the largest industrial installations covering a range of agro-industrial sectors. These include: power plants, refineries, and production of steel, non-ferrous metals, cement, lime, glass, chemicals, pulp and paper, food and drink as well as waste treatment and incineration and the intensive rearing of pigs and poultry. The general objective of the IED is to prevent, reduce and eliminate as far as possible emissions into air, water and soil and remediate soil pollution arising from industrial activities.

The IED installations account for about 20% of pollutant emissions by mass to air and a similar share of emissions to water. While IED sectors are large GHG emitters (around 40% of total EU GHG emissions), their CO_2 emissions are mainly regulated under the EU Emissions Trading System (ETS) and, as stipulated by the IED itself, their IED permit shall not include an emission limit value for that gas. Nevertheless, there are a number of IED installations whose CO_2 emissions are not regulated by the ETS, and there are emissions of GHGs other than CO_2 from IED installations, most of which are not regulated by the ETS. Altogether, it is estimated that around 10% of GHG emissions of IED plants are not covered by the ETS, representing around 4% of total EU GHG emissions[3].

This evaluation provides a particularly timely opportunity to assess how well the current legal framework on industrial emissions is working, how relevant it remains in light of the stated EU policy ambitions, and the degree to which it achieved its intended impacts. It includes a review of the implementation of the IED based on Member States reports and complementary information held by the Commission.

The evaluation has been carried out in line with the European Commission's Better Regulation guidelines[4]. Evidence gathering and its analysis was carried out with the support of independent experts. This SWD was supported by their report[5]. Other

[1] https://ec.europa.eu/info/sites/info/files/european-green-deal-communication-annex-roadmap_en.pdf
[2] https://ec.europa.eu/environment/industry/stationary/ied/legislation.htm
[3] Estimation based on E-PRTR data.
[4] https://ec.europa.eu/info/law/law-making-process/planning-and-proposing-law/better-regulation-why-and-how/better-regulation-guidelines-and-toolbox_en
[5] Ricardo Energy & Environment, Umweltbundesamt (AT), Milieu (2020) ,"Support to the evaluation of the Industrial Emissions Directive (Directive 2010/75/EU)", https://europa.eu/!nY63hc

evaluations have recently been concluded for legislation with which the IED interacts strongly, notably on air quality[6], water management[7], and urban waste water treatment[8]. The relevant aspects of those interactions have been considered in this evaluation.

The general public, industrial stakeholders, public authorities, and representatives of civil society have been consulted throughout the process. The evaluation assesses the legislation against the five standard criteria of effectiveness, efficiency, coherence, relevance and EU-added value. It primarily covers the period from adoption of the IED, in 2010, to the present; however, in some aspects (e.g. emissions of large combustion plants), it was pertinent to look back further to its predecessor legislation.

In terms of legislation, the evaluation covers the IED, including the information exchange process for elaborating Best Available Techniques Reference Documents (BREFs)[9]. It covers all activities within the scope of Annex I to the IED and the whole of the EU. It also covers the following main implementing decisions adopted under the IED that govern its implementation:

- the Commission Decision setting up the IED Forum[10];
- the BREF Guidance[11].

The 17 implementing decisions containing the conclusions on Best Available Techniques (BAT conclusions) adopted so far under the IED are not individually assessed as part of the evaluation, but are indirectly addressed as a whole for the following reasons:

- The process to derive the BAT conclusions is analysed in detail and applies to all those adopted;
- The effectiveness of the IED is mainly the cumulative effectiveness of the implementation of the BAT conclusions;
- Most evaluation questions, e.g. on efficiency, apply to the BREF process, and consequently to the drawing up of all BAT conclusions. Where issues specific to individual BAT conclusions have been raised (usually by stakeholders) or assessed in studies, they have been documented.

A number of other implementing acts adopted under the IED have not been included in the evaluation. These are the following ones:

[6] SWD(2019) 427 final, https://ec.europa.eu/environment/air/pdf/SWD_2019_427_F1_AAQ%20Fitness%20Check.pdf
[7] SWD(2019) 439 final, https://ec.europa.eu/environment/water/fitness_check_of_the_eu_water_legislation/documents/Water%20Fitness%20Check%20-%20SWD(2019)439%20-%20web.pdf
[8] SWD(2019) 700 final, https://ec.europa.eu/environment/water/water-urbanwaste/pdf/UWWTD%20Evaluation%20SWD%20448-701%20web.pdf
[9] This is referred to as the "BREF process" and is described in detail in Section 3.3.
[10] 2011/C 146/03, https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32011D0517(01)
[11] 2012/119/EU, https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=uriserv:OJ.L_.2012.063.01.0001.01.ENG

- Implementing rules on the determination of start-up and shut-down periods for large combustion plants[12] are not included because they cover a very specific technical issue;
- Implementing rules on transitional national plans[13] for ensuring compliance of Large Combustion Plants (LCPs) with IED requirements are time-limited and all expire in 2020;
- Implementing rules for Member State reporting[14] are not addressed, but they provide some of the data used in the evaluation.

This evaluation will also feed into an Impact Assessment on the revision of the IED, seeking to ensure its fullest contribution to the Zero Pollution ambition and coherence with other policy objectives, such as industrial decarbonisation, also taking note of the Masterplan[15] adopted by the High Level Group on Energy Intensive Industries, and a cleaner and more circular economy to the benefit of both public health and enhanced resilience of natural ecosystems, in line with the European Green Deal Communication.

2. BACKGROUND TO THE INTERVENTION

2.1. Description of the intervention and its objectives

Industry is responsible for a significant share of overall environmental impacts. The IED is the main EU legislation regulating the environmental impacts of large agro-industrial sources. It combines and strengthens requirements previously set under seven different EU Directives (see Annex 5 for details of legal instruments), namely:

- The Integrated Pollution Prevention and Control Directive (IPPCD)[16]
- The Large Combustion Plants Directive (LCPD) [17]
- The Waste Incineration Directive (WID) [18]
- The Solvent Emissions Directive (SED)[19]
- Council Directive 78/176/EEC on waste from the titanium dioxide industry[20]
- Council Directive 82/883/EEC on procedures for the surveillance and monitoring of environments concerned by waste from the titanium dioxide industry[21]
- Council Directive 92/112/EEC on procedures for harmonising the programmes for the reduction and eventual elimination of pollution caused by waste from the titanium dioxide industry[22]

[12] 2012/249/EU, https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32012D0249
[13] 2012/115/EU, https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32012D0115
[14] (EU) 2018/1135, https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32018D1135
[15] https://ec.europa.eu/docsroom/documents/38403

[16] Directive 2008/1/EC, https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32008L0001
[17] Directive 2001/80/EC, https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32001L0080
[18] Directive 2000/76/EC, https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32000L0076
[19] Directive 1999/13/EC, https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:31999L0013
[20] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A31978L0176
[21] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A31982L0883
[22] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A31992L0112

As an example of better regulation, the IED was introduced following a review of the industrial pollution policy framework[23]. The motivation was to further control industrial pollution, while simplifying regulations, lowering the administrative burden, and improving enforcement. It aimed to support innovation and provide better coherence with other aspects of EU environmental policy acquis (specifically concerning air, water, soil, waste, circular economy).

2.2. Objectives of the IED and problems it is intended to solve

The IED is intended to respond to a number of needs. The first is to support a high level of protection of human health and the environment by preventing, reducing and eliminating, as far as possible, adverse impacts arising from industrial activities (e.g. emissions to air, water and soil, waste, resource consumption). The second is to ensure a level playing field for operators within sectors and across the EU for industrial pollution prevention and control. The third is to ensure access to information, public participation in decision-making and access to justice on industrial activities' environmental permitting and performance. The fourth is to reduce unnecessary or excessive administrative costs for economic operators from previous legislation controlling industrial emissions.

In response to these needs, the IED has a number of objectives. These include:

- to establish a framework for the control and permitting of the main industrial activities;
- to avoid distortion of competition by ensuring consistent environmental requirements for all economic operators within each sector;
- to ensure that permitting of industrial installations is based on best available techniques;
- to stimulate innovation by encouraging the development and application of emerging techniques;
- to ensure simplification and clarity of the legal framework and reduce or avoid unnecessary administrative burden.

2.3. Key requirements and principles

Scope of the Directive

More industrial activities fall under the scope of the IED than under its preceding legislation, the IPPCD. In 2015, around 51 700 installations were reported as undertaking industrial activities within the scope of the IED. Implementation of the IED, while driven by EU actions, is therefore much decentralised. It depends on the correct and consistent implementation by a large number of competent authorities across the EU.

[23] https://ec.europa.eu/environment/archives/air/stationary/ippc/ippc_revision.htm

The IED is based on several principles, in particular: an integrated approach to pollution prevention and control, the use of best available techniques in permitting, flexibility, inspections and monitoring, public participation and access to justice.

Integrated Approach and Permitting

The IED requires that emissions from industrial sources are dealt with in an integrated way and minimised. All installations conducting activities listed in IED Annex I are required to operate according to a permit issued by the competent authority of the concerned Member State, and reflecting the principles and provisions stipulated by the IED. These are the general requirements set out in Chapters I and II of the IED. The permit extends to all environmental aspects of an installation's operating activities, including emissions of pollutants to air, water and soil, waste generation, resource use, noise, odour prevention of accidents and restoration of the site upon closure.

For certain activities, i.e. large combustion plants (LCPs), waste incineration (WI) and co-incineration plants, solvent using activities (SE) and titanium dioxide production (TiO_2), the IED also sets, in specific sectoral chapters, minimum requirements based on the predecessor Directives.

Best Available Techniques (BAT)

Permit conditions must be based on the use of Best Available Techniques (BAT), which are the most environmentally effective of the economically viable techniques available. EU wide BAT conclusions are adopted as sector specific implementing decisions that define BAT and the related environmental performance to be incorporated in permits issued by Member States' competent authorities.

In order to define BAT and the BAT-associated environmental performance at EU level, the Commission organises an exchange of information with experts from Member States, industry and environmental organisations. This work is co-ordinated by the European IPPC Bureau[24](EIPPCB) at the EU Joint Research Centre in Seville (Spain). This process results in BAT Reference Documents[25] (BREFs). The BAT conclusions are a distinctive chapter of the BREFs. More information on the production of BREFs is contained in section 3.3. Figure 2-1 shows a schematic view of the IED.

[24] https://eippcb.jrc.ec.europa.eu/
[25] https://eippcb.jrc.ec.europa.eu/reference

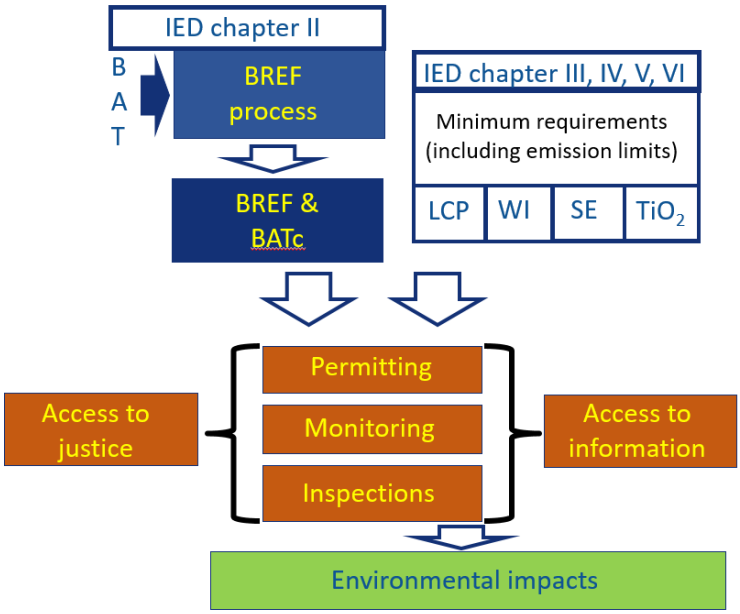


Figure 2-1: Schematic overview of the IED (legend: LCP - large combustion plant, WI - waste incineration and co-incineration plants, SE - solvent using activities, TiO_2 - titanium dioxide production)

The setting of BAT and BAT-AEPLs at EU level is in general based on imbalances between installations with high environmental performance and those less performing ones. The BAT used in well performing installations can then be generalised across all installations through the BREF processes, creating a level playing field and a high level of environmental performance within each industrial sector. Market demand leads to continual innovation in techniques and improved performance at lower cost. This process continues independently of the BREF review process, ensuring that better performing techniques are available in a subsequent cycle.

BREFs have a standard format, set out in the BREF Guidance, consisting of the following chapters:

Preface
Scope
General information about the sector concerned
Applied processes and techniques
Current emission and consumption levels
Techniques to consider in the determination of BAT
Best Available Techniques (BAT) conclusions (BATc)
Emerging techniques
Concluding remarks and recommendations for future work
References
Glossary of terms and abbreviations
Annexes (dependent upon relevance to the sector and availability of information)

The BAT conclusions identify a non-exhaustive and non-prescriptive list of BAT, as well as the environmental performance levels achievable with the use of BAT. They can contain:

- BAT-Associated Emission Levels (BAT-AELs), i.e. a numerical range of emission levels for specific pollutants,
- BAT-Associated Environmental Performance Levels (BAT-AEPLs) other than emission levels, which usually address the consumption of raw materials, energy or water, as well as waste generation, and/or
- Descriptive BAT which are not associated with either BAT-AELs or BAT-AEPLs, e.g. concerning monitoring, site remediation, environmental management systems, or the limitation or ban of the use of hazardous substances.

IED Article 14(3) makes BAT conclusions the mandatory reference for setting permit conditions. Article 15(3) makes BAT-AELs the binding requirements for pollutant emissions, usually to air and water. Their upper level is the upper boundary for the corresponding emission limit values set in permits, unless a derogation is granted by a competent authority subject to strict conditions set by the IED. BAT-AEPLs and descriptive BAT are not binding in the same way as BAT-AELs, but authorities must use them as a reference for setting permit conditions.

Competent authorities must update installation permits to be in line with the content of the BAT conclusions, and operators must be compliant with them within 4 years of publication of the BAT conclusions in the Official Journal of the EU. This gives BAT conclusions a more prominent role than under the IPPCD, where they were not legally binding. In doing so, permitting authorities must also ensure compliance with relevant minimum requirements contained in IED Chapters III to VI.

Flexibility

The IED allows competent authorities some flexibility to set less strict emission limit values. Such derogations are possible only in specific cases, where an assessment shows that achieving the emission levels associated with BAT described in the BAT conclusions would lead to disproportionately higher costs compared to the environmental benefits due to the geographical location, local environmental conditions, or the technical characteristics of the installation, preventing the implementation of BAT. However, the use of this derogation procedure is strictly limited as the competent authority has to ensure that no significant pollution is caused and that a high level of protection of the environment as a whole is achieved. The competent authority shall always document its justification for granting such derogations. In the case of the sectors covered also by the specific Chapters IV, V, VI, VII, derogations cannot exceed those minimum requirements.

At the same time, competent authorities must set stricter emission limits when an environment quality standard is exceeded.

Figure 2-2 illustrates the different regimes for emission limits under the IED.

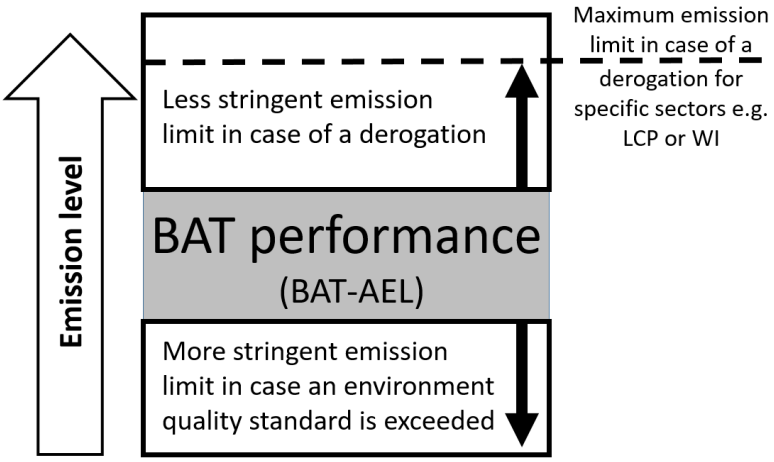


Figure 2-2: Emission limits under the IED

Inspections and Monitoring

The IED contains mandatory requirements on environmental inspections. Member States must set up a system of environmental inspections and draw up inspection plans accordingly. The IED requires a site visit to take place at least every 1 to 3 years, using risk-based criteria.

Operators have to report to Member State authorities the results of the monitoring requirements set by BAT conclusions, and Member States are reporting to the EU on several aspects of the implementation of the Directive. This is described in more detail in Section 3.4.

Access to Information and Access to Justice

Access to information and public participation are key elements of the IED. They enable the public to have a right to participate in the decision-making process, and to be informed of its consequences in accordance with the Aarhus Convention. This requires, in particular, ensuring public information on applications for permits by industrial operators and access to permits issued by competent authorities and the results of emissions monitoring held by them. In view of the large number of IED installations, public involvement is also key to police the correct implementation of IED requirements in permits and their respect by operators. Access to justice is another aspect of the Aarhus Convention transposed in the IED. It aims to ensure that, where a problem arises, individuals affected or NGOs can take legal action to ensure the respect of the IED requirements.

Figure 2-3 outlines the different roles and obligations of the Competent Authorities and operators of industrial installations in the permitting process.

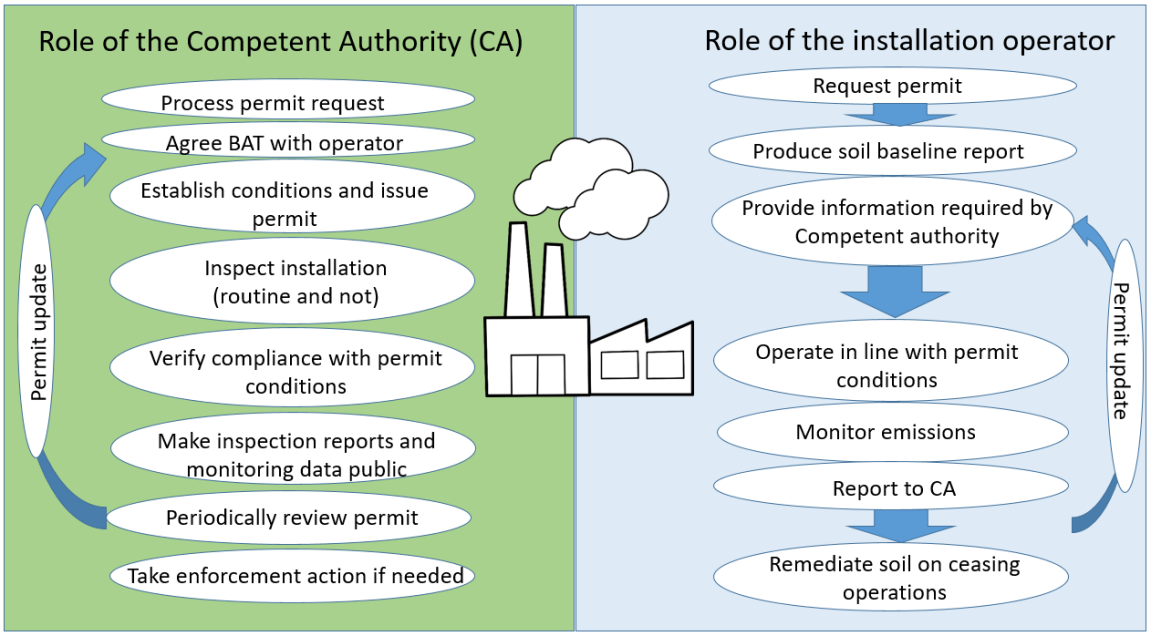


Figure 2-3: Roles and obligations of the Competent Authorities and installation operators

The IED Forum

The IED requires the Commission to establish and regularly convene a Forum to support the information exchange. The Forum is composed of representatives of Member States, industry and environmental NGOs. It has been created as a formal expert group through a Commission decision, and is chaired by the Commission. New members of the Forum, who are not Member States, are appointed by the Director General of DG Environment. The IED Forum has so far held 14 meetings and all documents relating to them are publicly available on the internet on CIRCABC[26].

The Commission is required to obtain the opinion of the Forum on the proposed content of BREFs and make it publicly available. The Commission must also take into account this opinion for the adoption of the BAT conclusions. The Commission also obtains the opinion of the Forum on the practical arrangements for the exchange of information including on the work programme for the revision of BREFs. This has, over the years, led to incremental improvements of the BREF process. Forum members nominate participants in the Technical Working Groups who carry out the detailed work on each BREF.

[26] https://circabc.europa.eu/ui/group/06f33a94-9829-4eee-b187-21bb783a0fbf

2.4. Intervention logic

For illustrative purposes, the approach through which the IED operates can be described through a simplified sequence:

→ IED identifies sectors with large environmental impacts

→ IED creates a framework for BAT based permitting

→ BREF process identifies BAT and associated environmental performance levels

→ MS competent authorities issue BAT-based permits for installations

→ Industrial operators apply BAT to comply with permit conditions

→ MS competent authorities undertake inspection, compliance and enforcement actions

→ Emissions and environmental impacts decrease to levels prescribed

→ Civil society can access information and challenge permit decisions

→ IED contributes to the EU's environmental quality objectives.

Figure 2-4 shows a summary intervention logic for the IED, the elements of which are explained below. A more detailed version is presented in Annex 2.

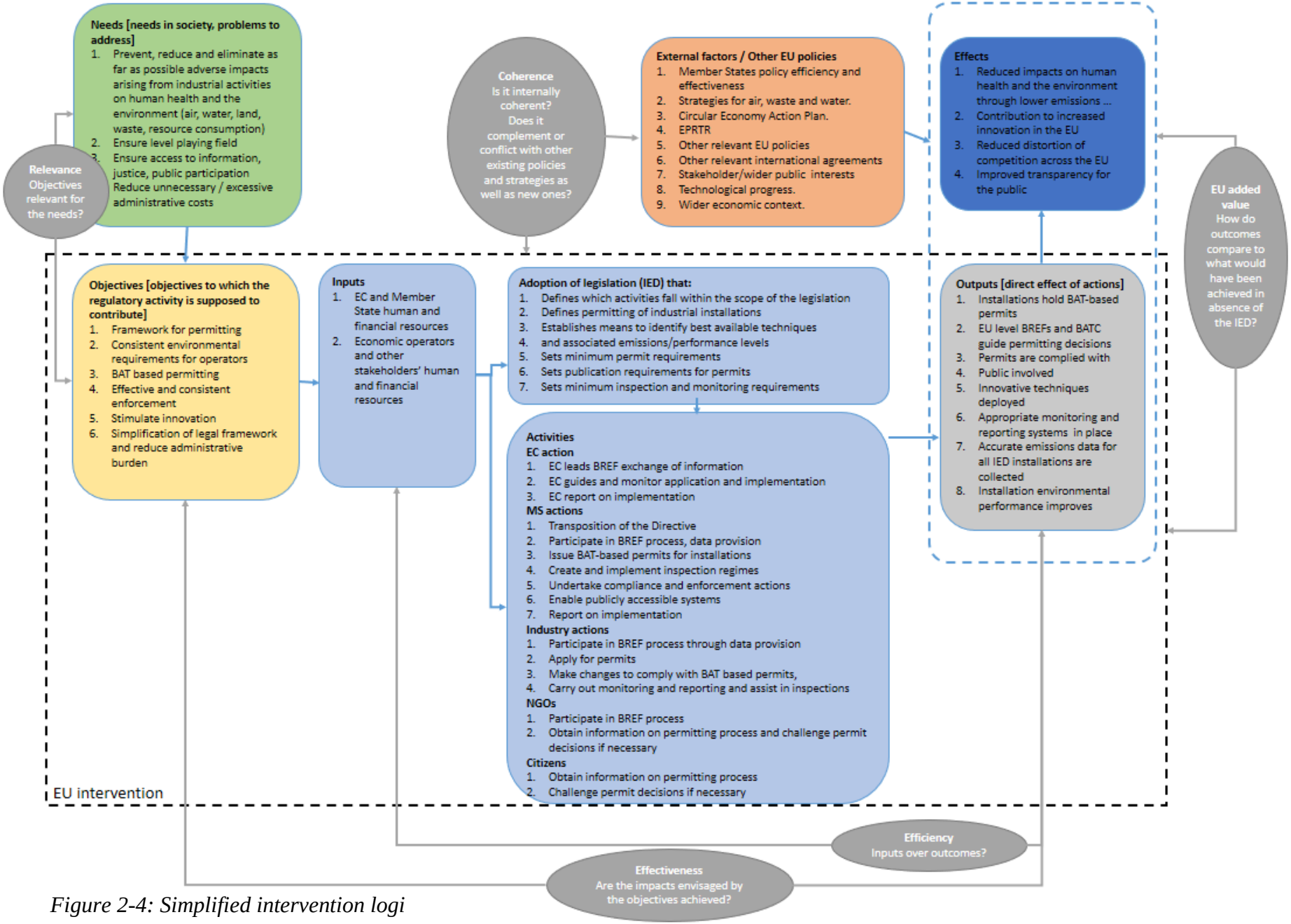


Figure 2-4: Simplified intervention logi

Objectives

The main **objectives** of the IED are described in Section 2.2.

Inputs

The **inputs** needed are essentially human and financial resources. These are made available by the European Commission, Member State authorities, economic operators and other stakeholders. EU inputs are primarily needed for the EU level actions, while Member States provide input at EU, national, regional and local levels.

Activities

The resources provided are used to undertake a range of **activities** at various different levels. The first of these, at EU level, was the preparation and adoption of the IED. From that time onwards the main actions of the Commission are to manage the production of BREFs and adoption of BAT conclusions, oversee implementation of the IED and report on it. Member States had to ensure that the necessary structures were in place at national and sub-national levels to implement the IED. Member States, industry and NGOs then participate together with the Commission in the development of BREFs and BAT conclusions. At installation level, Member State competent authorities have to engage with operators to grant permits, review them when necessary, ensure that permit conditions are respected, inspect installations and carry out enforcement action, if needed. Operators of installations must make investments, as needed, to reduce their environmental impacts and ensure that they are compliant with the permit requirements. NGOs and citizens are able to participate in permitting processes, access emissions monitoring information and bring complaints and information to the competent authorities when needed.

Outputs

There are a number of **outputs**. All installations covered by Chapter II of the IED should hold regularly updated and BAT-based permits. Permitting decisions should be guided by BREFs and BAT conclusions. The permits should be complied with by operators and compliance should be enforced by competent authorities. The public should be involved in permitting decisions and have access to information on the environmental performance of industrial installations. Innovative techniques may be deployed to reduce the environmental impacts of industrial activities. To ensure compliance and enforcement, appropriate monitoring and reporting systems should be in place at all IED installations. Member States' competent authorities should collect accurate emissions data for all IED installations and make them publicly available. The European Pollutant Release and Transfer Register (E-PRTR) provides the legal framework for monitoring aggregate pollutant emissions from IED installations and making that information public, in line with the requirements of the Aarhus Convention.

The IED should lead to the improvement of the environmental performance of industrial installations across the EU.

Effects

If the implementation of the IED is **effective**, this should lead to benefits in four areas:

i. reduced impacts on human health and the environment through lower emissions to air, water and soil, reduced waste generation and higher resource efficiency;
ii. a contribution to increased industrial and technology innovation in the EU;
iii. reduced distortion of competition across the EU;
iv. improved transparency for the public regarding information on the environmental performance of industrial activities.

External factors

A number of **external factors** outside the intervention are relevant, as they may influence delivery of the stated objectives. Action is required by Member States to transpose and implement the IED and this is key to its effectiveness and efficiency. Implementation requires effective cooperation within Member States between national, regional and local authorities and other actors. General economic and social conditions and technological progress are also relevant. Implementation of the IED is also influenced by other EU policies. Relevant strategies and policies include in particular the thematic strategies for air, water, soil, waste, the energy efficiency agenda and the Circular Economy Action Plan. Other EU legislation of relevance include the Water Framework Directive and other related water legislation, EU Emission Trading System, National Emission Ceilings Directive, Air Quality Directive and the Waste Framework Directive, as well as their related legislation.

Overlaid onto the Intervention Logic in Figure 2-4 are the five criteria which form the basis for any evaluation undertaken in line with the Better Regulation Guidelines:

- **Effectiveness**: are the impacts (**outputs** and **effects**) envisaged by the **objectives** achieved? This effectively considers whether the objectives themselves have been achieved in practice.
- **Efficiency**: how do the **outputs** compare to the **inputs**? Have they been achieved in an efficient manner?
- **Relevance**: are the **objectives** of the IED still relevant for the **needs** in society and problems to address?
- **Coherence**: is the IED internally coherent? Does it complement or conflict with other existing policies and strategies, as well as new ones?
- **EU added value**: how do outcomes (**outputs** and **effects**) compare with what would have been achieved in the absence of the IED (or any EU policy on industrial pollution control)?

The intervention logic has been used to develop the individual evaluation questions under each of the evaluation criteria. These are described in Annex 3 and used in Section 5.

2.5. Industrial emissions policy context prior to 2010

Baseline and points of comparison

To evaluate the impacts of the IED, a counterfactual baseline scenario was used assuming the IED had not been implemented. The baseline considers relevant external factors, for example, the evolution of the legal framework and the expected evolution of key variables relating to industrial emissions and production.

The main reference for the baseline was the Impact Assessment (IA)[27], completed in 2007 and accompanying the proposal for the adoption of the IED. This defined the problems with the existing legal framework and its expected evolution in the absence of any further intervention (business as usual scenario - BAU). The IA is the starting point for the definition of the baseline and has been supplemented by input from other relevant sources.

A major weakness of the IA was that it only contained information on emissions to air, and no quantitative data on emissions to water or soil. It also contained little quantitative data on other aspects such as inspections, compliance or enforcement. While no ex-ante assumptions exist about these parameters, wherever possible, the evaluation uses other sources to provide an indication of the situation either before the IED or early in its implementation.

Some illustrations of these alternative data sources are as follows:

- E-PRTR data is available for emissions to water, so the emissions since the Impact Assessment are compared to the situation in 2007 as shown in Figure 3-7.
- E-PRTR data is available for emissions to soil, so the change in emissions since 2008 are shown in Figure 3-9.
- Information on inspections was reported in 2012-13 and it was the only data available for comparison.
- There is no systematic information on enforcement, but for some Member States, available information on enforcement actions suggest there has been little change in their frequency.

Main assumptions

Expected evolution of the legal framework

In the absence of the IED, the pre-existing legal instruments would have continued to regulate industrial emissions. The IPPCD was the main instrument setting the overall framework for regulating industrial emissions. It gave a broad structure and set of principles for permitting. The sectoral Directives would have continued to drive the use

[27] https://ec.europa.eu/info/law/better-regulation/have-your-say/initiatives/12306-EU-rules-on-industrial-emissions-revision

of BAT to comply with their ELVs. Inconsistencies between the IPPCD, sectoral Directives and other legislation would have continued.

Industrial emissions reporting would have continued to be regulated by the European Pollutant Release and Transfer Register (E-PRTR), thus supporting public access to emissions information from agro-industrial activities.

There would have been limited integration between the IPPCD, LCPD, SED, WID, and E-PRTR reporting requirements. Reporting would have anyway needed to comply with the INSPIRE Directive.

External relevant parameters/factors

Industrial emissions would have been mitigated to varying degrees by other existing environmental legislation which would continue having an effect. The main policy areas and legislation from which these effects are expected are:

- Climate change and energy policies: the EU ETS[28], the Effort Sharing Regulation[29] and the Monitoring and Reporting Regulation[30], as well as Member State planning via National Energy and Climate Plans;
- Industrial accidents: the Seveso Directive[31];
- Chemicals: REACH[32];
- Air Quality[33]: National Emissions Reduction Commitments Directive, Ambient Air Quality Directive and Fourth Daughter Directive;
- Water quality[34]: the Water Framework Directive, the Environmental Quality Standards, the Nitrates Directive, the Groundwater Directive;
- Waste[35]: the Waste Framework Directive, the Circular Economy Action Plan[36], the Landfill Directive.

Market developments also impact on industrial emissions. The economic downturn after 2008 had an impact on the level of both industrial production and therefore also its emissions. Nevertheless, as the market recovered, so did production and emissions levels. While that economic crisis decreased or slowed down investments, its impact was time limited. However, industry would not have been expected to invest in reducing their environmental impacts substantially beyond what they were legally obliged to do and therefore overall the crisis is not expected to have had any lasting effect on emissions intensity.

[28] https://ec.europa.eu/clima/policies/ets_en
[29] https://ec.europa.eu/clima/policies/effort_en
[30] https://ec.europa.eu/clima/policies/ets/monitoring_en
[31] https://ec.europa.eu/environment/seveso/
[32] https://ec.europa.eu/environment/chemicals/reach/reach_en.htm
[33] https://ec.europa.eu/environment/air/reduction/index.htm
[34] https://ec.europa.eu/environment/water/index_en.htm
[35] https://ec.europa.eu/environment/waste/index.htm
[36] https://ec.europa.eu/environment/circular-economy/index_en.htm

Main problems prior to the adoption of the IED

The IA identified a number of main problems with the predecessor legislation. Under the baseline scenario, these issues would be expected to continue. The main ones were:

Insufficient BAT implementation

The IPPCD included rather vague provisions on the role and meaning of BAT and gave considerable flexibility to competent authorities in the permitting process to deviate from the use of BAT described in the BREFs. An unclear role of the BREF in the permitting process led to disparities among Member States from different permitting approaches, which reduced the overall environmental benefits. Deviations from the use of BAT occurred without due consideration of the technical, geographical or local environmental conditions of the installation and transparency of the permitting process was limited. This often resulted in permits not based on BAT described in the BREFs and Member States often set ELVs in permits that were not sufficiently stringent.

While there were a number of interacting policies, many of which could incentivise the uptake of BAT by industry, there was no basis to expect them to trigger a significant increase in uptake of BAT. As a result, emissions would not be expected to decrease.

Limitations with regard to compliance and enforcement

Different approaches among Member States and varying levels of completeness of reporting would have led to continuing challenges in assessing compliance or enforcement. While some improvements were expected, the overall difference in the Member States approach to inspections, compliance reporting and enforcement would be expected to continue.

Limited stimulation of innovation

Divergences among Member States in the implementation of the IPPCD meant that there would not have been strong and consistent market signal to technology suppliers concerning the needed level of environmental performance. This would have limited the development and deployment of better techniques.

Administrative burden

The (combination of) legislation was complex, causing inconsistencies and uncertainties regarding interpretation of the requirements and unnecessary administrative burden. The administrative burden varied considerably among Member States and regions due to differences in implementation. Some degree of unnecessary administrative burden was related to permitting practices. Some requirements were redundant and the ELVs in sectoral Directives could not be updated as regularly as BAT conclusions.

Insufficient scope

The scope of the IPPCD was insufficiently clear, with a number of legal uncertainties and in some cases, too restricted. A number of polluting activities were not regulated, which

would have been insufficient for Member States to meet environmental objectives set in EU law and policy. EU environmental objectives have further developed since then and the shortcomings would have even been greater now.

Limited access to information and public participation

The main instrument to facilitate public access to information on industrial emissions was the E-PRTR, which however only provided information on yearly pollution load from plants. Inspections and permit reviews and reporting requirements on compliance varied among Member States. There was limited evidence of public engagement in the permitting process.

2.6. Expected evolution of key variables under the baseline scenario

There has been limited change in the number of permitted IED installations across the EU and this was not expected to change significantly for Member States in the future.

Half of the IED installations received an inspection between 2012 and 2013. The average annual number of inspections ranged between 1 and 6 per installation. Across Member States, the share of permitted installations inspected ranged from 100% to less than 50%. Under business as usual (BAU) it is assumed that around 50% of IPPCD installations would have received an inspection each year and the disparity among Member States would have continued.

Compliance costs to operators varied considerably by Member State, by sector and by BAT uptake under the IPPCD. Annual inspection frequencies would not have changed with, on average, a site inspection involving 3 days inspection time annually, at a total cost of €80 million per year to regulators. Differences among Member States and sectors would have been expected to continue with consequent risks of market distortion.

It is assumed the administrative costs to regulators associated with permitting would have primarily concerned the reconsideration or update of permits. These were assumed to be approximately half the cost of issuing a new permit. If permits were updated every 10 years, then the cost would have been in the range of €11-40 million per year.

BREF development administrative costs were estimated at €5-10 million per BREF and are expected to remain the same under BAU.

The BAU emissions of pollutants of IPPC activities is expected to remain fairly constant assuming BAT application did not increase significantly and non-stringent ELVs were applied. IPPC sector emissions would have become a higher share of total emissions due to progress in cutting emissions in other sectors.

2.7. Main changes with respect to the IPPCD

The following elements represent the main changes introduced by the IED compared to the preceding IPPC regime:

- Merger of seven preceding Directives;
- Expansion of the sectors covered by the Directive;
- The obligation on installations to use BAT;
- BAT conclusions as the mandatory reference for permit conditions;
- The obligation to set ELVs in permits within the BAT-AEL range;
- Formalised procedure for the exchange of information to draw up and review BREFs;
- Elements relating to emerging techniques;
- Conditions for the granting of derogations;
- Minimum requirements for specific industry sectors in Chapters III, IV, V and VI;
- Compulsory inspection plans and inspection frequencies;
- Stronger provisions on public access to information, participation and access to justice.

3. IMPLEMENTATION / STATE OF PLAY

3.1. Current situation

The IED had to be transposed by 7 January 2013. In the absence of timely transposition by 20 Member States, the Commission pursued non-communication infringements in the period 2013-2016. All concerned Member States have by now adopted the necessary measures transposing the IED into their national legal order and all Commission enforcement procedures have been closed.

On the basis of conformity checking studies, the Commission has assessed the quality of Member States' transposition of the IED. Following this, there remain active EU Pilots for 15 Member States (an overview is provided in Annex 8). Of these, a few remaining issues are being clarified with three Member States; infringement action for incorrect transposition has already been launched against two other Member States and additional action may be launched in 2020 against ten additional Member States. In addition, with regard to IED implementation, infringement action has been launched against two Member States for bad application. In general these concern specific issues rather than systemic problems.

Some of the pending transposition issues relate to the fact that, in the case of federal Member States, the IED has to be transposed not only at federal level but also at the level of regions, states or sub-entities, in a consistent manner. Other transposition issues touch upon some technical definitions or processes, which require equally precise and comprehensive transposition measures. A few remaining issues stem from the fact that some IED provisions are not entirely clear.

Feedback obtained through implementation reports and workshops with Member States over the period covered by this evaluation have identified a number of IED implementation topics causing problems for competent authorities or industries. Efforts

have been made to tackle these on an ongoing basis, and this evaluation takes stock of the current situation.

Some challenges concerned BAT conclusions: interpretation, timely inclusion in permits; the role of so-called "horizontal" BAT conclusions, implementation through general binding rules, granting of derogations and application of stricter emission limit values in permits where exceedance of local environmental quality standards (air/water) so require, and indirect releases to water through centralised water treatment plants. Transboundary pollution seems rarely addressed. Other important issues concerned monitoring of emissions, measurement uncertainties and compliance assessment. In addition, some Member States still seem to struggle with ensuring transparency of information and public participation in permitting procedures.

The Commission has engaged with Member States to address those implementation challenges, for example in workshops on specific topics, such as implementation of derogations, compliance assessment and emissions to water. Regular meetings involving the Commission and Member States in the Industrial Emissions Expert Group, as well as in the Article 13 IED Forum, that also involves industry and NGO representatives, provided further opportunities for addressing these challenges.

The Commission has also prepared a compilation of responses it has provided to stakeholder questions on IED implementation, which is posted on CIRCABC[37].

Moreover, the Commission cooperates with the European Union Network for the Implementation and Enforcement of Environmental Law (IMPEL) to exchange on IED implementation and develop relevant tools. The Commission also participates in the Academy of European Law training of Member States judges on topics related to industrial emissions legislation.

Finally, the Commission has launched a process to support implementation and compliance promotion through the sampling of IED permits from installations across the EU. The Commission intends to pursue this effort and possibly complement it with other tools to further inform on implementation and compliance assessment.

3.2. IED installations and overall emissions

Number of IED installations

Almost 51 700 installations were permitted under the IED in 2015. The breakdown of these is shown in Figure 3-1. The largest share of installations permitted is for the intensive rearing of poultry or pigs (IRPP). Other sectors with a significant share of permitted installations include waste management, production and processing of metals, and the chemical industry.

[37] https://circabc.europa.eu/ui/group/06f33a94-9829-4eee-b187-21bb783a0fbf/library/cbcfa4fc-cb8e-4cd7-bf7a-cbba10c28fb4?p=1&n=10&sort=modified_DESC

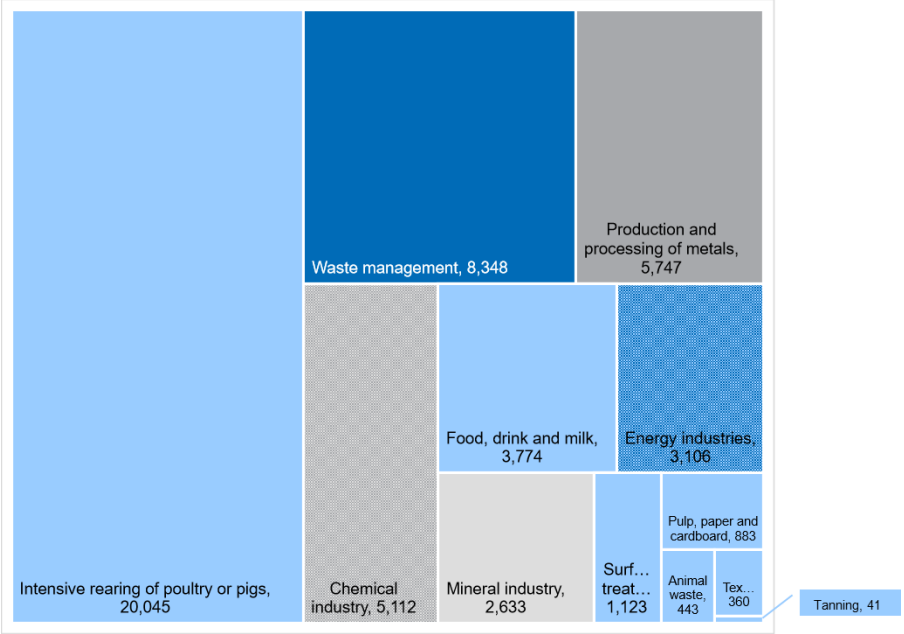


Figure 3-1: Total number of permitted installations by sector[38] (EU28, 2015)

Emissions to air

In terms of damage cost[39] from emissions, as shown in Figure 3-2, the sectors with the largest share are large combustion plants (LCP), followed by refineries (REF), intensive rearing of pigs or poultry (IRPP), and iron and steel (IS).

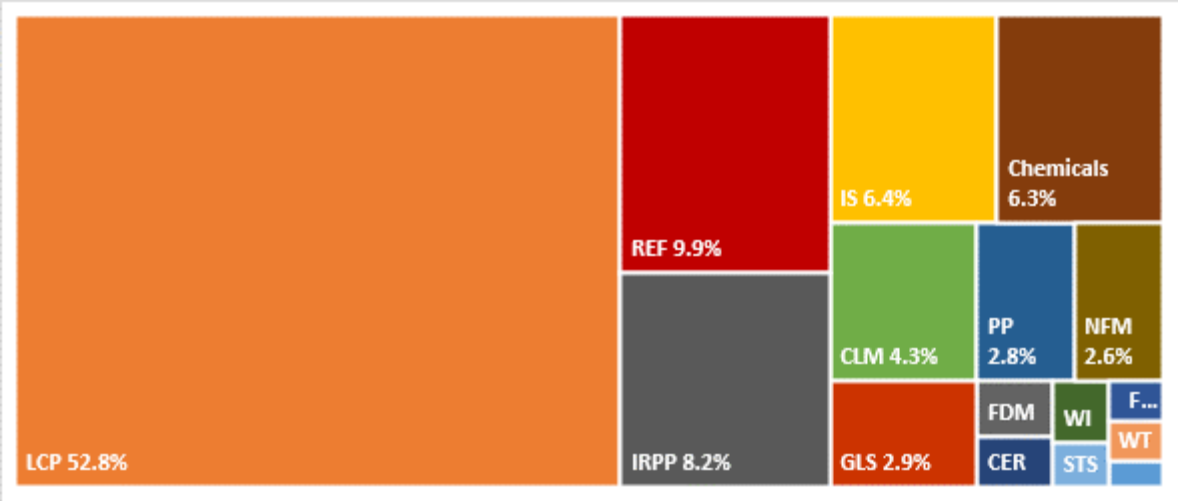


Figure 3-2: Share of damage costs from emissions to air by sector[40,41,3](EU28, 2017)

[38] [10] Ricardo Energy & Environment (2018), "Industrial emissions policy country profiles"

[39] Based on damage costs from EEA technical report 20/2014 which includes damage costs for the main air pollutants, heavy metals and organic emissions. A large share of these costs results from impacts on human health. https://www.eea.europa.eu/data-and-maps/daviz/costs-of-air-pollution-from-industrial-facilities

Industrial emissions to air and water have generally decreased under the IED and its predecessors[42]. Moreover, since 2007, reductions of key air pollutants have been achieved at the same time as overall economic growth, indicating that there has been a decoupling of industrial activity from emissions to air. This is illustrated by Figure 3-3 and Figure 3-4 which show, for a set of key pollutants, how overall indexed emissions to air from industry have changed over the last decade.

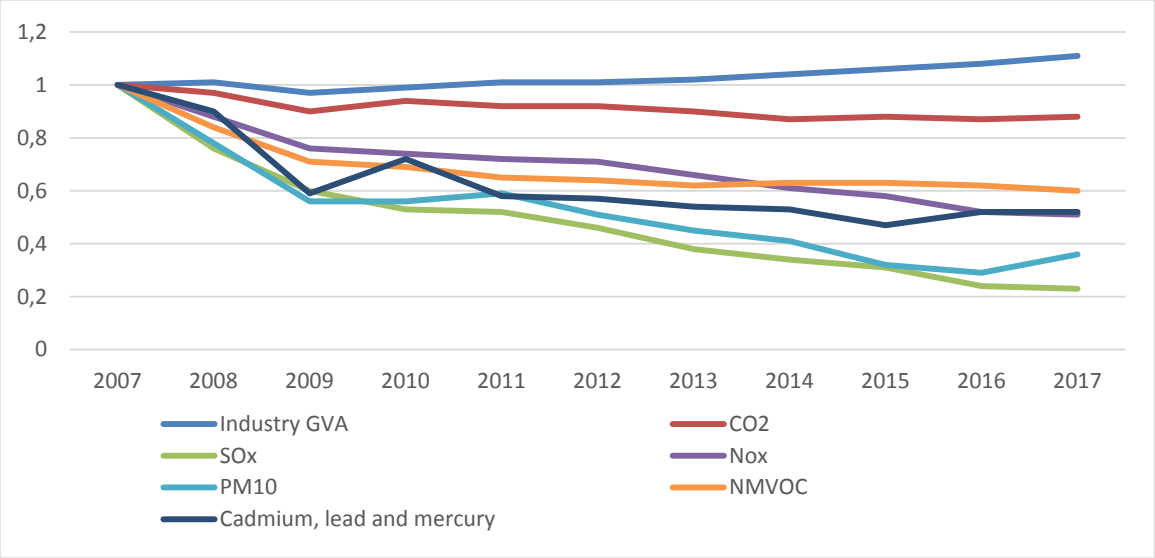


Figure 3-3: Release of air pollutants and gross value added for industry[42] (EEA-33)

Figure 3-4 shows, for the four dominant pollutants in terms of overall damage, how the annual damage costs (in €) from IED sector emissions to air have changed over the same period. Total damage is dominated by SO_X and NO_X and the reductions are dominated by the change of emissions from Large Combustion Plants (LCP). The total has more than halved over the period to just below €100 billion in 2017.

[40] Based on E-PRTR data and EEA damage costs.
[41] Acronyms: **LCP**- Large Combustion Plants; **REF** - Refineries; **IRPP** - Intensive Rearing of Poultry or Pigs; **IS** - Iron and Steel; **Chemicals** represent **LVIC** and **LVOC** - Large Volume Inorganic and Organic Chemicals; **CLM** - Cement, Lime and Magnesium Oxide; **PP** - Pulp and Paper; **NFM** - Non-Ferrous Metals; **GLS** - Manufacture of Glass; **FDM** - Food, Drink and Milk; **STS** - Surface Treatment Using Organic Solvents; **WI** - Waste Incineration.
[42] EEA (2019), "Industrial Pollution in Europe", https://www.eea.europa.eu/data-and-maps/indicators/industrial-pollution-in-europe-3/assessment

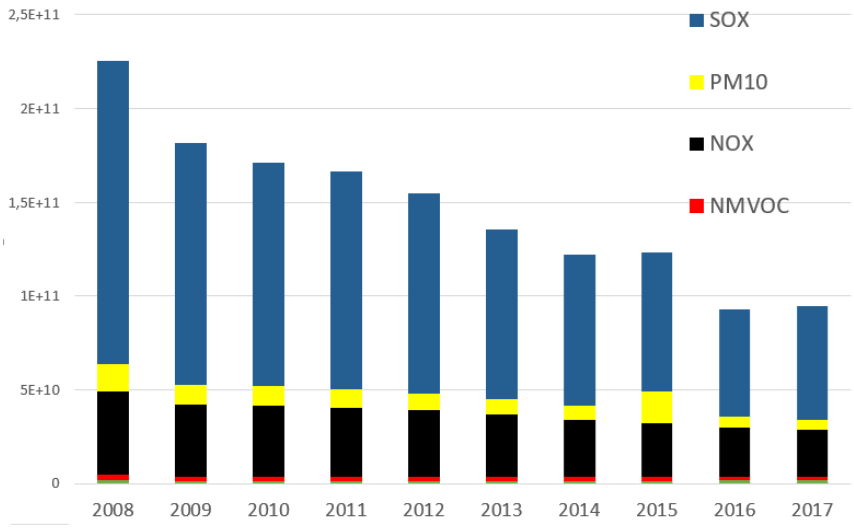


Figure 3-4: Damage cost of emissions to air from IED installations by pollutant[43]

An important driver for this are the ELVs set in the LCPD and effective from 2008 (as shown in Figure 3-5) with transitional provisions until 2016 when the IED ELVs for LCPs became effective. While other factors could contribute, like for example the change in energy use in LCPs shown for comparison, full decomposition analysis indicates that the ELVs are the main driver in emission reductions.

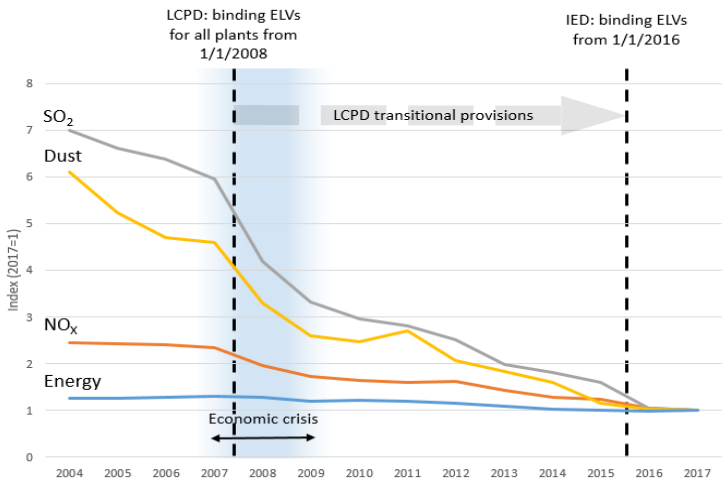


Figure 3-5: Timeframe of legislative impacts on LCPs[44]

[43] [8] ICF, Aether (2018), "Indicators for Industrial Emissions Policy"

[44] Adapted from EEA (2019), "Assessing the effectiveness of EU policy on large combustion plants in
reducing air pollutant emissions", https://www.eea.europa.eu/publications/effectiveness-of-eu-policy-on

A similar picture can be seen for most IED sectors with only different rates of change. Figure 3-6 below shows the evolution of damage costs from emissions to air for 21 IED sectors.

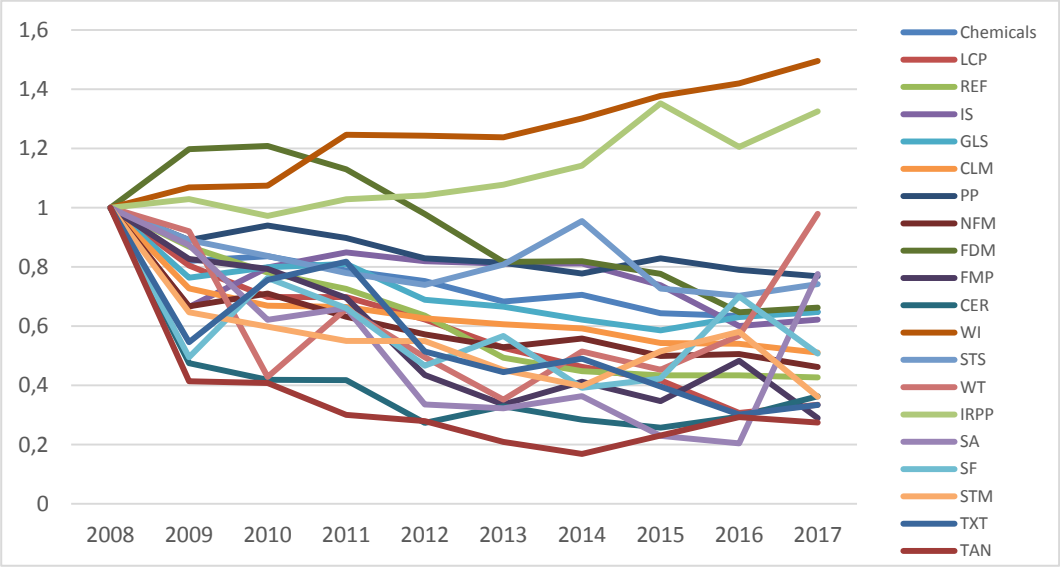


Figure 3-6: Normalised damage costs of emissions to air by IED sector[1,42,45]

For only two sectors (Waste Incineration and Intensive Rearing of Pigs or Poultry) has damage from emissions increased over the time period. For all other sectors damage from emissions has decreased by up to 73% compared to 2008.

While they have not been shown separately in the previous figures, ammonia (NH_3) emissions to air are a specific case and compared to 2008, overall NH_3 emissions have remained fairly static. In 2017 around 92% of these emissions came from agriculture. However, only a few percent of this is emitted by agro-industrial activity regulated under the IED (mainly from intensive rearing of poultry or pigs).

Emissions to water

Figure 3-7 shows, for a number of pollutants, an absolute decoupling of the total mass emissions to water from industry Gross Value Added (GVA). There is a visible declining trend for heavy metals (Cd, Hg and Pb). In the case of Nitrogen (N), Phosphorous (P) and Total Organic Carbon (TOC) releases have declined since 2007 as well, although to a lesser extent.

[45] Acronyms: **Chemicals** represent **LVIC** and **LVOC** - Large Volume Inorganic and Organic Chemicals; **LCP** - Large Combustion Plants; **REF** - Refineries; **IS** - Iron and Steel; **GLS** - Manufacture of Glass; **CLM** - Cement, Lime and Magnesium Oxide; **PP** - Pulp and Paper; **NFM** - Non-Ferrous Metals; **FDM** - Food, Drink & Milk; **FMP** - Ferrous Metals Processing; **CER** - Ceramics; **WI** - Waste Incineration; **STS** - Surface Treatment with Solvents; **WT** - Waste Treatment; **IRPP** - Intensive Rearing of Poultry or Pigs; **SA** - Slaughterhouses and Animals By-products; **SF** - Smitheries and Foundries; **STM** - Surface Treatment of Metals and Plastics; **TXT** - Textiles; **TAN** - Tanning of Hides and Skins;

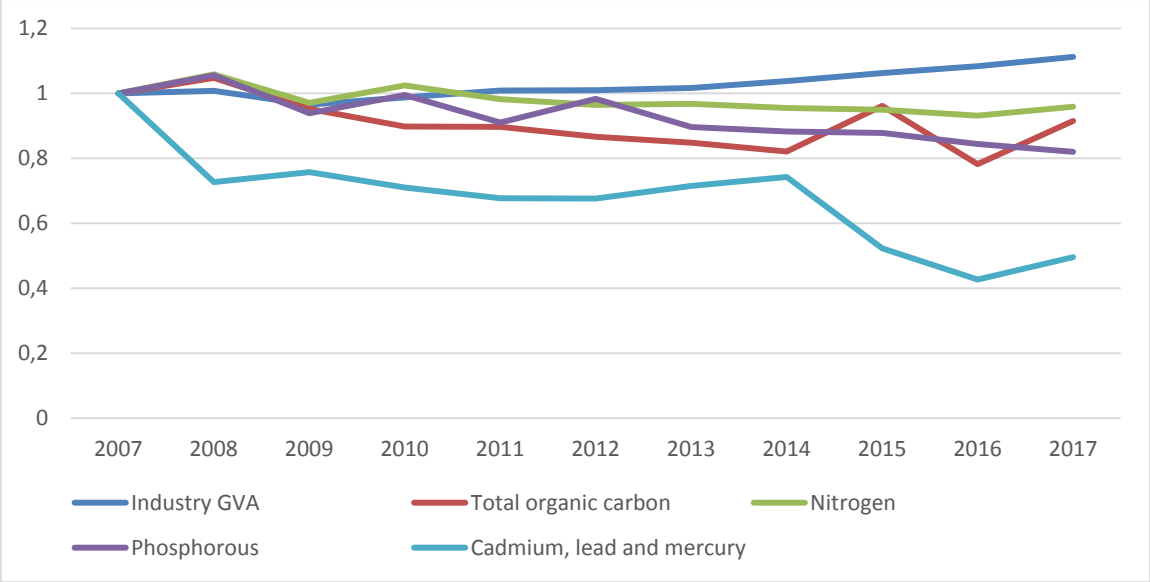


Figure 3-7: Release of water pollutants and gross value added for industry[42] (EEA-33)

Figure 3-8 shows the contribution that industry makes to total emissions to air and water for all sources, based on 2017 data. This demonstrates that, despite the significant reductions seen to date in emissions from industrial activities, they still contribute a significant proportion of total EU emissions for some important pollutants.

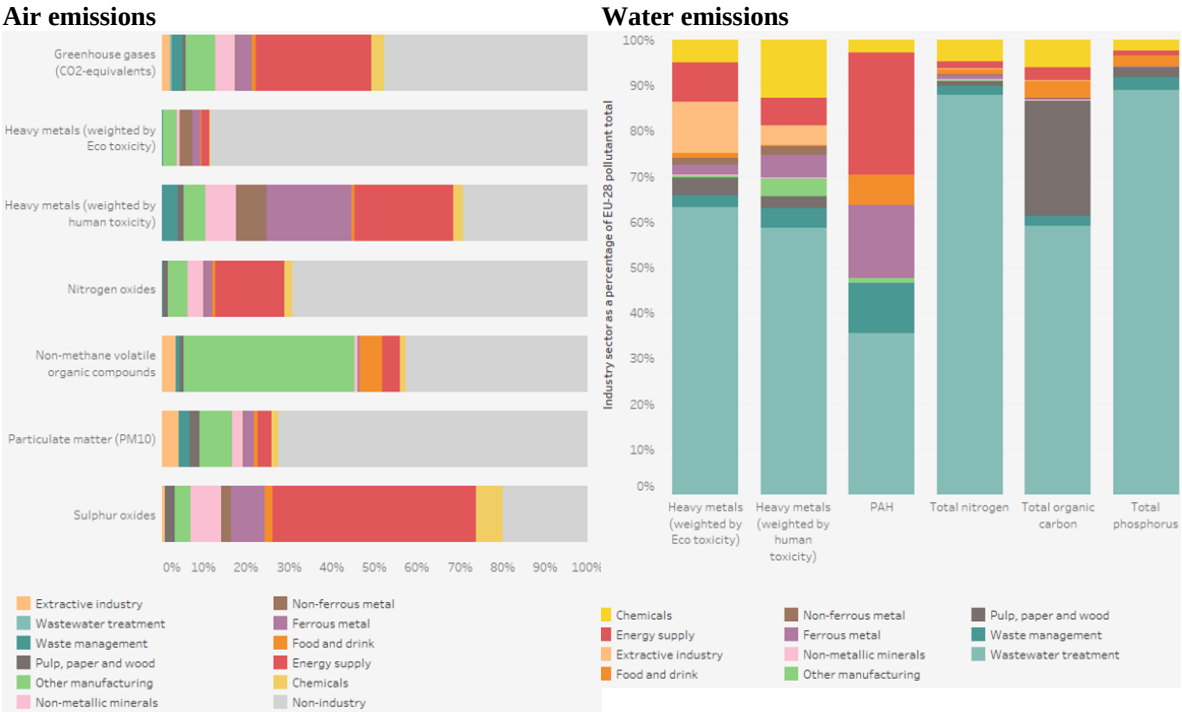


Figure 3-8: Industrial air and water emissions as a percentage of total EU28 pollution by sector[46], 2017

Emissions to soil

[46] EEA (2019) EU-28 Industrial pollution profile 2019, www.eea.europa.eu/themes/industry/industrial-pollution/industrial-pollution-country-profiles-2019/eu28

In contrast to emissions to air or water, emissions to soil and groundwater are much harder to ameliorate once they have occurred. The IED therefore focuses on measures to prevent emissions. This requires the use of techniques such as impermeable floors, avoidance of leaks and secondary containment for vessels. These techniques have been included as BAT in relevant BAT conclusions and should have been required in permit conditions where appropriate.

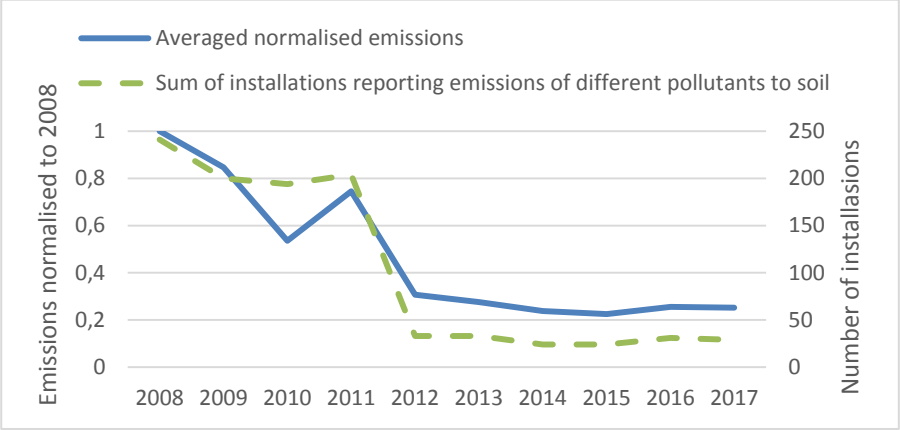


Figure 3-9: Trend in selected pollutant emissions to soil from IED sectors[47]

Emissions to soil from IED installations are also reported under E-PRTR and the same thresholds apply as for emissions to water. Very few installations report any emissions as illustrated for the average of a number of pollutants in Figure 3-9 and the amount of emissions has also decreased dramatically over the period.

Furthermore, operators of installations are responsible for remedying any contamination of the soil that took place during their operation. Evidence of the initial condition of the soil at the installation comes from baseline reports required under Article 22 of the IED, which must be produced at the start of operation or before the first permit update after January 2013. The status of baseline reports has been reported under the Second IED Reporting Decision. Operators will be obliged to return the soil to the existing condition on cessation of activities and therefore have a strong interest to avoid polluting it.

Article 16 of the IED requires periodic monitoring of soil and groundwater to verify there are no releases. On cessation of activities, IED Article 22 requires the soil and groundwater condition to be checked again and remediated, if necessary.

It should be borne in mind that IED installations cover a very small proportion of total EU land area and represent a very small proportion of polluted sites in the EU.

[47] Based on E-PRTR reported data. The pollutants emitted to soil considered in this graph are: Arsenic, Cadmium, Chlorides, Chromium, Copper, Halogenated Organic compounds, Lead, Mercury, Nickel, Polychlorinated Biphenyls, Total Phosphorus and Zinc.

3.3. Production of BREFs and implementation of BAT conclusions

BREFs are produced through a highly participative process of exchange of information managed by the European Commission. This exchange involves the Commission, Member States, the industries concerned and environmental non-governmental organisations, as shown in Figure 3-10, and is hereafter referred to as the BREF process.

An early step in the process is the agreement by the Technical Working Group (TWG) of the environmental aspects that will form the focus of the BREF. These are known as the Key Environmental Issues (KEIs). This decision is guided by suggestions from TWG members and other data that they are able to provide in support. A number of factors is taken into consideration by the TWG in arriving at its decision. These include factors such as the significance of the impact, the contribution of the sector to overall impacts and the availability of data.

The BREF production process involves gathering information on the performance of installations and techniques in terms of short and long term emissions, consumption of raw materials, water and energy and the generation of waste. It then assesses the techniques used, monitoring, cross-media effects and their economic and technical viability and developments. The process results in the identification of best available and emerging techniques and their associated performance levels. The resulting BREF describes for defined activities, applied techniques, emission and consumption levels, techniques considered for the determination of BAT as well as BAT conclusions and any emerging techniques.

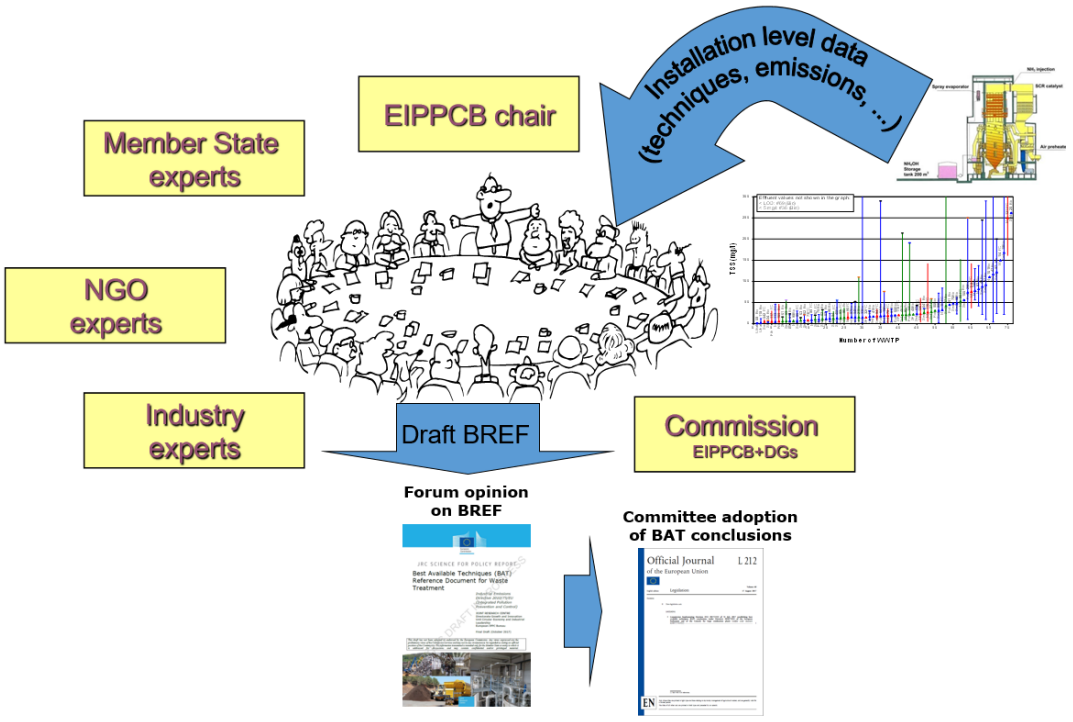


Figure 3-10: The BREF information exchange process

An important part of the process consists in identifying BAT-Associated Emission Levels (AELs) ranges, taking into account the effectiveness of the techniques used and any information on the cost of those techniques made available by TWG members.

To support the TWG analysis and discussions, emissions concentrations per pollutant collected from reference installations are plotted together with information on the technique(s) used. An example is shown in Figure 3-11 from the chemical sector for releases of total suspended solids (TSS) to water.

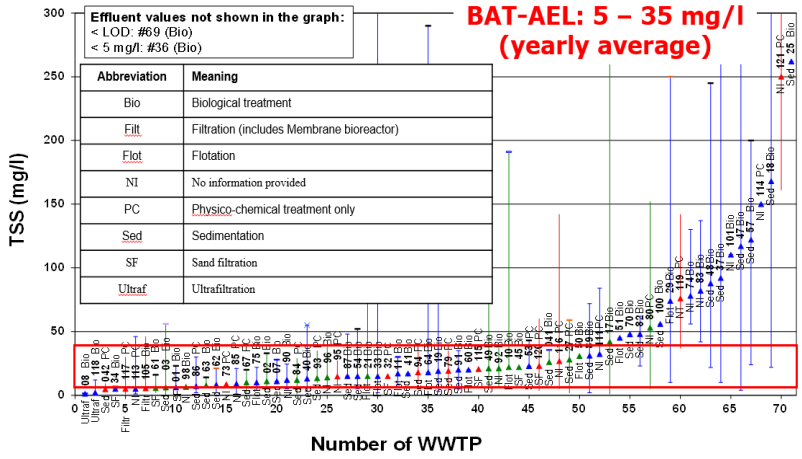


Figure 3-11: Example of analytical output from the EIPPCB[48] for total suspended solids (TSS) emitted to water from the chemical sector

The drawing up and review of BREFs is an intensive and demanding process. Six to eight BREFs are worked on simultaneously with the resources available to the EIPPCB and Technical Working Groups (TWGs). Figure 3-12 shows the current status of the different BREF reviews.

For the 16 BREF reviews that have been finalised by the end of the evaluation support contract[49], the yellow bar shows the four year period within which the permits must be updated in line with the BAT conclusions. Timings after the start of 2020 are shown indicatively.

By June 2020, 10 of the finalised BREFs have been implemented in permits. It is expected that the last BREF reviews in the current cycle will start in 2021. In view of this, reflections have started about scheduling review work beyond 2021. A workshop with the Article 13 Forum took place in June 2020 to discuss this.

[48] https://eippcb.jrc.ec.europa.eu/sites/default/files/2019-11/CWW_Bref_2016_published.pdf

[49] At the time of finalising this document, the 17th BAT Conclusions for the STS sector received the positive vote of the IED Article 75 Committee and have been adopted as implementing act by the Commission.

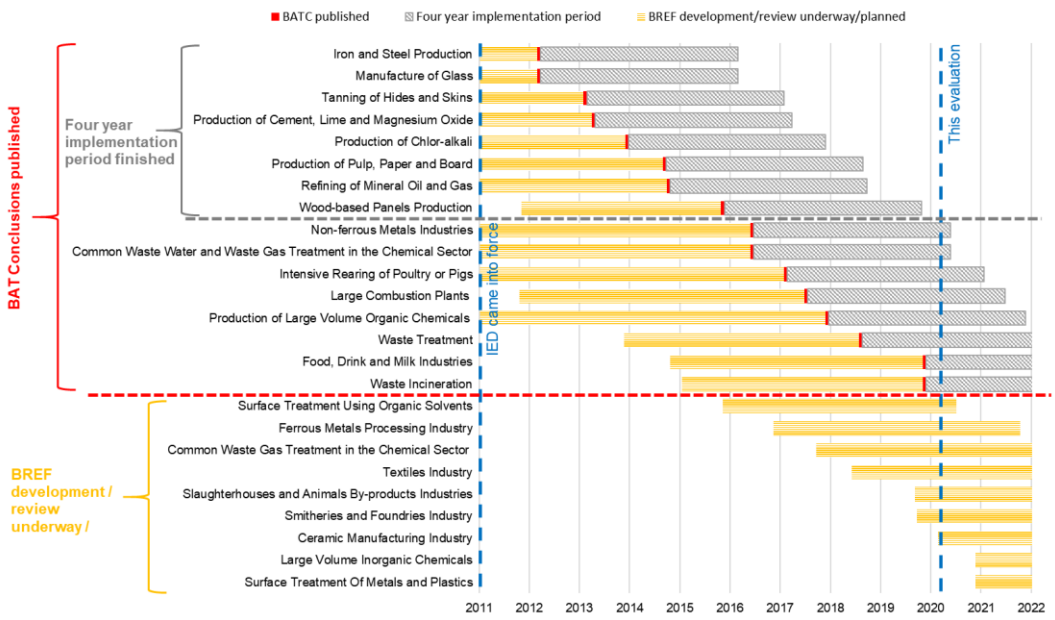


Figure 3-12 Status of IED BREF reviews (January 2020)

3.4. Monitoring and reporting under the IED and E-PRTR

The emission limits set in permits under the IED are primarily expressed in pollutant concentrations and are accompanied by corresponding monitoring obligations for operators. Operators must provide Member State authorities with appropriate monitoring results so that they can verify compliance. The results of emissions monitoring are held by the competent authority which shall make this data publicly available. There is no further reporting of emission concentrations required to EU bodies.

Industrial operators have at the same time the obligation under the E-PRTR to determine the annual quantity of released pollutants using measurements, calculations or estimations, and report them to Member State authorities, which in turn report them to the European Environment Agency (EEA). These data are the basis for assessing the environmental impacts of industry. Although there is a large overlap in scope, not all IED installations are under the E-PRTR scope and vice-versa.

Member State authorities have additional reporting obligations under the Second IED Reporting Decision. These have been simplified in accordance with the conclusions and recommendations of the Fitness Check of EU Environmental reporting obligations. All narrative reporting has been converted into reporting of factual data generated by Member States as they implement the IED. This includes a range of administrative data (e.g. relating to location, permit, activities carried out) and specific information for each IED installation (e.g. on permit updates, derogations or inspections). Furthermore, IED reporting has been streamlined with E-PRTR reporting to ensure better consistency and increase the value and usefulness of the reported data. All non-confidential information is made public.

3.5. Compliance and enforcement

In view of the very large number of installations and the hundreds of competent authorities overseeing them, it is essential for the checking of compliance with IED permit conditions and enforcement action, if needed, to be taken in a decentralised manner. The IED therefore requires permits to contain the measures necessary for checking compliance with the relevant conditions. This includes requiring operators to provide the necessary information to the competent authorities for them to verify compliance with the permit conditions. The emissions monitoring information provided by operators to the competent authorities must be made available to the public.

Competent authorities are required to carry out inspections of installations at a frequency that depends on the environmental risk posed. Inspections may involve non-routine visits as appropriate. The IED also enlists the support of the public and environmental NGOs who may file complaints about environmental problems related to an installation. If these relate to serious environmental problems, the authority would normally be expected to carry out an inspection and also has the power to suspended operations.

Where operators are found to not be respecting permit conditions, it is for the relevant competent authority to take enforcement action. It would normally be expected that, once operators are informed by a competent authority of any shortcoming in their compliance with permit conditions, they would rectify those within the period required. It is only in case of recalcitrant operators or very serious pollution incidents that action before a court might be needed. Since there is no obligation for Member States to report information on such compliance problems, very limited information is available about enforcement action or court cases. The available information suggests that there might annually be court cases affecting less than a few tenths of a percent of all IED installations.

Little information is available on penalties actually imposed as a result of those cases, due to the lack of a central register. However, data gathered on the type and scale of penalties that may be imposed under IED Article 79 shows a significant variation in these among Member States and that these have changed little from those under the IPPCD.

3.6. Innovation

Innovation was stated as one of the objectives in the Impact Assessment accompanying the proposal for the IED. As the IED is primarily focused on "available" techniques, its influence on innovation is mainly indirect. However, the Directive provides for an explicit mechanism to identity and promote the use of emerging techniques.

Indirect promotion of innovation

Permitting of large agro-industrial installations is at the core of the IED. Permit conditions are based on BAT and BAT-AELs. The definition in the IED states that *"available techniques" means those developed on a scale which allows implementation in the relevant industrial sector, under economically and technically viable conditions, taking into consideration the costs and advantages, […] as long as they are reasonably accessible to the operator.*

Under the IED, BAT conclusions aimed at reducing emissions and containing BAT-AELs are prescriptive. They are the main lever to trigger operators' investments in techniques, necessary to enable them to meet the emission levels required by the permits. To ensure a level playing field and impact emission reduction across the whole sector, the IED requires performance levels that are achievable using "best available" techniques, as opposed to emerging techniques, whose effectiveness and economic viability is by definition unproven.

The IED neither prevents competent authorities from setting more stringent limits, e.g. in situations where air quality requires it, nor operators from choosing to achieve lower concentration of pollutants. On the contrary, as soon as an operator has an economic or strategic reason to deploy innovative techniques beyond the IED requirements, it benefits from the IED mechanism, as these techniques would be taken into account in the following BREF review, paving the way for subsequent standard-setting across the sector. Although available evidence shows that emission limit values in permits are usually set at the least stringent limit of the BAT-AEL range, in most cases this is more stringent than the previously permitted levels, thus progressively reducing emissions.

Hence, the IED does stimulate innovation indirectly.

IED provisions on emerging techniques

The IED includes an explicit mechanism to support innovation in the IED through the concept of "emerging techniques". It is the role of the TWG to identify emerging techniques, in particular to inform competent authorities through BREFs about developments that may have subsequently emerged.

The basis for this is described in the BREF Guidance (2012/119/EU) point "1.2. Procedure for the drawing up and reviewing of BREFs" – *"The reviewing of BREFs is a continuing process, due to the dynamic nature of BAT. For example, new measures and techniques may emerge, science and technologies are continuously developing, and new or emerging processes are being successfully introduced into the industry. In order to reflect such changes and their consequences for the BAT, BREFs have to be periodically reviewed and, if necessary, updated accordingly. […]"*

Moreover, the IED Article 15(5) includes provisions to facilitate the testing and use of emerging techniques through a nine month permit derogation.

Since experience showed that the TWG was not very effective at identifying emerging techniques, in 2017 DG Environment set up a pilot Innovation Observatory to reinforce this objective.

Participation of technology suppliers in the BREF process

Efforts have also been made to encourage technology suppliers to participate in the work of the TWGs, as they are key to technology development and innovation. Participation in TWGs is limited to EU level organisations and ESWET (European Suppliers of Waste-

to-Energy Technology) and EPPSA (European Power Plants Suppliers Association) have been present for a long time. More recently, ACCESSA (Association for Catalytic Control of Emissions from Stationary Sources) has fulfilled that requirement and now participates in the TWGs.

4. METHOD

4.1. Short description of methodology

An evaluation matrix (Annex 3) was prepared based on the twelve areas for assessment set out in the evaluation roadmap, with some minor adjustments. This identified sub-questions, assessment criteria, indicators, data sources, data collection and data analysis methods.

Various data sources have been used. Desk research has comprised literature and evidence assessment and quantitative assessments related to emission reductions and administrative burden. The assessments of changes in emissions have looked at absolute emissions, as well as emission factors (per unit of product).

A substantial amount of field research has been conducted to gather stakeholder views. This has comprised five activities: public consultation, targeted survey, stakeholder interviews, focus groups discussions and stakeholder workshops. Their outcome is recorded in the report of the study supporting this evaluation[3].

The public consultation was published on the Commission's Better Regulation portal[50]. It gave the opportunity to all interested parties to give their views on broad questions relating to the IED. Responses were analysed by stakeholder group and a factual summary report was published in September 2019.

The targeted survey was addressed to stakeholders with a good understanding of the implementation of the IED. The survey comprised 50 questions, as well as free text boxes. Responses were analysed qualitatively and quantitatively. In view of the number of responses, it was possible to separate Member State responses into national and sub-national level.

Telephone interviews were used to complement the targeted survey. Some addressed groups not covered by the survey, such as EU bodies, and others were to follow up with survey respondents.

Two focus groups were organised to discuss the BREF process. They provided an opportunity to explore conflicting opinions.

Workshops open to all stakeholders were held at the start and end of the consultation process. The first one at the start informed stakeholders about the consultation and provided an overview of the information available. The second and last one, at the end, enabled a presentation and discussion of preliminary findings and the opportunity to bring further relevant evidence.

[50] https://ec.europa.eu/info/law/better-regulation/initiatives/ares-2018-4758971/public-consultation_en

4.2. Limitations and robustness of findings

The evaluation has proceeded in line with the roadmap. Extensive consultations have been organised and to simplify the presentation of the results, they are shown for four groupings of respondents. These were: Member State responses at national level, Member State responses at sub-national level, industry and "Others", a category which included environmental NGOs, consultancies and respondents that do not fit in the other categories.

The impacts of the IED are on-going and yet to be realised for some sectors (as illustrated by Figure 3-12), so it is not feasible to quantify the impacts across all industries. This limitation is inherent to the rolling nature of BREF reviews where at any moment some sectors are more impacted than others.

One of the main difficulties has been to separate the impacts of the IED from those of its preceding legislations and of other EU policies regulating industrial installations. Another challenge has been the lack of a comprehensive baseline in the underlying impact assessment and that, at the same time, some of the evidence used instead has different baselines. Where effects could not be disentangled or clearly attributed, they are documented as such.

The E-PRTR data documents the *quantity* of released pollutants and is the main source of information for assessing the effectiveness of the IED on pollutant emissions, complementing the Member States implementation reports. Therefore, there are good data-sets available regarding the quantity of pollutants released to air and, to a lesser extent to water, as well as other information required to be reported. Limited emissions to soil are reported, which is in line with the expectation that these mostly should not occur.

However, for other aspects little information is available. In contrast to the E-PRTR data, the emission limit requirements for installations are expressed in pollutant *concentrations*. Responsibility for verifying compliance with emission limits set in permits rests with Member States and no data on compliance with permit conditions is available at EU level. Given that the sites are to be inspected regularly and the public has the possibility to file complaints, it is assumed that facilities do comply with the requirements.

Information, such as how permit conditions have been set, administrative cost and burden, number of inspections, enforcement, compliance assessment, public participation and the costs and benefits of implementing BAT conclusions is scarcely available from industry or public authorities. Furthermore, Member States have varying approaches; where in some cases permits are issued centrally, in more regionalised counties it is often at regional level and in some cases at local level. Therefore, specific approaches have been designed to address these limitations, including the following:

- Data on inspections is required to be reported under the Second IED Reporting Decision. Provisional data from this reporting has been used in the evaluation and fuller information will become available in the near future.

- To better understand permitting practices, a permit sampling study has been done for cement kilns and electric arc furnaces in steel-works to understand the level at which emission limit values have been set, and the degree to which permits are publicly available. This data has been used in this evaluation and has been supplemented with interviews with permitting authorities.

- Costs and benefits were assessed ex-ante for LCPs and ex-post for the Iron and Steel sector. Such assessments could not be carried out for additional sectors due to a lack of data, in particular on the detailed cost of techniques, and the disproportionate effort which would have been required to this end.

- Where other evidence was lacking, stakeholder views have been sought. The main mechanism for this was the very detailed targeted questionnaire. . Where appropriate there has been follow up for specific issues, such as sub-national implementation, through interviews with relevant stakeholders to explore the topic in greater detail.

Another constraint is the limited range of experts who are knowledgeable about the topic, which results in a limited amount of independent research or literature. This is relevant because of the wide scope of the IED and the fact that relevant experts are often knowledgeable about a specific sector rather than about general issues of implementation. Furthermore, a significant share of the literature is provided by interested parties, principally industry or environmental NGOs. In some cases, responses to questionnaires may be polarised, i.e. industry may have been generally positive to prevent any change and environmental NGOs generally negative to claim stricter requirements. It is also clear that a number of concerted responses (as indicated in Annex 4) have been provided to the surveys by groups of stakeholders. This is presumably intended to give a higher profile to these comments or responses. To provide insight into these limitations when formulating conclusions, an assessment of certainty has been indicated for each aspect of the responses to the evaluation questions (as explained in Annex 5). Findings based on literature and data have been cross-checked with survey responses as far as possible. Where solid data is available, the findings are considered robust. If the data are weak, but survey responses provide a similar picture, then there is also reasonable certainty. Where the assessment had to rely only on survey responses, then the findings become weaker, particularly if stakeholder opinions diverge between groups.

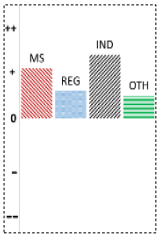
The process of proportionate triangulation has been applied in the assessment of results.

5. ANALYSIS AND ANSWERS TO THE EVALUATION QUESTIONS

The evaluation is structured around the five better regulation criteria. These have been split, where appropriate, into different questions for which one or more evaluation sub-questions are identified. The following sections give an overview of the assessment at the level of each of the criteria, followed by the assessment for each sub-question.

It is noteworthy that, for virtually all stakeholder responses, it is observed that industry was most positive about the Directive, followed by national authorities then by sub-national authorities, whereas the least positive was the category "Others", which includes environmental NGOs.

Findings are accompanied by indications of robustness e.g. **[High]** as well as stakeholder sentiments as shown on the right for the 4 stakeholder groups with strongly positive as ++, positive +, neutral 0, negative - and strongly negative --. The methods used are explained in Annexes 5 and 6.



5.1. Effectiveness

Evaluation criterion 1: To what extent has the IED been effective?

Overall response [and robustness]:

The IED has overall been effective. It has contributed to reducing emissions and the related impacts on human health and the environment and has covered most of the important sectors although a number of polluting agro-industrial activities do not fall within its scope. **[High]**

The collaborative process to develop BREFs and identify BAT has been effective and has implicitly addressed costs. By involving experts from Member States, industry and environmental NGOs, it has resulted in a high degree of consensus on the measures adopted. **[High]**

The IED has made a limited contribution to innovation and has been less effective at addressing circular economy, including water efficiency issues. **[Medium]**

BREFs have supported BAT-based permitting in Member States with a limited use of derogations, reducing the distortions in the market. **[High]**

The IED has helped improve access to information on the environmental performance of industrial activities and strengthen enforcement and access to justice and led to simplification. **[High]**

Implementation is also key. Specific attention is needed in relation to access-to-information provisions and provisions affecting stringency, for example how BAT conclusions are implemented in permits, compliance assessment and derogations. **[High]**

What is the issue?

The IED is intended to reduce the environmental impacts of the most polluting industrial sectors. Because there are a number of different steps in the overall process and different elements that may impact on the effectiveness of the intervention, it is necessary to split this criterion into a number of sub-elements. Assessing whether these have been effective requires a number of sub-questions to be answered. These are:

1(a) To what extent has the IED contributed to reducing and (as far as possible) eliminating pollution arising from industrial activities?
1(b) Are there any industrial activities that fall outside the scope of the IED (partially or fully) which generate high levels of pollution?
1(c) Have there been any pollutants that have been omitted/fallen outside the scope of the Directive?
1(d) Has the IED strengthened provisions on enforcement and environmental improvement?
1(e) Has the IED stimulated innovation in the prevention and control of pollution from industrial activities?
1(f) Has the IED led to simplification of the legislation and cut unnecessary administrative burden?
1(g) Has the IED strengthened public access to information?
1(h) Has the IED strengthened public access to justice?
1(i) To what extent does the BREF process identify the techniques that are the most effective techniques (and identify the most appropriate associated emission or performance levels) for achieving a high level of environmental protection?
1(j) Does the BREF process sufficiently consider both costs and benefits in identifying the best available techniques?
1(k) To what extent has the IED supported Member States in implementing BAT-based permitting?
1(l) To what degree are exceptions taken up that result in permits not being based on BAT?
1(m) To what extent does the emissions monitoring and reporting system facilitate the assessment of compliance under IED, and of the quantity of released emissions?
1(n) Are monitoring requirements fit for purpose?
1(o) Are there significant differences between Member States and sectors in implementation?

EFFECTIVENESS: To what extent have the IED's objectives been achieved?

Evaluation sub-question 1(a): To what extent has the IED contributed to reducing and (as far as possible) eliminating pollution arising from industrial activities?

Overall response: In relation to emissions to air, there have been significant reductions from the industrial activities within the scope of the IED. The degree of reduction varies by pollutant, but aggregate indicators, such as overall damage cost, have also reduced strongly, demonstrating that the reduction efforts have been well targeted. While it may not be the sole factor, the IED has definitely contributed to reducing pollutant emissions to air from industrial activities in its scope. **[High]**

In relation to emissions to water, the reported evidence is less robust, but shows a reduction too. The IED has also contributed to reducing emissions to water from activities in its scope. **[Medium]**

Reported emissions to soil are very low and expected to be minimised by application of BAT. **[Medium]**

In relation to resource use in industry or of changes over time, there is little quantitative information available about how the IED has affected this other than qualitative stakeholder views. Overall, the IED has not been very effective in addressing resource efficiency and circular economy aspects. **[Medium]**

What are the findings? To assess the extent to which the IED has contributed to reducing and (as far as possible) eliminating pollution arising from industrial activities, it is necessary to look at data on emissions from them, as well as causal links to the IED. While the IED itself has been in force since 2012 and 2016 for the LCP ELVs, so far 17 BAT conclusions have been adopted and the four year implementation window has concluded for the first eight. Therefore, the impacts of the IED are ongoing and yet to be realised for some sectors. It is thus not feasible to quantify the full impacts. This limitation is inherent to the rolling nature of BREF reviews where, at any moment, some sectors are more impacted than others.

Data show that reported emissions to air of several pollutants from industrial activities have dropped relatively consistently over the past 10 years. The IED is very likely to have contributed to this, but there may also be several other factors, in particular the effects of the preceding legislation or structural changes such as changing fuel use. Available assessments demonstrate the impact that the IED has had, or is likely to have, on emissions to air.

Large combustion plants are a major contributor to emissions to air from IED sectors. Whilst their emissions have been reduced significantly, given a number of time-limited flexibilities granted to Member States under the IED, this has been slower than what

would have been achieved if BAT had been applied earlier. However, the decreasing trend is very encouraging and the main time-limited flexibilities are coming to an end at the time when the 2017 BAT conclusions for large combustion plants will become applicable.

For emissions to water, reported emission data are less complete or robust, but generally show some reduction. Data on direct and indirect releases reported by IED industry, which are reported separately under the E-PRTR, show that direct releases have been significantly reduced, especially heavy metals, but that indirect releases going to centralised waste water treatment plants including urban waste water treatment plants have remained rather stable over the last 10 years. As the Urban Waste Water Treatment Directive (UWWTD) is focused on a limited set of pollutants linked to domestic pollution, it is assumed that they do not abate all pollutants from IED installations to levels consistent with the use of BAT. As indirect releases from industrial installations would become part of the emissions reported by urban waste water treatment plants under the E-PRTR, together with those from other origins, it is difficult to judge to what extent the IED has impacted emissions to water. Whilst this is a limitation in the evidence available, reductions are nonetheless expected where BAT-AELs for emissions to water have been included in BAT conclusions, which should lead to tightening of permit ELVs and therefore to reduced actual emissions.

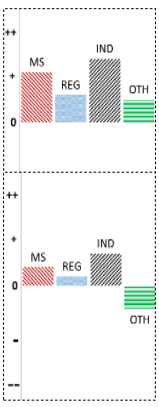
There is little evidence on emissions to soil, but as explained in Section 3.2 these ought to be largely eliminated by the use of BAT.

There is little evidence on the IED's impacts on aspects such as energy use, raw materials consumption and waste generation. The less binding nature of these aspects of BAT conclusions could be expected to have contributed to them having less impact.

Regarding the circular economy, robust evidence on the direct impacts of BAT conclusions is not available. This is partly due to the non-binding nature of the IED requirements in this area, the economic interest of the operator and concerns over commercial confidentiality that limit the amount of information industrial operators make available in the BREF process. Furthermore, the IED applies to the operation of plants and not to the entire value chain.

For some IED sectors, it is likely that any untapped potential is limited because many installations covered by the IED recycle materials (for example glass, paper and metals). Furthermore, in some cases, there is virtually no waste (e.g. slaughterhouses) because all potential "waste" is turned into a "resource" for another industry.

Stakeholders: While the reaction was generally positive regarding the IED's impacts in reducing emissions to air and to a lesser extent to water, some questioned whether the current pollution reductions are sufficient.



The reaction was less positive in relation to resource efficiency aspects with a general view that the IED makes a small contribution to the circular economy. Some stakeholders

considered it was under delivering whilst others emphasised limitations inherent to using permitting of process industry to regulate circularity.

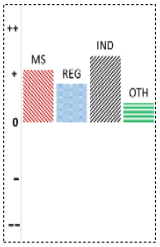
EFFECTIVENESS: To what extent have the IED's objectives been achieved?

Evaluation sub-question 1(b): Are there any industrial activities that fall outside the scope of the IED (partially or fully) which generate high levels of pollution?

Overall response: There are a small number of agro-industrial activities not covered by the IED that may generate high levels of pollution. **[High]**

What are the findings? With regard to the coverage of highly polluting industrial activities, there are a relatively small number of these not already within the scope of the IED. This includes various intensive livestock activities (cattle, aquaculture, mixed farms, poultry farms below IED activity thresholds), and mining, which either emit relevant pollutants (e.g. ammonia) or have grown in importance (e.g. aquaculture). The previous Impact Assessment concluded that the full IED permitting process was not appropriate for some of these activities (e.g. cattle) due to the administrative burden

Stakeholders: There was general agreement that the IED addresses the most polluting sectors. Various stakeholders identified industrial activities outside the scope of the IED. Whether these generate "high levels of pollution" requires further investigation. This includes some activities covered by the IED below the prescribed activity thresholds.



EFFECTIVENESS: To what extent have the IED's objectives been achieved?

Evaluation sub-question 1(c): Have there been any pollutants that have been omitted/fallen outside the scope of the Directive?

Overall response: No pollutants are outside the scope of the IED. However, in relation to GHGs, while the integrated approach encompasses them, IED Article 9 forbids competent authorities to set ELVs for them for installations falling under the ETS. Limited attention has been given to GHG emissions in BREFs and BAT conclusions, affecting installations not covered by the ETS. There may be indirect effects on GHG emissions through BAT on energy efficiency including in some cases BAT-AEPLs. **[High]**

Other concerns relate to coherence with other EU legislation and Technical Working Group choices of Key Environmental Issues for a BREF. The data-driven approach to BAT-AELs limits the ability to address pollutants for which little emission monitoring data is available, e.g. a range of water pollutants. **[Medium]**

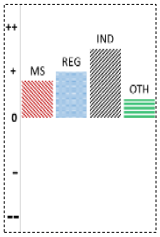
What are the findings? IED Annex II provides a non-exhaustive list of pollutants. The BREF process is not limited to these and has covered additional pollutants. Member State

competent authorities are also obliged to establish ELVs in permits for polluting substances which are likely to be emitted from the installation concerned in significant quantities, having regard to their nature and their potential to transfer pollution from one medium to another. This is neither limited to the list of pollutants in Annex II to the IED nor the list of pollutants with BAT-AELs in BAT conclusions.

With regard to GHGs, IED sectors are responsible for around 40% of total EU GHG emissions. Most of these sectors are regulated under the EU Emissions Trading System (ETS) and ELVs for GHGs may not be set in IED permits for these sectors, as stipulated by Article 9 of the IED. Nevertheless, there are some IED sectors whose CO_2 emissions are not in the ETS scope and there are other GHG emissions that are not regulated by it. It is estimated that around 10% of GHG emissions of IED plants are not covered by the ETS, representing around 4% of total EU GHG emissions.

Due to the provisions of Article 9 of the IED and the fact that most of the GHG emissions from IED installations are regulated under the ETS, BAT-AELs for GHG emissions have been set in BREFs in very few cases only. The BREF coverage of GHG emissions has largely been limited to techniques to increase energy efficiency and related BAT-AEPLs. In a few cases, BAT to reduce GHG emissions originating from processes other than combustion have been set[51].

The fact that an increased energy efficiency also means reduced emissions of air pollutants and GHGs has always been recognised during the BREF development. However, little attention has been given to date to the synergies that may be achievable through decarbonisation techniques other than those related to energy efficiency.



Stakeholders: Stakeholders largely agree that the most relevant pollutants are addressed. Regarding omitted pollutants, a number of stakeholders (Member State authorities and environmental NGOs) referred to GHG emissions from installations covered under the EU ETS. The need for better coherence of substances addressed by other EU legislation, such as the Water Framework Directive and related water quality legislation, as well as REACH, was generally stressed.

[51] e.g. on emissions of fluorinated refrigerants from cooling systems, on process emissions of carbon dioxide from ethylene oxide, or on diffuse emissions of sulphur hexafluoride from electrolytic cells in primary aluminium production.

EFFECTIVENESS: To what extent have the IED's objectives been achieved?

Evaluation sub-question 1(d): Has the IED strengthened provisions on enforcement and environmental improvement?

Overall response: The IED environmental inspections provisions are more explicit than under the IPPCD and the provisions relating to environmental permits have been strengthened. **[High]**

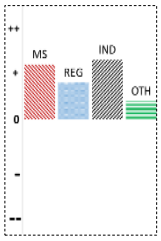
Penalties applied by the Member States vary significantly. **[Medium]**

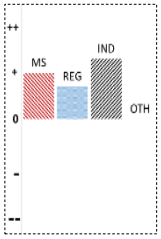
Although hard data is not available, the strengthening of these provisions together with views expressed by stakeholders suggest that enforcement has to a degree been strengthened. **[Medium]**

What are the findings? The provisions relating to environmental permits have been significantly strengthened under the IED – namely by establishing BAT conclusions and the BAT-AELs, associated BAT on monitoring and their other aspects as the mandatory basis for setting permit conditions.

One important aspect related to enforcement is the IED requirement for periodic environmental inspections of installations and an inspection plan. These provisions are more explicit than under the IPPCD. Whilst the IED includes a standard provision on penalties, Member States have a large margin of appreciation on how to implement this provision, resulting in significant variation among Member States.

Initial information on these aspects is contained in the IED Member State implementation reports covering the 2013-16 period and more detailed information on inspections that has been provided in their 2017 and 2018 implementation reports. There is however no pre-IED baseline data on inspections and information on the frequency of IED non-compliance is neither reported nor publicly available.





Stakeholders: The majority of responses, across all stakeholder types, agree that, compared to the state of play under the IPPCD, the entry into force of the IED requirements on use of BAT conclusions and permits has led to better control over environmental impacts.

Most stakeholders, except "Others", also agree that enforcement has been strengthened.

EFFECTIVENESS: To what extent have the IED's objectives been achieved?

Evaluation sub-question 1(e): Has the IED stimulated innovation in the prevention and control of pollution from industrial activities?

Overall response: The IED has to some degree stimulated innovation, in particular through provisions for identifying and deploying BAT, expansion of markets for BAT, and identification of emerging techniques. **[Medium]**

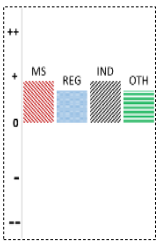
BAT are inherently "backward looking" featuring techniques which are already commercialised: this means their ability to stimulate innovation is limited. **[High]**

The pilot IED Innovation Observatory has led to an increase in emerging techniques documented in the concerned BREFs. **[High]**

What are the findings? The IED has, to some degree, stimulated innovation in the prevention and control of pollution from industrial activities through its provisions for identifying BAT and related BAT-AELs and for identifying emerging techniques described in Section 3.6. The main impact has been the deployment of BAT. The market for relevant techniques is larger in the EU than it would otherwise have been, and the market outside the EU is also stimulated, to the degree other jurisdictions take inspiration from aspects of the IED or BREFs. Some identified emerging techniques have become BAT in the subsequent BREF review.

Due to resource constraints, the BAT information exchange process focuses less on gathering information on emerging techniques. Relevant types of stakeholders working on emerging techniques do not necessarily participate in TWGs. In 2017, work started on a pilot dedicated mechanism to better reach appropriate stakeholders and identify emerging techniques through an Industrial Emissions Innovation Observatory. This may stimulate innovation further.

In addition, there are very few cases of operators having been granted a derogation under Article 15(5) from ELVs to facilitate the testing of emerging techniques.



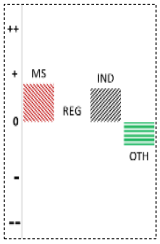
Stakeholders: While stakeholders generally consider that the IED has stimulated innovation, many view the emerging techniques chapter of the BREF as having had less impact on innovation than other parts of the BREF process and the IED. Some think innovation has not been stimulated to its maximum potential. A major reason for this is that the BREF process identifies techniques already commercially in use, rather than those not yet commercialised. Limited information has been included in the emerging techniques chapter of BREFs. The limited time allowed for derogations under Article 15(5) from BAT-AEL-based emission limits to test emerging techniques was also cited as a barrier.

EFFECTIVENESS: To what extent have the IED's objectives been achieved?

Evaluation sub-question 1(f): Has the IED led to simplification of the legislation and cut unnecessary administrative burden?

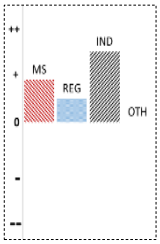
Overall response: The merger of the predecessor Directives has clarified and, to a lesser extent, also simplified the requirements. Nonetheless, some complexities remain. **[High]**

What are the findings? As regards simplification of the legislation and unnecessary administrative burden, the key difference is that seven Directives were replaced with one. The same IED requirements relating to a permit apply to installations in all covered sectors. Some aspects of the differences between the preceding directives remain in the IED. Despite this, there remain some unclear aspects, such as which installations are covered by BAT conclusions as well as by specific IED chapters. Some challenges relate to interactions between the texts of the specific sectoral IED chapters with that of the BAT conclusions which must be aligned with the requirements of IED Chapter II. The large numbers of requests for clarifications is a strong indicator that some uncertainties and complexities remain.



Stakeholders: The majority of survey respondents agreed that the IED has contributed to simplification of the provisions relative to the previous regime.

However, they believed more strongly that the provisions had been clarified compared to the previous legislation.



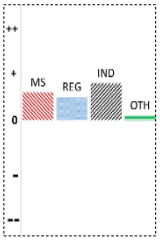
EFFECTIVENESS: To what extent have the IED's objectives been achieved?

Evaluation sub-question 1(g): Has the IED strengthened public access to information?

Overall response: Access to information has improved but there remain some failings in implementation by Member States. **[High]**

What are the findings? As regards public access to information, whilst there has been improvement under the IED, there remain deficiencies: not all permits are publicly available online, information available online is sometimes very difficult to locate and in at least one Member State, authorities have initially requested fees for access to permits.

Stakeholders: Most stakeholder groups consider that access to information has improved, except "Others", who believe there is insufficient information available and that the situation has not improved.



EFFECTIVENESS: To what extent have the IED's objectives been achieved?

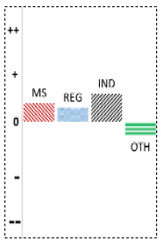
Evaluation sub-question 1(h): Has the IED strengthened public access to justice?

Overall response: Access to justice has somewhat improved, but limitations remain. **[Medium]**

What are the findings? With regard to public access to justice, the IED did not include any specific new provisions. Changes made to improve and strengthen public access to information and participation in permitting procedures were expected to lead to greater capacity of the public to challenge new or revised permits and other issues. While there continue to be limitations in knowledge (see previous section on public access to information) and no clear baseline for comparison, public access to justice appears to work, at least to some extent, where new permits are considered. The main limitation seems to be, at least in some Member States, 1) the ability of the public or environmental NGOs to challenge revisions to existing permits and 2) the interpretation of what constitutes "substantial change" in IED Article 24 (in combination with uncertainty over whether the public can challenge a decision if the change is declared to be non-substantial). Other issues relate to the ability of the public and environmental NGOs to challenge omissions to act by competent authorities, e.g. where permits have not been issued for an installation.

In its draft findings in an ongoing case against the EU (case ACCC/C/2014/121), the Aarhus Convention Compliance Committee has expressed a view that the IED provisions on public participation in permitting do not cover all cases where the Convention requires such participation, and therefore, are not fully compliant with the provisions of the Aarhus Convention.

Stakeholders: Responses are fairly consistent across different groups with over half the responses indicating there has been no change, while the remainder mostly believe there has been some improvement compared to the preceding situation.



EFFECTIVENESS: How effective is the BREF elaboration process?

Evaluation sub-question 1(i): To what extent does the BREF process identify the techniques that are the most effective techniques (and identify the most appropriate associated emission or performance levels) for achieving a high level of environmental protection?

Overall response: The definition of BAT and the collaborative process with Member States, industry and environmental NGO experts to draw up and review BREFs has in general allowed the most effective techniques for achieving a high level of environmental protection to be identified. **[Medium]**

The BREF process identifies in general the BAT that are most effective for achieving a high level of environmental protection. The effectiveness of the determination of BAT has varied among BREFs and may have been affected by the composition of the TWGs and scarcity of data among other reasons. **[Medium]**

The BREF process identifies appropriate BAT-AE(P)Ls. **[Medium]** There are some limitations identified, including whether it has always targeted the most relevant environmental issues and pollutants.

Cross-media effects have been sufficiently considered in identifying BAT but there is room for improvement in the integrated approach. **[Medium]**

What are the findings? The information exchange process established under the IED to draft BREFs has involved the collaboration of Member State, industry and environmental NGO experts. It provides for continual improvement of this process in the Article 13 IED Forum and procedural issues are also identified and discussed in specific BREF TWGs. There have also been specific workshops held on the topic. The process for deriving BAT-AELs has been discussed extensively within TWGs for specific BREFs and some changes have been implemented as a result. Many of these previous discussions have addressed topics raised at this stage by stakeholders.

Since BAT conclusions have been drafted with the involvement of Member States, the Committee votes for their adoption have always been positive reaching up to 100% support in comitology votes. This high degree of support largely exists across all stakeholder groups.

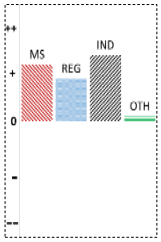
An ex-post assessment of the Iron and Steel BAT conclusions concluded that only about 20% of processes in that sector had been impacted. The choice of sectors at the time of the analysis was limited, since there were only seven sectors where BAT conclusions had been fully implemented in permits. This sector was selected as there are a manageable number of installations that are relatively homogeneous and cover reasonably well the entire EU. Unfortunately, the iron and steel sector mainly chose not to collaborate with the assessment, which increased the uncertainty of the findings. While this may explain

the relatively low proportion of processes assumed to have been impacted, there may be other reasons. For example, the Iron and Steel BAT conclusions were among the first ones published under the IED, however most of the work was carried out prior to adoption of the IED and of the BREF Guidance. This less rigorous approach may have impacted the stringency of the requirements.

In contrast, an ex-ante assessment for large combustion plants (LCPs) of over 300 MW_{th} firing solid fuels found that the BAT Conclusions for LCPs are likely to lead to emission reductions at a large proportion of plants (impacting about 72% of the LCPs).

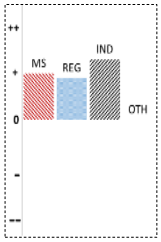
Stakeholders: Half of industry respondents consider that the BREF review process has rarely, or never, sufficiently considered the costs of techniques. The majority of "Others" thought that the costs were sufficiently considered some or most of the time. Member State responses were in between the two.

The majority of industry and, to a lesser extent, Member State national authorities agree that the BREF process identifies the most effective BAT. Around one third of "Others" disagree.



Furthermore, specific stakeholders raised potential issues, e.g. data collection (burden, scope or representativeness), TWG composition, consideration of cross-media effects and innovation. Concerns were raised on the focussed approach towards key environmental issues which may have led to a less integrated approach among all pollutants and their cross-media impacts.

Stakeholders broadly agree that the BREF process has identified the most appropriate BAT-AE(P)Ls. However, some respondents questioned whether the BAT-AEL derivation process is sufficiently systematic and transparent.



Regarding cross-media effects, around 75% of stakeholders believe that they are addressed some, most or all of the time. However, only about 25% believe they are addressed most of the time.

Just over half of most stakeholder groups indicated the length of the BREF process is about adequate with the industry being most positive. Meanwhile, Member States and "Others" tended to think it is too long, while industry tended to think it too short.

Feedback on the composition of the TWG includes: a need for broader representation;

EFFECTIVENESS: How effective is the BREF elaboration process?

Evaluation sub-question 1(j): Does the BREF process sufficiently consider both costs and benefits in identifying the best available techniques?

Overall response: As BAT are techniques already applied by operators in competitive market conditions, they are inherently considered economically viable. The BREF process provides sufficient opportunity to provide and consider costs in identifying BAT. **[High]**

In practice, industry has generally not provided much cost data. Whilst the BREF process does not itself quantify the human health and environmental benefits of implementing BAT, the separate Commission cost-benefit assessments that have been carried out concluded that the benefits significantly exceeded costs. **[High]**

that it can sometimes be dominated by industry participants; and that Member States should not be represented by third parties (industry, consultants).

What are the findings? With regard to the consideration of costs and benefits within the identification of BAT, cost is a relevant factor for consideration. In principle, where techniques are operated in existing plants, these are assumed to be economically viable without the need for further assessment by the TWG. Where the TWG provides appropriate cost data, it is included in the BREF. However, there have been challenges around obtaining cost data from industrial operators as part of the BREF process. This is also due to confidentiality aspects. There is no quantification of total avoided emissions or avoided damage costs at a sectoral level.

Stakeholders: Stakeholders generally consider that the BREF process has sufficiently considered the benefits of techniques some, most or all of the time; industry were the most positive, followed by Member States and then "Others".

EFFECTIVENESS: How effective is the BREF elaboration process?

Evaluation sub-question 1(k): To what extent has the IED supported Member States in implementing BAT-based permitting?

Overall response: BAT-based permitting has significantly increased under the IED. ELVs are set in line with BAT conclusions, though mainly at the least stringent end of the BAT-AEL range. **[High]**

There is little information on how the IED has influenced other permit provisions, for example where BAT conclusions contain BAT-AEPLs or descriptive techniques. **[Low]**

What are the findings? The degree to which the IED has supported BAT-based permitting in Member States is easier to assess for ELVs in permits, since they must be based on BAT-AELs. ELVs have mostly been set at the least stringent level of the BAT-AEL range. This approach has even been set out in national guidance or general binding rules in some Member States. Evidence from sampling of permits across the EU for specific sectors shows that about 15% of ELVs are set at more stringent levels.

In relation to BAT-AEPLs other than BAT-AELs, there is limited evidence of their use. However, this points to some variation in implementation across the Member States regarding whether the BAT-AEPLs are interpreted as binding, and thus included in permits, or not.

Stakeholders largely agree that the IED and BAT conclusions have enabled Member States to implement BAT-based permitting. This has increased in relation to the IPPCD, due to the new nature of the BAT conclusions which have become mandatory.

EFFECTIVENESS: How effective is the BREF elaboration process?

Evaluation sub-question 1(l): To what degree are exceptions taken up that result in permits not being based on BAT?

Overall response: A limited proportion of installations have been granted derogations. While IED Article 15(4) does allow Member States to derogate, in certain circumstances, from BAT-based permitting this allows more cost effective implementation. There is however limited understanding of the variability of approaches across the EU and insufficient knowledge as to whether all derogations are fully justified. Civil society has challenged the granting of derogations in some cases, arguing that they would be inconsistent with obligations to meet EU air quality standards. **[Medium]**

What are the findings? IED Article 15(4) allows for operators to apply for derogations from achieving the emission levels associated with applying BAT. These may be granted provided the conditions are fulfilled. Such derogations have been granted.

Evidence from sampling of cement kiln permits across the EU indicates that a small proportion of ELVs are set at levels above the upper end of the BAT-AEL range under Article 15(4) derogations. Member State reporting shows that, for Iron and Steel and Glass installations combined, 15 Member States granted derogations for 82 installations out of a total of around 780 installations, i.e. just over 10% of installations. In many instances these derogations are related to a single BAT conclusion. This suggests that, overall, the BAT conclusions were appropriate for the majority of the installations. However, an ex-post assessment of the Iron and Steel BAT conclusions concluded that they impacted only about 20% of processes in that sector. Unfortunately, equivalent data are not available for the Glass sector.

The Commission does not hold information pointing at widespread unlawful use of this derogation procedure. However, there are cases where civil society has challenged derogations at national level, arguing that derogations should not be given due to the contribution of the concerned plants to low air quality in zones not complying with EU air quality standards.

Stakeholders: The majority of stakeholders believe that there are significant differences in BAT implementation among Member States (Member States: 64%; Sub-national: 55%; Industry: 91%; "Others": 86%). Yet, this somewhat contradicts answers to sub-question 1(o) where all stakeholder groups largely agree that the IED has contributed to reducing distortion of competition (the proportions agreeing or strongly agreeing are: Member State: 86%; Sub-national: 88%; Industry: 69%; "Others" 67%).

EFFECTIVENESS: How effective is emissions monitoring and reporting?

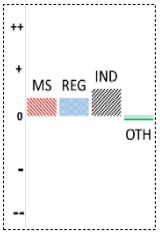
Evaluation sub-question 1(m): To what extent does the emissions monitoring and reporting system facilitate the assessment of compliance under the IED, and of the quantity of released emissions?

Overall response: Monitoring and reporting systems provide good information on emissions. Member States draw on the BREFs and BAT conclusions when setting monitoring requirements in permits. However, there is variation in implementation across the EU, in particular in relation to compliance assessment, which risks creating distortions. **[High]**

What are the findings? Emissions monitoring and reporting by operators to competent authorities is essential to assess compliance of installations and also for knowing the quantity of released emissions. All recent BAT conclusions contain consistent BAT for monitoring. Member States reporting to the Commission shows that monitoring frequencies in permit conditions are consistent with the frequencies given in the BAT conclusions. This points to overall improved transparency and consistency of the requirements across Member States.

There is however less evidence as to whether they have led to improved compliance. In many Member States, monitoring information is not systematically made public; and it is thus unclear if it is being reported consistently by operators and used by competent authorities for compliance assessment. The limited information available on the approaches used by competent authorities for compliance assessment points to divergences between them. Variations in compliance assessment rules risk creating distortions across the Internal Market.

Stakeholders: BAT on monitoring are mostly clear. More recent BREFs and BAT conclusions are considered to be much clearer with respect to monitoring aspects.



EFFECTIVENESS: How effective is emissions monitoring and reporting?

Evaluation sub-question 1(n): Are the monitoring requirements fit for purpose?

Overall response: There is a sound system in place for monitoring emissions from IED installations. **[High]**

Emissions data held by competent authorities are public, but it is not clear how easy it is to access them and how much use is made of this. Real-time monitoring information is rarely available to competent authorities. Emissions data, including real-time data, are rarely made available via the internet. **[Medium]**

What are the findings? The monitoring of emissions to air and water for compliance assessment purposes is largely based on EN standards. More than a hundred of these standards are used. Detailed provisions apply in Member States to ensure a high quality

of the measured data (e.g. accreditation schemes for testing laboratories or certification of automated measurement systems for emissions to air). Measurements are often carried out periodically, but emissions from large sources are usually measured continuously.

IED Article 24 stipulates that the results of emission monitoring, as required under the permit conditions and held by the competent authority, shall be made available to the public. However, while citizens may request these emission monitoring results and the authorities are obliged to share them, there is a certain barrier, because the results are rarely made available to the general public upfront via the internet.

There are, nevertheless, a number of countries outside the EU, as well as some EU regions and companies, which publish the results of emission measurements online, including in real time in the case of continuous measurements. These examples demonstrate the feasibility of applying digital technologies to improve the overall efficiency of emissions reporting, facilitate compliance checks and enhance public access to information.

Stakeholders: Some stakeholders have highlighted digitalisation as a way to improve the quality reporting and aid quicker identification of non-compliance.

EFFECTIVENESS:

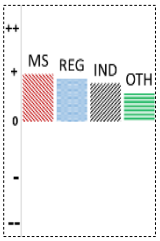
Evaluation sub-question 1(o): Are there significant differences between Member States and sectors in implementation?

Overall response: The IED has contributed to a more level playing field for operators compared to under the IPPCD. This is mainly achieved through a reduction in differences in stringency of permit ELVs among Member States. **[High]**

Variations in implementation remain among Member States, particularly with respect to compliance assessment and the granting of derogations. There appear to be minor differences among Member States in setting ELVs, with a limited share being set below the least stringent level set by BAT conclusions. **[High]**

What are the findings? The IED is intended to minimise differences in stringency among Member States and sectors. There is some (limited) variation in terms of the levels at which permit conditions have been set within the BAT-AEL range. The majority of ELVs appear to be set at the upper (least stringent) end of this range. Some Member States appear to have granted a greater number of derogations than others and some do not allow them at all. Stricter ELVs than those corresponding to the BAT conclusions appear to be rarely applied. Differences in the levels at which permit conditions are set based on the BAT-AEL range can impact on company costs. There appear to be differences in compliance assessment.

Stakeholders are of the opinion that the IED has contributed to a more level playing field compared to the IPPCD and sectoral Directives, although differences still remain. Permit conditions are largely being set according to the BAT conclusions – at least for BAT-AELs, which has led to a much more uniform approach among Member States than under the IPPCD. Differences among Member State approaches to conducting inspections have reduced under the IED with greater establishment of inspection plans as required under its Article 23.



5.2. Efficiency

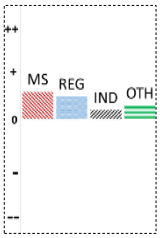
Evaluation Question 2: How economically have the resources used been converted into effects?

Overall response:

The overall benefits of implementing BAT conclusions have been shown to substantially outweigh all the costs. There is no part of the IED where costs have been identified as disproportionate. **[Medium]**

There has been continuous improvement of the BREF process. There is limited evidence on overall administrative costs or their possible increase or decrease. No unnecessary administrative costs have been identified. There are mixed impacts on EU competitiveness, but no evidence is available that these are significant. There is no evidence of excessive burden. **[Medium]**

The IED has improved environmental sustainability. **[High]** The effect on social and economic sustainability is less clear. **[Medium]**



What is the issue?

The assessment of efficiency compares the inputs used for a certain activity with produced outputs. This is particularly challenging for the IED, as it is hard to estimate compliance costs, due to the implementation of the BAT conclusions by competent authorities and in individual processes and installations.

The evaluation has therefore focussed on assessing whether the overall compliance costs are justified by the benefits obtained and whether there is evidence that efficiency could have been improved. It is also assessed to what extent the administrative burden has been reduced with respect to initial expectations. Finally, it is explored whether the implementation of the IED supported or hampered EU competitiveness in the global economy.

The following sub-questions are answered:

2(a) To what extent are the costs justified, given the impact of the IED and the benefits it has delivered?
2(b) Could efficiency have been improved?

2(c) To what extent has the administrative burden been reduced with respect to initial expectations?
2(d) Has implementation of the IED supported or hampered EU competitiveness in the global economy?
2(e) Has the implementation of the IED improved or been detrimental to economic, social and environmental sustainability?

EFFICIENCY: How economically have the resources used been converted into effects?

Evaluation sub-question 2(a): To what extent are the costs justified, given the impact of the IED and the benefits it has delivered?

Overall response: The overall benefits of implementing BAT conclusions have been shown to substantially outweigh the overall costs. **[Medium]**

There is limited knowledge of the overall costs and benefits other than reduced emissions to air. Cost assessments have been carried out for only a limited number of sectors, but the findings can likely be extrapolated more generally on the basis that the same procedure applies to all BREF reviews. **[High]**

What are the findings?

There is no pre-existing assessment of the overall costs of the IED or the benefits it has delivered. In particular, there is no agreed approach to value some of the benefits, e.g. reduced emissions to water. This makes it challenging to assess the extent to which the costs are justified.

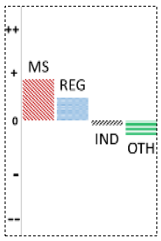
No cost-benefit analysis is required in the BREF process as the IED definition of BAT in Article 3 requires that it is cost-effective. During the drawing up and reviews of BREFs , economic viability is evaluated at the sector level. Usually, the TWG determines the economic viability of a technique by noting that it is used in various installations across various countries, under competitive market conditions. Any TWG member can bring data on costs and economic viability, which can be country-specific. IED sectors are in general not labour intensive, and the cost of technology dominates any investment triggered by the IED. In addition, IED operators are usually large multinational companies, not bound by national specificities. There is no evidence of an intrinsically differing economic viability for BAT among Member States. If for an individual installation this does not hold, then a derogation can be applied for (see "Effectiveness" sub-question 1(l)). However, to have an overview of the efficiency of the policy, some targeted cost-benefit assessments have been undertaken for a limited number of BAT conclusions. Carrying out these assessments is complex and expensive because the BAT conclusions apply at process level, and each installation has different processes. In view of this, as a minimum, it is necessary to have a sufficiently detailed database for the whole sector with information on processes at each installation.

An ex-post assessment for the iron and steel sector concluded that the benefits to society from compliance with the BAT conclusions for emissions to air (€932 million annually) are around 10 times the investment costs (€90 million annually). An ex-ante assessment for LCPs assessed that the benefits (€3.4-14.2 billion annually) will be between 2.5 and 5.8 times the investment costs (€0.59-5.7 billion annually) in 2025. Further detailed assessments could not be carried out due to their cost and difficulties in obtaining the comprehensive information needed on techniques used in plants at process level.

An assessment of the other main costs beyond the cost of techniques required for compliance with BAT conclusions, such as monitoring and inspection costs, has been done for the Iron and Steel sector. This suggests that the benefits still significantly exceed the costs after adding these non-investment related costs, primarily because these other costs are relatively small in comparison.

The IED mechanisms for derogations reduce compliance costs, as do the transitional arrangements for LCPs under Chapter III. It is not clear whether the use of these flexibilities leads to better efficiency in terms of costs per unit of environmental improvement.

Stakeholders: Member States largely agree that the benefits achieved from the IED are cost-effective while industry and "Others" are less positive.



Industry largely finds compliance costs moderately acceptable or does not agree or disagree. NGOs believe the compliance costs are fully acceptable.

There is a general view that the BREF process requires a large resource effort from Member States, industry and civil society, which stakeholders would like to see reduced.

Stakeholders provided examples where they claim that parts of certain BAT conclusions have been less cost-effective. However, they have not provided evidence supporting their views. In addition, some industry stakeholders claim that the accumulation of various obligations on LCPs from climate and energy policy, coupled with the obligation to comply with IED Chapter III and Annex V requirements in 2016 and then with the LCP BAT conclusions in 2021 have increased costs to operators. Literature has identified the risk of stranded assets for LCPs in this situation.

EFFICIENCY: How economically have the resources used been converted into effects?

Evaluation sub-question 2(b): Could efficiency have been improved?

Overall response: The BREF process has already been (and continues to be) subject to a process to improve its efficiency. Whilst successful, it is possible that more could be done in the future to further improve its efficiency, several suggestions were made by stakeholders. **[Medium]**

What are the findings? As regards whether efficiency could have been improved, the meetings of the IED Article 13 Forum as well as TWG meetings regularly discuss aspects of the BREF process. Where process improvements are identified and agreed these can be implemented. These efforts over the years appear to have led to efficiency improvements, but it is not excluded that further improvements may be identified.

Stakeholders: Two thirds of stakeholders have no view on whether the IED could have been implemented more efficiently whilst still delivering its objectives and minimising unnecessary costs. Most of the remaining third indicated that efficiency could have been improved. Several suggestions were made by stakeholders to help deliver the IED's environmental objectives whilst improving efficiency.

Survey respondents were generally positive about the process for Member State reporting to the Commission, even though the systems are in flux and the EU Registry on industrial installations is still being rolled out.

EFFICIENCY: How economically have the resources used been converted into effects?

Evaluation sub-question 2(c): To what extent has the administrative burden been reduced with respect to initial expectations?

Overall response: Additional administrative costs have been incurred for additional requirements under the IED compared to the IPPCD, for example the production of baseline reports by operators, under IED Article 22, on the state of soil and groundwater contamination. However, these costs are not "unnecessary" and no such costs have been identified. There is limited evidence of any change in overall administrative costs compared to before the IED. There is no good evidence on overall administrative costs. **[Medium]**

What are the findings? Regarding administrative costs, limited evidence has been identified on those associated with the IED overall and therefore on how this may have changed relative to under the previous legislation.

It is estimated that there was a one-off cost after implementation of the IED of the order of €19.9 million to produce baseline reports in relation to the state of soil and groundwater at the Iron and Steel installations. Other one-off costs are estimated at €7.9 million to carry out the BREF review and €14.9 million for the permitting of the installations. Additional annual costs are estimated at €5.5 million for national implementation of the IED, €5.5 million for monitoring and €4.5 million for inspections. Annualised, these costs are of an order of magnitude lower than the scale of investment costs for this sector.

Monitoring data are needed for the BREF process to function. Emission data provide the basis for establishing which techniques are BAT and the achievable emission levels.

Stakeholders: More than half of the stakeholders indicated that administrative costs to Member States and operators have increased under the IED compared to the previous situation. When asked whether the implementation of the IED has led to a reduction in unnecessary administrative burden for operators and/or Member State competent authorities, the respondents were generally negative to neutral. In explanation, a number of industry stakeholders highlighted that the requirement to produce baseline reports on soil and groundwater pollution represented a significant additional administrative burden. However, this new IED requirement was specifically introduced to address a gap in the IPPCD.

A co-ordinated industry response claimed that the burden for operators has grown due to increased monitoring provisions under the IED, for example where a BAT on monitoring is set for pollutants for which no BAT-AELs have been set. The IED derogations process was also reported to have increased administrative burdens for Member States (justified by reduced compliance costs for industry).

Inconsistencies between the BREFs and the provisions in Chapters III and IV of and associated Annexes to the IED were flagged by some stakeholders as potential unnecessary administrative burdens related to the different averaging periods used in the different documents. No further evidence has been identified indicating that the costs have caused an unnecessary or excessive burden.

EFFICIENCY: How economically have the resources used been converted into effects?

Evaluation sub-question 2(d): Has implementation of the IED supported or hampered EU competitiveness in the global economy?

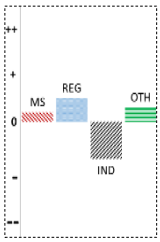
Overall response: The IED both supports (e.g. driving the export of EU sustainability expertise) and hampers EU competitiveness in the global economy (e.g. additional compliance costs in the EU compared to elsewhere). There is no evidence that these impacts are significant. Therefore, overall, the IED has not significantly impacted EU global competitiveness. Several non-EU countries are using information from BREFs to shape their national industrial measures or set emission limits. **[Medium]**

What are the findings? As regards the IED's impact on EU competitiveness in the global economy, Eurostat data shows that overall the industry environment compliance costs remain relatively constant. The IED impact assessment reported several studies that showed that environmental legislation does not impair economic competitiveness and was in many cases considered a competitive advantage. Costs associated with environmental legislation were generally a small factor in global competitiveness, with other costs, such as labour, raw materials and energy, being much more influential.

The Iron and Steel BAT conclusions assessment has indicated estimated total annualised compliance costs of around €134 million per year. In comparison, the sector's annual turnover is reported to be €123 billion and its annual investment costs are €3.9 billion. It seems unlikely that an additional cost of 0.1% of turnover will have a significant impact on competitiveness. A number of industry respondents referred to "Cumulative Cost Assessment" studies. However, this approach only considered costs and not benefits. Furthermore, it did not differentiate between the IED compliance costs and the costs of other emissions legislation, and the limited cost evidence was not seen as reliable. No specific supporting evidence about competitiveness impacts was provided.

A growing number of non-EU countries around the world are implementing legislation based on the BAT concept or using EU BREFs to provide information for setting emission limit values. The OECD is organising an exchange of information between international experts on BAT-like legislation. These factors help to reduce differences in environmental requirements internationally.

Stakeholders: Stakeholders groups had mixed views as to whether or not the IED has reduced competitiveness with countries outside the EU due to higher compliance costs. The majority of industry responses believe this is the case, as major competitors on the global market do not have to comply with similar legislation, while more than half of Member States and NGOs believe there is a benefit to EU competitiveness.



EFFICIENCY: How economically have the resources used been converted into effects?

Evaluation sub-question 2(e): Has the implementation of the IED improved or been detrimental to economic, social and environmental sustainability?

Overall response: The IED has improved environmental sustainability. **[High]**

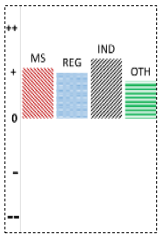
Whether the IED has improved social and economic sustainability is less clear since the effects are largely indirect. **[Medium]**

What are the findings? There is reasonable evidence about the IED's impact on overall environmental sustainability. Some of the harmful environmental impacts are clearly decreasing, which points to enhanced environmental sustainability of the regulated

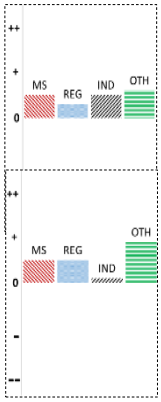
sectors. However, where the evidence on the impacts is less clear e.g. for resource efficiency, then the contribution to environmental sustainability is also less certain.

As regards the impact of IED implementation on economic and social sustainability, the conclusions are more indirect. The benefits from IED implementation that can be quantified largely arise from improved human health. These largely exceed the costs of implementation, which means that there will be overall economic benefits for society, like through reduced absenteeism at the work place due to sicknesses caused by air pollution or diminished costs of the related health care. The social benefits arise from lower industrial impacts on people and communities. There may also be other economic and social benefits from the higher acceptability of industrial installations, and the lower impact on property prices or on quality of life. However, the scale of all of these and therefore their impact on economic and social sustainability are less obvious since they are indirect.

Stakeholders: There was strong agreement across all stakeholder types that there has been an improvement in environmental sustainability since the implementation of the IED.

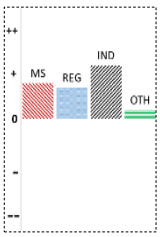


There was much less certainty regarding the positive effects of the IED with respect to social sustainability. While just over half of respondents indicated that there has been some or significant improvement, around a third claimed that there had been no impact.



Similarly, there was less certainty that the IED had led to improvements with respect to economic sustainability. Just under half of all respondents believed that there has been some or significant improvement since the implementation of the IED with mixed views between stakeholder types (the majority of MS authorities, both national and regional, and "Others" believe there has been improvements in economic sustainability; industry less so).

5.3. Relevance



Evaluation question 3: To what extent is an intervention relevant in respect to needs, problems and issues identified in target groups?

Overall response:

The IED is still relevant to the needs, problems and issues of the EU. **[High]**

The IED is able to respond to new or emerging environmental issues, but there are limitations due to the nature and time of the processes. **[High]**

The IED has not contributed greatly to the decarbonisation of industry and there are divergent views about whether it is relevant for this. **[Low]**

What is the issue?

The key consideration under this criterion is whether the environmental pressures caused by operating industrial plants have been fully addressed or whether there remains a need and scope for further improvements in the future.

A further aspect is whether the IED is able to adapt to new and emerging issues. This may be the case for specific pollutants that have come to attention or to new policy considerations such as the circular economy, zero pollution ambition, or the need for industrial decarbonisation.

The following sub-questions are answered:

3(a) To what extent do the IED objectives still correspond to the needs of the EU?
3(b) Is the IED able to respond to new or emerging environmental issues?

RELEVANCE: To what extent is an intervention relevant in respect to needs, problems and issues identified in target groups?

Evaluation sub- question 3(a): To what extent do the IED objectives still correspond to the needs of the EU?

Overall response: The IED remains relevant to the needs of the EU within its objectives. **[High]**

What are the findings?

To understand the extent to which the IED objectives still correspond to the needs of the EU it is necessary to assess whether or not the problems it was intended to address still exist. Emission data shows that industrial activities overall, and in particular those within the IED's scope, still contribute significantly to emissions of some pollutants (to air and water) resulting in significant health and environmental impacts. They are also major users of resources. Although the IED does not address land use and habitat protection

directly, through cutting industrial emissions to air, water and soil, it contributes to addressing pollution which is a driver of the decline of biodiversity. In view of this, the IED remains relevant to continue to address these impacts.

The steady decline in pollutant emissions from industrial activities (particularly to air) shows the IED and its predecessor legislation are having positive impacts. It therefore remains relevant to helping to protect human health and the environment in line with the European Green Deal.

Stakeholders: As well as the overall health and environmental impacts, the IED remains relevant for all the different stakeholder groups. For industry, it ensures a level playing field, for Member States it helps to meet their environmental goals while not disadvantaging their industry, and for EU citizens it ensures better health and public access to information and justice.

Stakeholders are of the view that the IED has generally addressed the most relevant environmental impacts. There are however some limitations with respect to energy use, raw materials consumption and waste generation as requirements for these included within the BAT conclusions are not binding in the IED in the same way as BAT-AELs.

Some stakeholders feel that the outputs are not ambitious enough to meet the needs of the EU and other policy objectives. This is driven to some extent by Member States approach to setting permit ELVs. Permitting authorities consider that releases to water require more stringent approaches to meet EU water quality objectives.

RELEVANCE: To what extent is an intervention relevant in respect to needs, problems and issues identified in target groups?

Evaluation sub-question 3(b): Is the IED able to respond to new or emerging environmental issues?

Overall response: The IED is able to respond to new or emerging environmental issues through the BREF process. But there are some limitations in relation to the length of the BREF process, the time between BREF reviews, and the need for the BREF process to have monitoring data on pollutants which leads to mainly covering existing rather than emerging pollutants. **[High]**

There are divergent views about the relevance of the IED for the decarbonisation of industry. **[Low]**

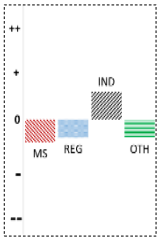
What are the findings?

There could be new or emerging environmental issues that the IED has not been able to address. From the BREFs drawn up and reviewed under the IED, e.g. Wood Based Panels and or Common Waste Gas Treatment in the Chemical Sector, it can be seen that

they have addressed additional pollutants to those listed in Annex II to the IED as well as new environmental issues. Since the IED in principle covers all environmental impacts and it is for the TWG to agree the scope of the BREF, it seems clear that the framework is able to respond to any new environmental issue. One major challenge limiting the ability to respond to emerging issues relates to the length of the BREF process and the relatively long time between BREF reviews. There is frequently a lack of monitoring data for emerging issues which hampers the ability to identify BAT. This has been the case more often for emissions to water (e.g. as regards micro-plastics), than for emissions to air.

The IED sectors emit a significant share of GHGs, but these are mainly regulated through the ETS and ELVs may not be set in IED permits for them. For the remaining GHG emissions not regulated under the ETS, BAT-AELs could have been identified and ELVs set in permits within the current legal framework. However, to date TWGs have largely chosen to address these GHGs emissions only indirectly through BAT and BAT-AEPLs on energy efficiency. Only in a few cases, BAT-AELs were set for GHG emissions (e.g. for methane emissions from certain large combustion plants).

Stakeholders: Stakeholder views on whether the IED and the BREF process are able to respond to new or emerging issues was mixed. Industry generally agreed that this is the case, while Member State authorities and "Others" either disagreed or did not know.



Some concerns were raised by stakeholders about the process for identifying key environmental issues which may constrain the ability to identify emerging issues. A reliance on the availability of complete data sets and a tendency to focus on the same substances as the existing BREF were considered to potentially make it harder to tackle new or emerging issues.

With regard to the duration, multiple stakeholder groups stated that the length of the BREF process and time between BREF reviews made it harder to deal with emerging issues. In contrast, several industry stakeholders provided examples of how the BREF process quickly responded to an emerging issue.

Whilst there is an ever increasing need for industry to rapidly adapt to a net zero-carbon economy in 2050, this has only been addressed marginally in BREFs. Stakeholder responses were mixed, with industry raising concerns about potential double regulation and overlaps with EU climate and energy policy, whereas environmental NGOs and Member States were overall more positive. Some stakeholders feel it is essential that all impacts are dealt with under the IED in an integrated manner.

5.4. Coherence

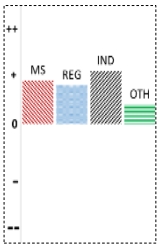
COHERENCE:

Evaluation question 4: Is the IED coherent with itself, other EU and international actions?

Overall response:

There is a high degree of coherence internally and with other policy instruments.

The IED is internally coherent, but nonetheless, several aspects, could be further clarified. The IED is largely coherent with other environmental and wider EU policies and supports at least to some extent their delivery. There is scope for greater contribution in some areas. **[High]**



What is the issue?

The assessment of coherence looks at how well different actions work together and thus, points to synergies as well as areas where there are potentially contradictory objectives or approaches that may cause inefficiency. It is necessary to assess whether the IED is coherent internally, coherent with other EU actions and with international actions. The following sub-questions are answered:

4(a) To what extent are the elements of the intervention logic complementary, mutually supportive and non-contradictory?
4(b) To what extent do the objectives and activities support or contradict those of other public interventions?

COHERENCE: Is the IED coherent with itself, other EU and international actions?

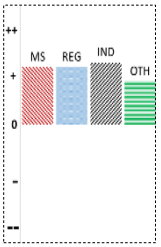
Evaluation sub-question 4(a): To what extent are the elements of the intervention logic complementary, mutually supportive and non-contradictory?

Overall response: The IED is overall largely coherent and consistent although several elements, for example the interactions between some BAT conclusions and specific chapters of the IED could be further clarified. **[High]**

What are the findings?

To assess the extent to which the IED is internally consistent and coherent, it is necessary to assess whether its parts all contribute to the same goals and whether there are contradictions between different requirements. It is clear that there are interpretation challenges in relation to various aspects of the IED, which are illustrated by the number

of enquiries received by the Commission. However, these do not point to fundamental contradictions or inconsistencies.



Stakeholders: Around half of the stakeholders indicated that the IED is very or extremely consistent. Nevertheless, similar comments were made by all respondents, flagging that overlaps, contradictions or inconsistencies still exist within the IED itself.

A number of stakeholders stated that the IED seems like a juxtaposition of several former Directives, rather than a piece of coherent legislation integrating parts of all former Directives in a coherent manner. In particular, clarification is felt to be needed on the interaction between the general requirements of Chapter II and the sectoral provisions of Chapter III on large combustion plants and Chapter IV on waste incineration and co-incineration plants. It was moreover claimed that there are inconsistencies between the relevant BAT conclusions and the requirements of Chapters III and IV. In addition, the wording of the text related to the treatment of confidence intervals is unclear, leading to Member State differences in compliance assessment. One stakeholder claimed that incoherence arises from the fact that most techniques to reduce emissions lead to increased resource use and waste generation. However, this is trade-off is well understood and taken into account in BREFs.

COHERENCE: Is IED coherent with itself, other EU and international actions?

Evaluation sub-question 4(b): To what extent do the objectives and activities support or contradict those of other public interventions?

Overall response: The IED is largely coherent with other EU environmental and wider EU policies and at least to some extent the IED supports the delivery of the objectives of other EU policies. However, whether there is scope for greater contribution in some areas, including water and circular economy policies, requires further assessment. There are scope inconsistencies between the IED and the E-PRTR Regulation. **[High]**

What are the findings?

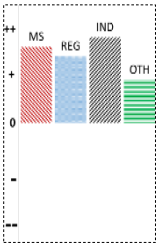
The IED's coherence with other EU environmental policies and legislation was assessed by comparing it with other EU legislation. This shows that the IED is mostly coherent with sectoral and wider EU environmental policies. The objectives are consistent, in that all the policies considered the aim to protect the environment and human health from pollution, and at least to some extent the IED is supporting the delivery of the objectives of other EU policies. However, in the case of the E-PRTR Regulation, there are several inconsistencies, particularly with respect to the scope or reporting thresholds of the industrial activities and pollutants covered, definitions, aggregated reporting, and collection methodologies, which have evolved over time.

Literature has assessed the contribution of the IED to water policy and the circular economy. On the contribution of the IED to water policy, it was found that the BREFs have had, and are likely to continue to have, positive impacts for both reducing emissions

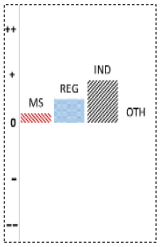
to water and, perhaps to a lesser extent, reducing water usage. The objective of the Water Framework Directive to have zero releases of priority hazardous substances is stricter than, and calls into question the setting of, BAT-AELs for such substances. On the contribution of the IED to the circular economy, it was found that the BREF process does not systematically include BAT on circular economy areas of resource use (e.g. water and materials), hazardous chemicals use and industrial symbiosis. Where BAT are included on the common cross-media themes of energy, materials, and waste, they often do not give quantitative targets and are not explicitly mentioned as aiming to meet circular economy objectives and strategies.

As a significant amount of indirect releases from IED plants transit through urban waste water treatment plants, including pollutants that are typically not abated by such plants like heavy metals, there appears to be excessive releases of those pollutants to be released to the EU water bodies. Given that the IED does not allow higher loads to be released than the amount compatible with the application of BAT, it appears that competent authorities have difficulty in applying this, and that there are inconsistencies in the joint implementation of the IED and the Urban Waste Water Treatment Directive.

Stakeholders: As regards the coherence with other legislation and policies, stakeholders were most positive about the interaction with air quality legislation. Nevertheless, some problems were identified by stakeholders concerning other legislation. For some substances, there were claims that their threshold levels in sectoral policies (especially water and chemicals) may not align with the IED. There were mixed views on whether the IED's scope encroaches on the scope of specific environmental legislation. Some thought the specific environmental legislation may be better suited to address problems while others thought the IED's integrated approach was the right way to tackle wider issues such as GHG emissions and energy efficiency.



It was also stated that the IED is not sufficiently aligned with some specific environmental policies and wider environmental objectives such as the circular economy. In particular the IED and E-PRTR have significant overlaps, however, there are still mismatches, especially in terms of their activities, pollutants and thresholds.



The stakeholder consultation carried out under the fitness check of the Water Framework Directive[52] showed that: (1) permitting authorities encounter difficulties in applying Article 18 of the IED to set stricter ELVs than those required by the BAT-AELs to comply with environmental quality standards, and (2) some industrial sectors claim difficulties in obtaining permits for new activities as a result of application of the provisions of the Water Framework Directive preventing discharges into water bodies failing to meet a "high" ecological status.

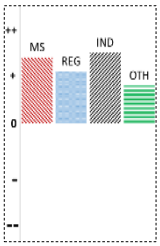
[52] https://ec.europa.eu/environment/water/fitness_check_of_the_eu_water_legislation/index_en.htm

5.5. EU added value

EU ADDED VALUE: To what extent are the policy actions best carried out at EU level?

Evaluation question 5: What is the added-value of the IED, compared to what is likely to have been achieved by Member States in its absence?

Overall response: There is significant added value of the IED at EU level. **[High]**



What is the issue?

The EU added value criterion brings together the findings from all other evaluation criteria and focusses on the benefits and changes resulting from EU action on industrial pollution prevention and control that are additional to those that would have resulted from action at local, regional or national level otherwise.

What are the findings?

There are a number of important benefits arising from action at EU level in comparison to action taken at national and sub-national levels only. EU action has ensured a more consistent approach in the adoption of environmentally effective industrial emission standards with relatively limited deviation among Member States. It has also ensured a more consistent approach in the monitoring and enforcement of the requirements across the EU. These elements have also helped to contribute towards a level playing field.

The BREF process itself would not be feasible to replicate at Member State level to the same degree. In some Member States there would not be sufficient installations in one or all sectors to enable any meaningful comparison of techniques and environmental performance levels. In any case, to the degree that the installations are subject to national legislation, they are likely to have a relatively similar environmental performance. It is also likely to be difficult to ensure any meaningful contribution of civil society to the BREF review process due to the heavy burden and limited resources and different priorities.

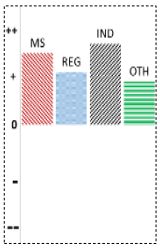
There is in addition some evidence to suggest that in the absence of EU action – initially under the IPPCD and then the IED – environmental standards, at least in many Member States, would have remained less demanding. As a result, the overall level of emissions and impacts on health and the environment would have been greater and therefore an EU-level approach is likely to have led to stricter requirements overall.

In addition, while the concept of BAT is also used in multilateral environmental agreements related to industrial pollution, there is evidence of similar concepts based on the EU system emerging in third countries, including the Russian Federation and Korea. The EU BREFs are also used as benchmarks within other systems e.g. in India. This is adding value at the global level. There appears to be interest from China in BREFs and it

appears to be following a similar approach to address industrial emissions, with for example ELVs set for LCPs that are in a comparable range to those in the EU.

The principles of subsidiarity and proportionality seem to be well reflected. In relation to subsidiarity, the responsibilities of Member States and the European Union as a whole seem to be both well allocated, and the interaction between them works well (e.g. in the BREF process).

Stakeholders: When asked directly, the majority of stakeholders were supportive of the EU action.



6. CONCLUSIONS

This evaluation is timely as it is being completed at a time when the EU is working on the implementation of the European Green Deal. This Staff Working Document provides important elements for informing this work, in particular with regard to the *Zero Pollution ambition for a toxic-free environment*. It is particularly relevant for the already announced revision of the IED, which will build upon the outcome of this evaluation, and take into consideration Europe's ambitions in terms of enhanced resource efficiency (including energy and water), in line with the Climate Agenda and the 2020 Circular Economy Action Plan.

Since its adoption, the Industrial Emissions Directive (IED)[53] has made a substantial contribution to reducing pollutant emissions from industrial installations across the EU. Under the IED, 17 BAT conclusions have now been adopted and a further six are under revision. Of the adopted 17 BAT conclusions, eight have now been implemented by Member States in an estimated 2 500 installation permits. The subsequent nine that are in the process of being implemented in permits represent around a further 36 000 installations.

The damage costs of all IED installations' emissions to air declined by around 50% between 2010 and 2017[40]. For the different IED sectors they have mostly declined, with the largest reduction being around 70% over the period from 2007 to 2016. Declines in emissions to water are less marked with around a 30% reduction from 2010 to 2017 in aggregated cadmium, lead and mercury emissions, while phosphorus emissions reduced by around 17% and nitrogen by around 7%.

The IED has also created EU-wide requirements for inspections of IED installations and common requirements for ensuring public access to information on industry emissions and access to justice.

What does and what does not work and how that links to the intervention

What does work?

In general, the evaluation shows that stakeholders have a high degree of satisfaction with the IED and the main implementing acts adopted under it (i.e. the BAT conclusions).

BREF process

There is widespread support and appreciation for the process of drawing up and reviewing BREFs. This participative approach to evidence-based establishment of regulatory requirements, actively involving all relevant stakeholders (Member States, industry and environmental NGOs), while requiring a substantial effort is much praised. The main outputs of the process are the identification of BAT and the establishment of

[53] https://ec.europa.eu/environment/industry/stationary/ied/legislation.htm

BAT-AE(P)Ls. The benefits of the process are illustrated by the high degree of support for the BAT conclusions adopted.

Permitting

The IED requires updating of permit conditions within four years of the publication of BAT conclusions in the Official Journal of the EU. The permits must be updated in line with BAT conclusions, although there is the possibility of derogations in limited cases. Permit updates have largely been managed within the required time period with the evidence available showing that permit ELVs are largely set within, but towards the least stringent end, of the BAT-AELs range and a limited number of time limited derogations are granted.

Reducing distortion of competition

The identification of BAT and their associated environmental performance at EU level is based on existing imbalances between installations with a good environmental performance and others with a less good one. The performance levels of "best in class" installations are then generalised across all installations through the obligation to apply BAT. Through this process, the IED has strongly contributed to reducing competitive distortion within the EU based on environmental requirements.

Reducing industry emissions

There are challenges to separate the impact of the IED from its predecessor legislation and other possible contributory factors. Nevertheless, decomposition analysis shows that reductions in LCP pollutant emissions are mainly due to lower emission factors driven by legislation. Extrapolating from this, it seems probable that the IED has been very important in reducing emissions to air from large agro-industrial sources. Reducing emissions to water appears to have been more challenging, and the impact is less certain due to poorer data and the fact that a share of industrial waste water is transferred to urban waste water treatment plants. It is likely that the IED has also contributed to minimising emissions to soil. By helping reduce emissions to all environmental compartments, the IED has contributed to addressing pollution, which is one driver of the decline of biodiversity.

Cost-effectiveness

The assessment of various aspects of the IED appears to show that it is cost-effective. Carrying out the identification of BAT at EU level is considerably cheaper than it would be if individual Member States were to carry out the same process themselves.

The costs and benefits of implementing BAT conclusions have been assessed ex-post for one sector (Iron and Steel) and ex-ante for another (Large Combustion Plants). Although there are limitations, these cost-benefit assessments demonstrate, for these sectors, that the quantifiable benefits are significantly higher than the investment costs. Additional costs of compliance (e.g. baseline reports, inspections and monitoring) with the

legislation have also been roughly quantified and this does not alter the overall conclusion on cost-effectiveness.

Promotion of BAT

The main focus in the process of identification of BAT is on existing techniques, in line with the definition of BAT in the IED. The generalisation of the use of these techniques as a result of updating emission limits in permits leads to an expansion of the market. This expanded market has potentially led to an increased interest from equipment suppliers in offering solutions to achieve the required outcomes more cheaply or more effectively. Meanwhile, this is likely to have indirectly stimulated innovation.

What works less well?

The evaluation has identified a number of areas where the performance of the legislation does not appear to be as satisfactory as expected or required by the latest high-level policy objectives. The main areas are outlined below:

Emerging techniques

BREFs contain a chapter on emerging techniques which is intended to inform competent authorities on techniques that might by then have come to the market. This chapter is reported to have received little focus during the information exchange process since it did not impact the BAT conclusions directly. The emerging techniques documented are reported to have been rarely used in permitting practice and the specific provisions under Article 15(5) for testing emerging techniques have hardly been used.

Clarification of legal requirements

The IED has created a single legal framework from what were previously seven separate Directives. It is however clear from the Commission's implementation support activities, discussions in expert groups and the large number of ongoing enquiries about different aspects of the legislation that there remain many areas of uncertainty or differences in interpretation. These differences limit convergence of the stringency of the requirements across the EU and may distort competition.

GHG emissions / Decarbonisation

While most of the CO_2 emissions from IED sectors are addressed by the ETS, and are subject to a prohibition of setting ELVs for CO_2 in IED permits, there remain some GHG emissions which are mainly addressed only indirectly through BAT and BAT-AEPLs on energy efficiency. BAT-AELs for GHG emissions have very rarely been set including for those where the current legal framework would have allowed it (i.e. for GHG emissions not covered by the ETS).

As increased energy efficiency also means reduced emissions of air pollutants, GHG emissions have always been considered during the BREF development. Nevertheless,

BREFs have paid little attention to date to the synergies that may be achievable for addressing other pollutant emissions through decarbonisation techniques.

The Masterplan[16] adopted by the High Level Group on Energy Intensive Industries provides further context to this evaluation in that it draws attention to the need for the IED permitting process to be adapted to support GHG abatement measures throughout the transition period, and to better document low carbon emission technologies under development in BREFs as potential emerging techniques.

Reducing resource use and supporting the circular economy

There is very little information available on what impact the IED may have had in addressing non-emissions aspects such as: energy, water and material use, as well as waste generation. Assessment in this area is hampered by commercial confidentiality, the reference character of any performance levels established in the BAT conclusions, and other economic incentives already in place.

Availability of data

A key requirement for the proper functioning of the BREF review process and BAT identification is the provision of data, especially by industry, which is not mandatory. There is usually a substantial amount of data provided, with typically 300 to 800 plant-specific questionnaires submitted for the drawing up or review of a BREF. Data is generally more easily available and in sufficient quantity and quality for pollutants that are already regulated and monitored. However, for emerging pollutants such monitoring data is generally limited which hampers the establishment of BAT conclusions.

A similar constraint exists for data on energy and resource use, waste generation and management as well as on the cost of techniques. For these, industry is less forthcoming and will often only supply such data if kept confidential. Limited data and their potential confidentiality hamper the operation of the information exchange process and the IED's ability to address those issues.

Implementation of BAT conclusions in permits

There is limited knowledge about the implementation of BAT conclusions into permit conditions and some concern exists that this may not be uniform across the EU. A first assessment of how BAT-AEL ranges in BREFs have been translated into emission limit values (ELVs) in permits has shown a widespread use of the least stringent value in the BAT-AEL range for setting ELVs in permits.

Moreover, setting ELVs for indirect emissions to water seems in some cases challenging, as the IED provisions do not appear to have been understood in the intended way by all competent authorities.

There is uncertainty over other aspects, as it is extremely unclear if how other BAT-AEPLs are used, for example for energy, materials or water use, or if and how narrative

BAT conclusions, i.e. not directly related to emission values, are translated into permit conditions.

Access to information

The IED's provisions securing public access to information have not been adequately and consistently applied across the Member States. The ongoing implementation of the Industrial Emissions Registry that requires linking permits to installations, as well as letters sent to Member States breaching accessibility of permit information should help to resolve these weaknesses.

Public participation in the permitting procedure and access to justice

Limited information is available about the extent to which IED provisions have facilitated public participation in permitting decisions and access to justice. Anecdotal reports suggest that public participation in permitting procedures is rather limited overall. There are also a limited number of identified court cases relating to IED implementation. Overall, penalties for non-respect of permit conditions vary significantly among Member States and appear largely unchanged from those under the previous legislation.

Lessons learnt

The IED combined seven prior directives and aimed to simplify the legal framework while strengthening their requirements. Generally, this appears to have been achieved.

The main mechanism through which environmental requirements are regularly reviewed and tightened, where justified, are the **BREF reviews**. This process existed prior to the IED but it has been given a more formal structure under the IED. It has been subject to continuous refinement and improvement, and has been recognised as a model of participative governance.

The **scope** of the IED was the subject of a thorough analysis when the IED was being designed. It however remains an important issue since the legislation may result in important boundary impacts, where for example new installations are built with a capacity just below the IED threshold to avoid its requirements.

Implementation activities carried out at EU level, for example meetings of the IED Forum and Technical Working Groups, are relatively accessible and transparent, especially to relevant stakeholders. However, in contrast, EU knowledge on how the IED provisions are actually implemented at Member State level is limited. This is in part due to the complexity caused by the large number of installations and, consequently, permits that require revision, the volume and complexity of technical documentation, different levels of Member States administration (e.g. regional, local) charged with permit writing and their available expertise and language capabilities, as well as some uncertainties regarding the legal status of specific IED provisions.

The IED makes a substantial contribution to a number of other pieces of EU legislation and policies, in particular those concerning air and water quality and soil protection.

However, it is hard to establish what impact the IED has, and whether the BAT conclusions, through the setting of permit conditions, have an important role for other policy areas such as energy efficiency, decarbonisation, water use or circular economy. Moreover, gathering such evidence is difficult due to the confidentiality of sensitive business information.

It is generally agreed that the IED has a high degree of coherence both internally and with other EU policies and legislation.

The E-PRTR Regulation provides important information on the quantity of emissions from the IED sectors. However, the quality of this information is hampered by misalignment in some areas as well as its thresholds for emissions to be reported, which reduce both the quantity and quality of the reported information. This is an important weakness.

Emissions from the industrial sectors covered by the IED, as well as the resource use within them, remain significant. Reducing the emissions and resource consumption, as well as encouraging the use of secondary raw materials and industrial symbiosis, remain highly relevant EU policy objectives. In view of this, it is clear both from literature and from stakeholder feedback that the IED remains relevant to EU needs.

In view of the large degree of support for the way the IED functions and its support for fair competition across the single market, it is unsurprising that stakeholders believe that the legislation provides a high EU added value. It is clear that action only at Member State level would not achieve the objective of reducing distortions of competition and would lead to a lower overall reduction in environmental impacts. Replicating the BREF production process at Member State level would lead to a multiplication of the resource needs and cost while probably delivering a lower overall benefit.

Does performance match expectations?

The IED definitely fulfils its role in reducing pollutant emissions to air. In general, the overall trend seen with regard to emissions for all pollutants and sectors is that they are continuously decreasing.

However, for emissions to water, it is harder to be certain, due to the lower quality of the data. Nevertheless, it appears that emissions are reducing, albeit less rapidly than the emissions to air, and that the IED is not delivering as much as expected. This view is largely shared by stakeholders.

For resource efficiency and circular economy, IED impacts are uncertain, and stakeholders are divided on the matter. It is not clear what expectations there were over the contribution that the IED could make, although the fact that these aspects of BAT conclusions do not have a legally binding status suggests that the expected benefit was lower than for pollutant emissions.

The lack of identifiable impact on greenhouse gas (GHG) emissions is largely in line with expectations since the setting of ELVs for GHGs in permits for IED installations that fall within the ETS scope was explicitly excluded from the IED at the time of its design, in order to avoid duplication of regulation. Furthermore, for such installations, permitting authorities may choose not to impose requirements relating to energy efficiency. However, identifying GHG emissions abatement and energy efficiency techniques is within the scope of the IED for all sectors and a number of BAT and BAT-AEPLs on energy efficiency have been established.

Overall, as far as information is available, implementation of the IED does appear to be largely in line with expectations. Some of the biggest uncertainties about its impact, and therefore whether this is in line with expectations, relate to implementation at Member State or regional or local level.

Is the IED's level of ambition sufficient in the context of the European Green Deal?

Since the environmental impacts of IED sectors remain significant, they are pertinent for the European Green Deal and its Zero Pollution ambition.

The overall level of environmental ambition of the IED is largely driven by its definition of BAT. The environmental performance of IED installations has generally improved, however, there is still untapped emission reduction potential as only a minor share of the installations is required to reduce their emissions towards the lower end of the BAT-AEL ranges prescribed by the BATCs. In the future, there may be synergies with decarbonisation (e.g. replacement of fossil fuel combustion with electric or hydrogen-based processes).

A key question is therefore whether the current BAT definition is sufficient for the ambition of the European Green Deal. If not, how can a higher ambition be balanced with what is "economically viable", how can that be financed and what would be its implications, e.g. for industry competitiveness?

The IED has had uncertain impacts on the circular economy and was not designed to address decarbonisation. Another important question is therefore whether the IED is fit for accompanying the move towards a carbon-neutral, zero-pollution and circular economy.

Are there issues that need to be addressed?

The evaluation identifies a number of issues that are unlikely to resolve themselves over time. These are grouped below into areas:

Scope

The assessment shows that there may be (agro-)industrial sectors outside the current IED scope with high environmental impacts. Most of them have been assessed for inclusion previously, resulting in a decision to leave them outside the scope. However, in view of

policy changes over time, it could be investigated whether their impacts are sufficiently large to be addressed, and how, if it is appropriate to do so.

As the environmental performance of the sectors regulated under the IED has improved, this might lead to installations under the threshold becoming increasingly relevant in terms of their environmental impacts.

In view of this, the thresholds for the IED sectors need to be kept under review and if appropriate, further activities added.

Member State implementation

There are a number of areas with differences among Member States with respect to the implementation of EU requirements. These include the implementation of BAT conclusions into permits, verification of compliance and application of proportionate and dissuasive fines where necessary, ensuring public access to information, facilitating participation in decision making and access to justice. The Commission made efforts to support Member State implementation in these areas with a view to further harmonisation, but more in-depth consideration seems justified.

Circular economy

The IED appears to be less effective in its contribution to energy, water or other resource efficiency, and to the wider circular economy approach. The Commission has carried out some preliminary investigations of these areas to better understand the situation and potential. Further reflection is needed on whether these aspects, including the re-use of reclaimed (industrial or urban) waste water in industrial processes, or the relation with the Landfill Directive can be enhanced. The new Circular Economy Action Plan[54] confirms the need for further action to facilitate water reuse and efficiency, including in industrial processes.

BREF review process

There is a continuous effort to improve the process for the elaboration of BREFs and BAT conclusions. Nevertheless, as the current BREF review cycle is nearing its end, there is merit in considering what the priorities are and the potential for further improvements to decide whether any re-focussing of effort is justified.

It is expected that the variation in environmental performance of IED installations in a given sector has reduced, compared to the time when the IED was put in place. This may have implications for identifying BAT in the next BREF review cycle. Therefore, it might be necessary in the future to also rely on considerations that go beyond the current criteria for assessing the environmental performance of installations.

[54] COM(2020) 98 Final of 11 March 2020 https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1583933814386&uri=COM:2020:98:FIN

Timeliness

The IED contributes to achieving environmental goals set in other legislation. However, the IED approach, involving BREF reviews and then permit updating, results in an almost a ten year time lag to implement requirements based on the achievable performance level at the start of the process. This time lag limits the contribution of the IED sectors to achieving the overall environmental policy objectives. Further reflection on ways to enhance the process and reduce the time lag is desirable.

Greenhouse gas emissions

In 2020, with Europe's stated ambition to achieve climate-neutrality by 2050, effectively tackling GHG emissions has become more important compared to when the IED was adopted back in 2010. In addition, the time frame for action is shorter than at the time of the IED development, with a clear recognition that energy-intensive industries also need to start planning and taking action to reduce and, where possible, eliminate their GHG emissions along with their other impacts. There has so far been little investigation into the potential of the IED to support industry decarbonisation and this merits further reflection.

In addition, further action under IED for curbing methane emissions could not only contribute to decarbonisation but also reduce a precursor of ozone, a harmful air pollutant. The NEC Directive includes a Commission declaration reminding of these links and the intention to consider measures for reducing methane emissions, and if appropriate, submit a legislative proposal to that end.

Coherence with other legislation

While there is overall a high degree of coherence, it is desirable to explore whether more can be done to enhance the IED's contribution to and interaction with other policy areas. One key aspect is the contribution to water policy which heavily depends, as far as point source pollution is concerned, on the correct implementation of the IED. Here the IED appears to be less effective and reflection is desirable for a more extensive and coherent approach to address water quality (emissions) and quantity (through water efficiency and water re-use). Other aspects are interlinked with the circular economy and decarbonisation topics, for example exploring whether more can be done to address energy efficiency.

Emerging techniques and innovation

To boost the identification of emerging techniques, the Commission has established a pilot Industrial Emissions Innovation Observatory to reach a broader set of stakeholders involved in research and development of new techniques to reduce the environmental impacts of different IED sectors. This has gathered a large amount of information on emerging techniques, which has been used as input for some recent BREFs. Based upon this, it seems desirable to expand and continue this work in the future, also to address the challenges of emissions reduction and efficiency in resource use.

The Industrial Emissions Innovation Observatory has also become increasingly relevant as the European Green Deal will require industry to undergo major transformations.

Public access to information and participation

There is limited knowledge about the ease of public access to information about IED installations, of public involvement in permitting decisions and, if necessary, of the ability to seek legal redress. Further work on the IED registry and efforts to ensure full compliance with the IED legal requirements will be an important step. Nevertheless consideration could be given to further actions in these areas.

One important aspect to improve public information will be to address the interaction with the E-PRTR Regulation. This could be improved to ensure that the latter provides more accurate information and better aligns with the sectors covered by the IED. This may require addressing the activities covered as well as the reporting thresholds.

The Commission will carefully take into account concerns raised by the Aarhus Convention Compliance Committee related to public participation in this field, also with a view to making it easier, for concerned parties, to seek judicial review where appropriate.

Digitalisation

Another area for possible efficiency gains in the process for developing BREFs is the use of digital solutions. Recent innovations have involved the use of advanced data visualisation software to enable the Technical Working Groups to better understand the data gathered and reduce the burden on the EIPPCB to produce different visualisations.

A wide range of other possibilities are being explored. For example, real time emissions monitoring data could be made available online, as is the case in Croatia for example. This has value in terms of transparency, public access to information and could also support the BREF process. Moreover, it could be used to quickly acquire direct access to information on installation emissions, supporting the questionnaire process, and facilitating emissions reporting. There would be many aspects to consider, not least the availability and quality of the data.

Other aspects that may merit further investigation are the use of satellite monitoring data for large point sources and possible applications of artificial intelligence to assessing permits.

Annex 1: Procedural information

1. LEAD DG, DECIDE PLANNING/CWP REFERENCES

This evaluation is led by DG Environment (DG ENV). It was included as item PLAN/2018/3301 in the DECIDE/Agenda Planning database. The roadmap for the initiative was published on 6 November 2018.

2. ORGANISATION AND TIMING

In October 2018, an inter-service steering group (ISSG) was set up for the IED evaluation, including members from all relevant Directorate Generals:

- Secretariat General (SG)
- Legal Service (LS)
- Agriculture and Rural Development (AGRI)
- Environment (ENV)
- Climate Action (CLIMA)
- Energy (ENER)
- Health and Food Safety (SANTE)
- Internal Market, Industry, Entrepreneurship and SMEs (GROW)
- Joint Research Centre (JRC)
- Research and Innovation (RTD)

The group met four times during the evaluation process, as shown in Table A1-1. On a number of deliverables, the group was consulted also in writing. The members of the group were invited to the two stakeholder workshops organised in the context of the consultation process described in Annex 2.

ISSG Meeting Date	Discussion Topics
1. 15/11/2018	Introduction to the IED, Evaluation Roadmap, Terms of Reference for the support study, Consultation Strategy
2. 13/3/2019	Intervention logic, Evaluation matrix, Questionnaire Open Public Consultation, Stakeholder categories and instruments, Workshop (attendees, structure, etc.), Targeted Consultations (online survey, interviews, focus groups), Support study timetable
3. 13/11/2019	Interim report of the support study, Preliminary findings
4. 12/02/2020	Draft final report of the support study, Draft Staff Working Document

Table A1-1: Meetings of the Inter-Service Steering Group

Table A1-3 under point 5 “Evidence, sources and quality” provides an overview and the timetable of the different stakeholders’ consultations.

3. EXCEPTIONS TO THE BETTER REGULATION GUIDELINES

There were no exceptions to the Better Regulation Guidelines[55] during this evaluation.

4. CONSULTATION OF THE RSB

An upstream meeting was held with the Regulatory Scrutiny Board on 18 June 2019.

On 29 April 2020 the RSB meeting discussing the draft SWD was held. The RSB gave its positive opinion on 4 May and made some suggestions for improvement. Table A1-2 shows these considerations and how they were addressed.

Main considerations by the RSB	How they were addressed
1. The report does not sufficiently explain to what extent the processes put in place by the Directive contribute to innovation and are compatible with the European Green Deal ambitions. The report should explain better the interaction between market forces, best available techniques (BAT) and innovation. It should clarify the extent to which the Directive was expected to promote innovation, through which mechanisms and whether or not they have been effective. The report should discuss whether the long revision process of specific sector BAT Reference Documents has been able to keep up with fast-paced and continuous innovation. The evaluation should further clarify the role of the Directive in promoting innovative techniques in different sectors, in the context of the European Green Deal ambitions. It should identify the limitations of processes in this regard.	Introduction of a new detailed *Section 3.6 "Innovation"*. Introduction of a new *Sub-section "Is the IED's level of ambition sufficient in the context of the European Green Deal?"* under *Section 6 - Conclusions*. Additional explanatory text on circular economy was added to *Section 5 1(a)*.
2. The report does not fully analyse the coherence with other related pieces of legislation. The report should go deeper in analysing the coherence with related pieces of legislation, in particular with the European Pollutant Release and Transfer Register. Overlaps, gaps and	Introduction of a new detailed *Annex 8 - Coherence with related EU legislation.*

[55] https://ec.europa.eu/info/law/law-making-process/planning-and-proposing-law/better-regulation-why-and-how/better-regulation-guidelines-and-toolbox_en

inconsistencies, including those with monitoring requirements may need more explanation. The report could also clarify the role of the Directive in applying the Aarhus Convention on access to information, public participation in decision-making and access to justice in environmental matters. The report could better substantiate that there is no conflict with emissions trading or other instruments to contain industrial emissions.	
3. The evaluation does not capture whether the economic viability of best available techniques at sector level might favour operators in certain Member States. The analysis used for establishing best available techniques considers cost-effectiveness and economic viability of the technology at sectoral level. Because of differences in the availability of resources to operate BATs across Member States, their introduction could favour certain types of operators and countries. From this perspective, the report should clarify possible limitations of this sectoral approach.	Several explanatory paragraphs were added to *Section 3.3 "Production of BREFs and implementation of BAT conclusions",* and to *Section 5 2(a).*
4. Some conclusions appear to overstate the findings of the evaluation. The indication of robustness of conclusions is welcome, but the conclusions themselves should be more nuanced to fairly reflect all the findings. The presentation of conclusions under each evaluation question is repetitive. A different presentation (less based on evaluation questions) would arguably result in shorter, less repetitive and more informative conclusions.	The wording of the conclusions was refined accordingly, in particular the sections on permitting, emissions, cost-effectiveness and cost-benefit assessment.
Additional comments	How they were addressed
It is not clear why the implementing decisions on BATs are not included in the scope of the evaluation.	A more detailed reasoning was added to *Section 1 "Introduction".*
The intervention logic lacks a simple logic explaining how the different processes put in place as a result of the Directive contribute to its objectives, in particular to emissions' reduction.	A simplified sequence of interventions was introduced under *Section 2.4 "Intervention logic".*

The different baselines used throughout the analysis could be better explained.	Additional explanatory text was added to *Section 2.5 "Industrial emissions policy context prior to 2010".*
The principle of triangulation of different sources has been applied. However, the factual evidence collected is relatively limited.	The factual evidence stems mainly from the circa 23 Commission studies carried out prior to this evaluation. They are now listed in a new *Annex 11 "Reference list (main sources)",* including the link to the public CIRCABC repository.
Transposition of the EID was due by 1 January 2013. Nevertheless, there are still pending issues regarding transposition or implementation in 15 or 16 Member States. How does this affect effectiveness?	Additional explanatory text was added to *Section 3.1 "Current situation".*
The ex-post assessment of the iron and steel BAT conclusions argued that these impacted only about 20% of processes in that sector. What conclusions can be drawn from this? Are BAT conclusions only partially relevant for the permitting process?	Additional explanatory text was added to *Section 5.1(i).*
The IED is the result of bringing together seven pieces of legislation. The overall conclusions could give a better assessment of the extent to which this Directive has streamlined and improved previous measures. A list with all improvements would have been helpful (for example, mandatory nature of BAT conclusions).	A list with the main changes introduced by the IED with respect to the preceding IPPC regime was added in a new *Section 2.7. Main changes with respect to the IPPCD*

Table A1-2: RSB comments

5. EVIDENCE, SOURCES AND QUALITY

Support study

The study "Support to the evaluation of the Industrial Emissions Directive (Directive 2010/75/EU)" provided substantial support for the Commission Evaluation of the Directive. The contract was signed on 27 February 2019. The contract was carried out by a consortium of experts led by Ricardo Energy and Environment, comprising also Milieu, Umweltbundesamt (UBA Austria), and ELLE. The final report of the study was accepted on 15/05/2020.

Stakeholder consultation

Consulting a wide range of stakeholders has been an important instrument for gathering information, evidence, and validating data and preliminary findings (see Annex 3, Stakeholder consultation). A1-3 provides an overview and the timetable of the different consultations.

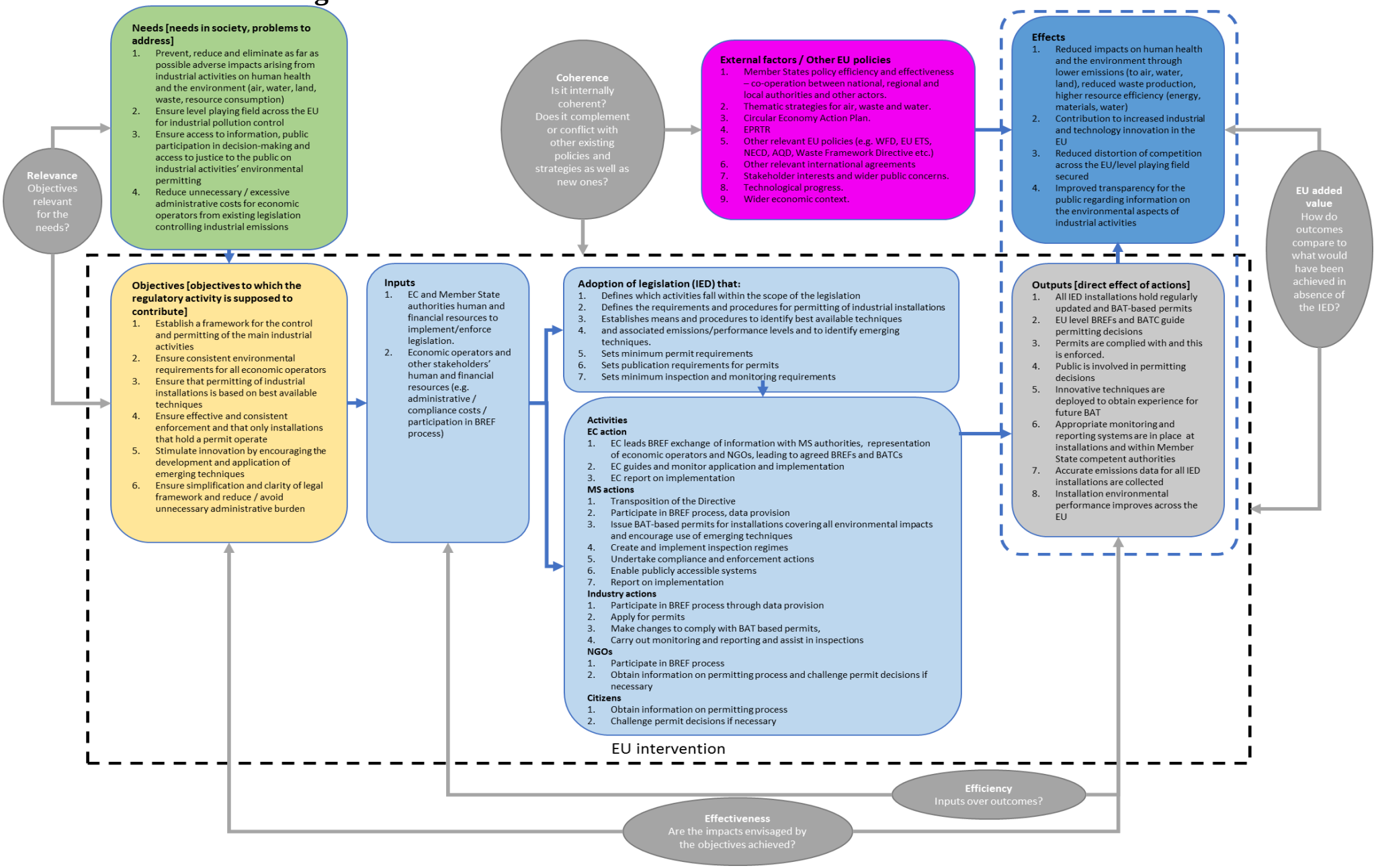
Date / Period	Stakeholders consultation
22 May 2019	First stakeholders workshop
May - September 2019	Open Public Consultation (OPC)
June - September 2019	Targeted Consultation Survey
15 October 2020	Two Focus Groups
2nd half 2019	Interviews
17 December 2019	Final stakeholders workshop

Table A1-3: Timetable of stakeholder consultations

Evidence from selected studies and documents

A wide range of information sources have been used. Evidence has been collected from around 200 different documents including some 24 studies carried out for the European Commission, all listed in Annex 11.

Annex 2: Intervention Logic



Annex 3: Summary evaluation matrix

The evaluation questions define the scope of the evaluation and map closely onto the intervention logic. The evaluation methods are designed to gather the evidence required to answer the questions and are presented in the evaluation matrix. Against each question are mapped:

- **Assessment criteria:** the operational questions to answer; used to develop questions to be asked to stakeholders.
- **Indicators:** potential indicators to measure the respective impacts and the different components of the intervention logic.
- **Data analysis approach:** description of the overall approach, methods and tools used.
- **Data sources and data collection methods:** key sources to use to answer the question and how data may be gathered.

Table A3-1: Evaluation matrix - effectiveness

Sub-questions	Assessment criteria	Indicators	Data analysis approach	Data sources and collection methods
EQ1. To what extent has the IED achieved its objectives?				
a. To what extent has the IED contributed to reducing and (as far as possible) eliminating pollution arising from industrial activities? To what extent can the effects reasonably be credited to the IED? Are there any industrial activities that fall outside of the scope of the IED (partially or fully) which generate high levels of pollution? Have there been any pollutants that have been omitted/fallen outside the scope of the Directive?	Pollution from IED activities has been reduced / eliminated IED Annex II pollutants What other factors influenced the outcome	Level of emissions (to different environmental media) from industrial activities (total of all IED activities, and split by sector) by pollutant type Number/type of pollutants captured	Quantitative analysis of some emissions to air and water for some sectors: Evolution in emissions by category of pollutant and sector since IED adoption compared with baseline Contribution of IED to NEC goals for NO_x, SO_x and dust for GLS, CLM, REF, P&P in selected MS. Mapping of industrial activities identifying those under IED Gap between reported emissions in BREF questionnaires and WBP and FDM BAT-AELs to estimate emission reductions. Gap between ELV in IED Annexes and BAT-AEL in relevant BATc For chosen pollutants, compare emissions under IED and outside and pollution share captured by scope of IED. BAT-implementation mentions in NECD National Air Pollution Control Programmes. BAT-AELs for hazardous substances versus sectors in literature; MS ELVs versus BAT-AEL; Hg inventory analysis	Databases / reports with emissions (E-PRTR, LCP inventories, air emission and water emission inventories) Review of literature Stakeholder consultation BREFs and BATC and BREF questionnaires MS IED implementation reporting Sample of permits on cement, P&P, GLS and REF regarding Hg, SO_x and NO_x (6 in total)
b. Has the IED strengthened provisions on enforcement and environmental improvement?	Evidence effectiveness of inspections and enforcement checks/tools has improved in comparison to the prior	Number/frequency of enforcement checks Levels of (non) compliance	Quantitative analysis: Analyse compliance/non-compliance levels and level of penalties by sector and over time on the basis of data from	Data sources e.g. IMPEL studies Surveys of authorities Workshop with expert groups (IEEG, Art 75, Art 13) and other groups such as

Sub-questions	Assessment criteria	Indicators	Data analysis approach	Data sources and collection methods
c. How does it compare to the previous situation (IPPC)?	situation under IPPCD Evidence that use of an integrated permit has contributed to more effective enforcement Reduced levels of non-compliance	Penalties levied	literature and responses to the survey of authorities Analyse non-compliance reasons and evolution over time. Input from authorities on appropriateness /effectiveness of current enforcement tools (semi-quantitative assessment) Qualitative: stakeholder views on enforcement evolution under IED. Groups such as IMPEL hint toward more coordinated enforcement Article 18 use from MS IED implementation reports. Complemented with input from authorities if Article 18 provisions are applied or not and why.	IMPEL IED impact assessment
d. Has the Directive stimulated innovation in the prevention and control of pollution from industrial activities?	Presence of evidence that the IED has led to an increase in the number of new/novel techniques being developed / adopted as BAT	Abatement technique evolution, R&D on better industrial process efficiency. Number of IED installations using Article 15(5) to test emerging techniques. Share of installations indicating IED played a role in decision to develop / test / adopt new technologies Techniques moving from emerging to BAT between BREF reviews Number of non-IED efforts to stimulate industrial innovation e.g. FP6/FP7/Horizon2020	Assess BREFs / BATc to identify new techniques included. Analyse MS IED reports for share of installations testing emerging techniques Operator survey responses on extent IED implementation led to development / testing / adoption of new techniques that wouldn't have happened otherwise. Review FP6/FP7/Horizon2020 literature to stimulate industrial innovation to assess other drivers	Review relevant studies including industrial innovation observatory. MS IED implementation reporting Survey operators covered by the IED and interviews with industry associations Interviews with EIPPCB, TWG members, EIT and research organisations. FP6/FP7/Horizon2020 research programmes
e. Has the IED led to simplification of the legislation and cut unnecessary administrative burden?	Replacement of the predecessor Directives with the IED has simplified the legislation Implementation of the IED has led to a reduction of administrative costs/burden in comparison to costs prior to its adoption	One-off costs related to: New operator to understand requirements New permit applications Permit reviews following publication of BATC Participation in BREF review processes Ongoing costs related to: Compliance assessment by MS of	Qualitative assessment of ease of understanding the IED versus predecessor directives. (Semi) Quantitative: data from studies to assess extent different types of administrative burden have reduced since IED adoption complement with qualitative input from industry and regulatory authorities asked to indicate the extent administrative burden has changed, providing examples	Review relevant literature including IED implementation reports and IED impact assessment Survey/interview of industrial installation operators and of MS competent authorities (legislators and permit writers)

Sub-questions	Assessment criteria	Indicators	Data analysis approach	Data sources and collection methods
		monitoring Reporting information to authorities and from MSs to the Commission. Other costs / savings	of costs under IPPCD and IED. Compare administrative costs in IED impact assessment and costs established via (primarily) stakeholder survey	
f. Has the IED strengthened public access to information? How does it compare to the previous situation (IPPC)?	Evidence that level of public access to information has improved in comparison to the prior situation under IPPCD	Number of MS providing permits online accessible to the public (includes consultations on new and revised permits and derogations) Level of stakeholder agreement that public access to information has improved since IED adoption	Quantitative Data on MS providing permit information accessible online. Stakeholder feedback (authorities, NGOs) to qualitatively assess the extent IED has made access to information easier compared to previous situation	Review of relevant literature including MS IED implementation reports and NGO reports on public access to information e.g. EEB report "Burning the evidence". Survey/interview of NGOs Feedback from the OPC
g. Has the IED strengthened public access to justice?	Evidence level of public access to justice has improved in comparison to situation under IPPCD	Level of stakeholder agreement that public access to justice has improved since IED adoption Case study focus	Stakeholder feedback (authorities, NGOs) to qualitatively assess the extent that the IED has made access to justice easier compared to previous situation	Survey/interview of NGOs. One targeted survey question on access to information relates to access to justice.
EQ2. How effective is the process of elaborating BREFs and BAT Conclusions?				
a. To what extent does the BREF process identify the techniques that are the most effective techniques (and identify the most appropriate associated emission or performance levels) for achieving a high level of environmental protection?	Extent to which BATc include BAT-AE(P)Ls based on the best available techniques to achieve high level of environmental protection. Stakeholder groups in TWG BATc ambitious enough to lower emissions. Does upper BAT-AEL trigger environmental improvement? Are some BATc more challenging than others BAT-AELs distinguishing new and existing plants; what is the consequence? Transparency from data and technology evaluation to BAT-AELs. Criteria to set BAT-AEL Main conflict areas when setting BAT AELs TWG access to assess	Overview of benefits from applying BREFs and BATc. Comparison of efforts and benefits. Stakeholder views on effective interaction in TWG. Has BREF process has been data and evidence based Transparency of data and information/technology gathering BREF process timescales. Number of TWG members broken down by MS and industry Number of comments on a BREF.	The objectives of BREFs and BATc are identifying BAT that are the most effective techniques to achieve a high level of environmental protection, taking into account the costs and benefits. Important to consider whether this has been achieved through review of upper and lower BAT-AELs, ELVs, emission data and inventories, literature and engagement with stakeholders (regulators, NGOs, industry and technology providers). Stakeholder consultation to explore whether process takes into account viewpoints across industry, technology suppliers and regulators effectively without bias.	Review of relevant literature (including ICF 2013) including studies assessing the costs and benefits of the BAT Conclusions (e.g. Ricardo 2016, 2018). Survey/interviews/workshops of regulators, operators, NGOs, technology providers, EIPPCB, TWG members. Focus group on the BREF process. BREFs and BATC New level of environmental protection (BAT AEL) vs old level ("old" ELVs e.g. in Annexes of IED)

Sub-questions	Assessment criteria	Indicators	Data analysis approach	Data sources and collection methods
	information, comments and ask questions (quality check).			
b. Does the BREF process sufficiently consider both costs and benefits in identifying the best available techniques?	Cost and benefits of identified BATs are properly identified.	Proportion of BATc demonstrably based on sufficient economic and environmental data. Stakeholder views (EIPPCB, industry, NGOs)	Qualitative assessment of whether judgements made in deciding on BAT have sufficient evidence to judge both costs and benefits of techniques.	Survey/interviews of regulators, operators, NGOs, technology providers, EIPPCB. BREF process Focus group.
c. To what extent has the IED supported Member States in implementing BAT-based permitting? d. To what degree are exceptions taken up that result in permits not being based on BAT?	How straightforward is it for MS authorities to issue permits based on BAT? Are findings from the BREF process and BATc accessible to MS to implement BAT in permits?	Permit conditions have been based on BAT Number and type of derogations applied for and granted (many may imply the BATc was difficult to implement) Commission guidance Feedback from MS authorities	Quantitative analysis: Review MS implementation reports to identify how BATc have been used in permits. Review MS reports, studies and other sources to identify numbers of Article 15(4) derogations applied for and accepted by activity, pollutant, BATc. Qualitative analysis: regulator feedback how BREFs and BATc have been used in permitting.	Review literature e.g. MS implementation reports re Article 15(3), 15(4), 15(5); Article 15(4) study. Survey regulators and other groups e.g. IMPEL. Guidance from Commission. Review permit selection to identify implementation of BATc – link with #1a.
EQ3. How effective is the emissions monitoring and reporting process?				
e. To what extent does the emissions monitoring and reporting system facilitate the assessment of compliance under IED, and of the quantity of released emissions? Are the monitoring requirements fit for purpose?	Monitoring requirements provide sufficient information to assess compliance. No or limited problems identified with monitoring or reporting procedures. No or limited gaps in the information. Monitoring provides sufficient information to assess quantity of emissions.	Views on suitability of emissions monitoring techniques and frequency in BATc. Views on suitability of reporting, distinguishing: reporting to Competent Authorities, to European Commission and to EEA for E-PRTR.	Qualitative analysis: feedback from stakeholders on suitability and robustness of the monitoring and reporting requirements and systems in place. Identification of any particular challenges and the reasons for this. Consider monitoring and reporting systems applied in selection of non-EU countries e.g. Korea.	Review literature, in particular implementation reports, evaluation of E-PRTR and environmental reporting Fitness Check. Review approaches applied in non-EU countries based on literature and direct engagement. Stakeholder consultation (interviews, survey(s), workshop) – in particular with regulators and operators.
EQ4. Are there significant differences between Member States and sectors in implementation?				
f. Are there significant differences between Member States or between different sectors (including social costs as a consequence of poor implementation)? g. Has the IED	General level of variation in IED implementation. Level of variation in use of different legislative flexibility provisions.	Number/proportion of each of exceptions, general binding rules, flexibilities and derogations per sector per MS Indicators on costs/benefits as mentioned in EQ5.	Qualitative: implementation experience by operators across different MS, and MS authorities. Examine specific reasons or parameters that led to differences in IED costs or benefits among MS and how important they are. Quantitative: assess variation among MS	MS implementation reports and summaries. IMPEL studies. Ongoing studies on implementation (MS support, implementation assessment). Stakeholder consultations - Views from industry on harmonised implementation

Sub-questions	Assessment criteria	Indicators	Data analysis approach	Data sources and collection methods
contributed to creating a level playing field? What is causing them; and do these differences affect the costs or benefits of the IED?			in how the flexibility, derogation etc. has been taken up, supported by justifications to identify potential distortions.	at EU level.

Table A3-2: Evaluation matrix - efficiency

Sub-questions	Assessment criteria	Indicators	Data analysis approach	Data sources and collection methods
EQ5. The extent to which the costs are justified, given the impact of the IED and the benefits it has delivered? *(links with EQ7 administrative costs assessment)*				
a. What are the costs and benefits (monetary and non-monetary) associated with the implementation of the IED in each Member State, and in the EU as a whole b. Have the benefits been achieved in a cost-effective manner? **c.** To what extent are the costs justified, given the impact of the IED and the benefits it has delivered?	Do benefits exceed compliance and administrative costs (monetary and non-monetary) associated with implementation of the IED, and MS distribution. The cost/benefit ratio of the IED compares favourably with other comparable interventions.	Monetary value of emissions reduction in IED industrial sectors that can be attributed to the IED (by MS and EU level). Direct and indirect administrative and technical costs for the various actors and processes arising from the IED requirements.	Quantitative: A full assessment by sector is not possible. Case study approach focusing on some sectors where BATc implemented (e.g. Iron and Steel production) where a CBA analysis is available. Understand direct and indirect administrative and technical costs from IED implementation (includes operator costs to apply and maintain permit / install and maintain abatement equipment / monitor and report, regulator costs to review, grant, enforce permits, costs of BREF process). Compare to impacts and benefits. Compare with costs and benefits of other legislative actions.	Literature review – IED IA on costs and benefits of other legislative actions for comparison. Ex-ante (LCP) and ex-post (Iron and Steel) BATc CBA assessments. MS implementation reports. Damage costs by MS. Stakeholder consultation (interviews, surveys, workshops) - targeted survey questions (public authorities and industrial sites) to quantify time spent and investments; feedback through workshops and interview regarding proportionality between costs and benefits Impact assessments and evaluations of other legislation (e.g. NECD revision).
d. How proportionate were the costs for different stakeholder groups, taking into account the benefits achieved?	Specific stakeholders have disproportionate costs or benefits? Specific stakeholders' costs not justified by benefits (i.e. high cost-benefit ratio)?	Costs per stakeholder group involved. Benefits for society of reduced health/environmental impacts.	Quantitative analysis where available using outputs of EQ 4a, 4b and 4c.	As above.
EQ6. Could efficiency have been improved?				
a. What factors could have improved efficiency by strengthening delivery of the objectives while minimising unnecessary costs?	Elements of IED implementation with highest costs.	Qualitative indices on cost-benefit ratios (very high, high, medium, low, very low) for various measures and dimensions related to IED.	Qualitative: stakeholder views on aspects that could more efficiently have reduced impacts or stakeholder inputs. Triangulation of results from other efficiency EQs.	Stakeholder consultation (surveys, targeted OPC) particularly MS authorities and industry representatives. BREF process Focus group.
EQ7. To what extent has administrative burden been reduced with respect to initial expectations? (*See also EQ1e and questions related to benefits of the IED)*				

a. What are the administrative costs to the Member States, Commission, and IED operators? b. What are the administrative costs of the BREF process? **c.** How timely and efficient is the process for reporting and monitoring?	How administrative costs compare to IED IA estimates. Total administrative costs for IED implementation so far for Commission, MS, IED operators relative to IPPCD. Administrative costs to develop BREFs (total and per BREF) before and after IED. Time and costs for BREF process before and after IED. Frequency, extent, and time or cost of requirements for reporting and monitoring, separately for industry and authorities relative to IPPCD.	Overview of efforts to elaborate BREFs and BATc. Length of time per BREF review. Frequency of monitoring reporting. Developments in direct and indirect administrative costs (quantitative evidence where available, otherwise qualitative indications).	Quantitative analysis of the (estimated) manpower costs for the Commission, MS authorities, industry and NGOs relative to IPPCD. Application of standard cost model and associated wage rates (e.g. from Eurostat) for estimating burden. Consider whether effort of BREF process is proportionate to the benefits achieved by applying BAT.	Survey/interviews of regulators, industry representation, NGOs, EIPPCB: quoted administrative costs from parties directly working on reporting obligations. BREF process Focus group. Evaluations and impact assessments of other EU environmental legislation (e.g. EU ETS). IED IA.
d. Taking account of the objectives and benefits of the IED is there evidence that the costs have caused unnecessary or excessive administrative burden?	Ratio of administrative costs to benefits Is ratio of administrative cost to benefit comparable to other similar interventions Compare with IED IA expectations	Ratio of administrative costs to benefits	Quantitative: review of administrative costs and comparison with benefits (estimated in earlier questions). Qualitative: stakeholder views on areas that led to unnecessary or excessive administrative burdens.	Inputs from other EQs. Feedback from stakeholders (surveys, interviews, workshops).
EQ8. Has implementation of the IED supported or hampered EU competitiveness in the global economy; has the implementation of the IED improved or been detrimental to economic, social and environmental sustainability?				
a. How has the IED affected the competitiveness of the EU industry?	IED has had a positive impact (at least no negative impact) on productivity and profitability of EU industry affected by its implementation. IED improved the competitiveness of EU industry in comparison to its main competitors by promoting the adoption of new technologies/ innovation.	GVA per unit of production. Average profit margin of affected sectors. Level of savings in energy/environmental. Mitigation costs for EU industry affected by IED.	Semi-quantitative. Analyse Eurostat and sectoral study data (where available) on GVA and profit margins of sectors over time. Compare with competitors outside the EU (where relevant). Indicative analysis since profitability and competitiveness affected by multiple factors beyond IED. Complement with (industry, authorities) input on positive or negative IED impact on productivity, profitability, operating costs. Other EQs (e.g. EQ1) feed into this.	Literature assessments (e.g. cumulative costs assessments). Eurostat (e.g. GVA, sector production outputs and profit margins). Stakeholder interviews (industry).
b. Has the implementation of the IED improved or been detrimental	Evidence available suggests IED had a positive impact (or, at least, no negative impact)		Qualitative bringing together evidence and conclusions from other EQs (e.g. EQ 1, 5, 9a) and stakeholder input.	Literature and datasets. Stakeholder interviews (industry).

to economic, social and environmental sustainability?	economic, social and environmental sustainability.			

Table A3-3: Evaluation matrix - relevance

Sub-questions	Assessment criteria	Indicators	Data analysis approach	Data sources and collection methods
EQ9. To what extent do the IED objectives still correspond to the needs of the EU? (This will be considered alongside outputs from EQ1)				
a. Has the IED addressed the most relevant environmental impacts and pollutants? b. Has it set relevant standards and obligations to protect human health and the environment?	BREF process has covered all relevant environmental impacts (and relevant pollutants) identified at the time of its adoption. Environmental impacts/pollutants covered are still relevant today. No important pollutants omitted BATc appropriate to address relevant health and environmental impacts.	Level of emissions from identified pollutants. Human health impacts and level of risk associated with identified pollutants. Pollutants expressly covered in IED compared to pollutants reported in E-PRTR.	Analysis of these indicators will demonstrate the extent that the addressed environmental impacts and pollutants were and still are an issue in the EU. We will also use input from stakeholders on the initial and ongoing need to address the specific environmental impacts and use the conclusions from question 1 to assess and help conclude on the relevance of the provisions and the standards and obligations.	Literature (KEI studies and method paper authored by Ricardo and its long list of pollutants) and environmental datasets (E-PRTR, NECD inventories). Literature analysis on the IA and Directive's recitals summarising the rationale for intervention and the formulation of EU policy needs. Stakeholder consultations with particularly EU staff and MS authorities on rationale of Directive, and with civil society. Triangulation of formulation of objectives with formulation of needs and rationale.
c. How relevant is the IED for the different stakeholders and to EU citizens in particular?	IED recognised as appropriate instrument to reduce environmental impacts and protect human health among stakeholders	Benefits accrued to society	Qualitative. We will use input from question 9a and input from stakeholders (authorities, industry, civil society and experts) to conclude on the relevance for the IED for different stakeholders	
EQ10. Is the IED able to respond to new or emerging environmental issues?				
a. Has the IED been flexible enough to respond to new or emerging issues?	New environmental issues and pollutants emerged under IED have been covered by BREFs BREF process sufficiently flexible to cover new issues not initially identified	Number of new/additional pollutants and/or environmental issues covered in BREFs.	Evidence from BREFs by sector if/how new environmental issues were covered. Conclusions from EQ2 and stakeholder input to assess ease (time needed, procedures) to cover new issues in different stages of the process.	BREFs – identification of key environmental issues. Stakeholder survey/interviews (industry, civil society NGOs, academics/experts.)

Table A3-4: Evaluation matrix - coherence

Sub-questions	Assessment criteria	Indicators	Data analysis approach	Data sources and collection methods
EQ11. To what extent is the IED internally consistent and coherent?				

a. To what extent is the IED internally consistent and coherent, in particular among its different chapters? Are there any identified cases of overlaps, contradictions or other inconsistencies in terms of the provisions / requirements? To what extent do provisions match the objectives of the Directive? What, if any, are the inconsistencies, contradictions, unnecessary duplication, overlap or missing links between provisions and activities listed in Annex 1?	Is IED coherent internally No unnecessary, unclear or contradictory requirements Instances of interaction and existence of possible inconsistencies. Provisions support objectives. Streamlining provisions (permitting, reporting and monitoring) contributed to a coherent approach to achieving IED objectives. Permits issued align with conditions based on BAT.	Stakeholders view IED as internally coherent. Clarity of provisions Consistency of the articles and requirements.	Qualitative discussion based on logical analysis and input from stakeholders on whether the provisions are all working together and the IED is delivered in a coherent and simple manner.	Desk research. Legal analysis - review of legal proceedings and guidance that would hint to lack of clarity or coherence and critical review of Directive. Questionnaires and interviews with EU and national authorities. OPC. IED compliance assessment studies.
EQ12. To what extent is the IED coherent with other EU environmental and wider EU policies, and with market-based instruments?				
a. To what extent is the IED coherent with wider EU policies, like climate and energy, and market-based instruments, in particular the EU-ETS, the circular economy and the sustainable use of resources, as well as specific EU environmental policies such as those concerning water, air, waste, and chemicals? b. Does the IED adequately contribute to the achievement of the EU environmental policy objectives and targets? c. How do objectives, provisions and implementation compare and what are the possible gaps, overlaps and inconsistencies? d. Are there any changes needed under the IED/BREFS to improve its contribution to these objectives?	EU and MS policy goals support IED objectives. IED coherent with other emissions reduction policies. IED supports targets. IED coherent with other EU environment legislation. Are there EU and MS coordination mechanisms supporting coherent, integrated approach to achieve IED objectives? Adequate contribution of the IED and BATc to environmental objectives. Positive environmental impacts due to IED.	Degree of alignment between objectives, provisions and implementation. Degree of contribution to the specific environmental objectives. Stakeholders view IED as contributing to fulfil these environmental objectives. Instances of interaction and existence of possible inconsistencies.	Qualitative assessment based on logical analysis and input from stakeholders whether the objectives of the Directive is in-line with other EU environmental and wider EU policies and whether there overlaps or inconsistencies (e.g. whether IED permits take into account the fulfilment of other broader environmental objectives/ obligations such as water body status, ambient air quality).	Eurostat/EEA data. Stakeholder consultation. Literature review. EU policy objectives such as Thematic strategies; 7th Environmental Action Programme; EU action plan for the Circular Economy; Clean Air Programme for Europe; EU biodiversity strategy to 2020. IED studies. Fitness check of the Ambient Air Quality Directives. Fitness check of the Water Framework Directive, Groundwater Directive, Environmental Quality Standards Directive and Floods Directive. Evaluation of the Water Framework Directive.

e. Extent IED is coherent with E-PRTR? f. How do objectives, provisions and implementation compare and what are the possible gaps, overlaps and inconsistencies? g. What progress has been made for streamlining reporting activities?	IED and E-PRTR coherent and complementary. Sectors, pollutants and activities aligned with the E-PRTR. EU Registry on Industrial Sites established.	Number of installations/facilities. Pollutants in IED Annex II and E-PRTR. Sectoral coverage. Alignment of objectives, provisions and implementation Interactions and inconsistencies.	Quantitative: assess proportion of IED activities covered by E-PRTR by sector. Qualitative: compare IED and E-PRTR scope definitions (pollutants, sectors, installations). Compare monitoring data (concentrations e.g. mg/Nm^3) to EPRTR reporting (mass emissions) and difficulty and uncertainty in converting between these.	E-PRTR. REFIT evaluation of E-PRTR. Fitness check on environmental monitoring and reporting (COM(2017) 312). Stakeholder feedback (particularly MS authorities responsible for EPRTR and IED reporting).
h. To what extent does the IED complement or interact with key EU funding programmes	Objectives of key EU programmes support IED objectives and use of emerging techniques and R&I.	Alignment between objectives, provisions and implementation.	Review alignment. Do programmes support use of "emerging techniques" and support R&I feeding the BREF process?	Desk research, OPC, targeted stakeholder survey.
i. To what extent does the IED comply with the international regulatory framework? For each instrument • scope and requirements • How IED contributes to fulfilling obligations • What contributions made in the EU can be attributed to the IED? Opportunities for greater synergies?	For each instrument: IED is coherent with commitments. Areas in which the IED contributes to obligations.	For each instrument: Obligations align with EU international commitments. Interactions and possible inconsistencies.	Review relevant international conventions including: The Convention on Long-Range, Transboundary Air Pollution, Convention on the Transboundary Effects of Industrial Accidents, Protocol to Abate Acidification, Eutrophication and Ground-level Ozone.	Desk research. Questionnaires and interviews with EU level authorities. Legal analysis. Case studies.

Table A3-5: Evaluation matrix – EU added value

Sub-questions	Assessment criteria	Indicators	Data analysis approach	Data sources and collection methods
EQ13. What is the added-value from the IED, compared to what is likely to have been achieved by Member States in its absence?				
a. To what degree has the IED enabled Member States and their competent authorities to take successful action to improve beyond what would have been possible without EU action?	IED requirements exceed national law requirements. Level playing field across the EU.	Degree of uptake of BAT. Reductions in emissions.	Assess likely degree of uptake of BAT-based permitting with IED versus without. Triangulation with analysis on effectiveness of specific IED actions unlikely to have been achieved by MS level action.	Output from EQ1 on emission reductions relative to baseline. Engagement with MS authorities on whether revised BREFs and BATc led to more stringent permit conditions than under business as usual (for that MS).
b. Does the IED and its means of implementation create synergies or overlaps with other Community objectives, and how has the distribution of responsibilities between EU, Member State, regional and local levels impacted on the management of environmental impacts?	Overlapping policy scope with IED.		Qualitative discussion on synergies and overlaps	Stakeholder consultation, particularly with EC officials and MS national authorities across thematic areas. Literature sources e.g. cumulative costs assessments, impact assessments and evaluations of other EU law.

Annex 4: Stakeholder consultation

1. Consultation strategy

The key objectives of the consultation process were:

i. to confirm the scope of this evaluation;
ii. to collect factual information on the implementation of the IED from associated stakeholders, in order to complement the desk-based research conducted as part of Task 2, and;
iii. to ask stakeholders to express their views about the effectiveness and efficiency of the IED.

In the context of the IED evaluation, a broad scope for the stakeholder consultation was necessary to ensure that all relevant and interested stakeholders were given an opportunity to express their opinions and to contribute to the evaluation.

The Evaluation Roadmap[56], including a consultation strategy, was published on 6 November 2018, and feedback was received by 4 December 2018. The consultation methods and tools outlined in the strategy have been followed, as described in more detail in the following sections.

2. Consultation activities

A number of consultation tools were used to collect data and views. The main ones were:

- Open public consultation
- Targeted online survey
- Interviews
- Focus groups
- Stakeholder workshops

All Commission's minimum standards have been met. Details of each of the consultation activities are provided below.

a) Open public consultation (OPC)

A 12-week open online public consultation in all 23 official EU languages was open for responses between 27 May 2019 and 4 September 2019 via the Commission's central public consultations portal[57].

[56] https://ec.europa.eu/info/law/better-regulation/have-your-say/initiatives/1913-Evaluation-of-the-Industrial-Emissions-Directive
[57] https://ec.europa.eu/info/law/better-regulation/have-your-say_en

The survey contained 20 multiple choice questions, using Likert-scales of 5 options (most negative to most positive). The scales for most questions included one or more "opt-out" responses, such as "Do not know" or "I am not familiar" to avoid forcing respondents into giving an opinion they do not feel qualified giving. Finally, one open question at the end asked the respondent for any further relevant feedback, information or opinions they wished to share.

b) Targeted online survey

The targeted survey was developed using an open source online survey tool (Survey Monkey) and configured using the tool's editing facility, with data validation and formatting added as required. The questionnaire was developed in discussion and agreement with the European Commission including the Inter-Service Steering Group (ISSG) throughout May and June 2019.

The questionnaire script was based on the relevant evaluation questions, but tailored to make the survey more user-friendly, and also to reflect the relevant audience. Closed questions were complemented with open questions, which allowed respondents to provide further explanations and wider opinions. Similar to the open public, respondents were asked first to identify themselves and indicate to which stakeholder group they belonged. The survey included questions grouped by 10 key themes relevant to the IED that are considered as part of the evaluation.

The survey was tailored with specific questions for three different main stakeholder groups (Member State authorities, industry representatives, and "Others" respondents). Stakeholders were able to provide their input between June and September 2019.

c) Interviews

Targeted telephone interviews to complement the online survey took place with representatives of Member States' authorities responsible for implementation, industry associations, civil society, and other key stakeholders. Interviewees were identified based on a stakeholder mapping taking into account that:

- It was important to understand views not only of national but, where applicable, also of regional and/or local competent authorities in charge of implementing and enforcing the IED requirements.
- The views of EU level umbrella organisations were important, but so were those of businesses impacted by the IED.
- The main civil society input was expected to come from non-governmental organisations at EU and Member State level. But it was also desirable to receive input from local organisations that have used the provisions of the IED.

The stakeholder interviews were grouped into three categories:

- Stand-alone interviews with stakeholders who were not the primary target of the online survey (e.g. EU institutions, such as EEA, JRC and relevant units of the Commission and NGO.
- Follow-up interviews with survey respondents who expressed their interest to take part in interviews to further discuss their inputs to the survey. Survey respondents included two main stakeholder groups: industry and Member State authorities.
- To fill remaining knowledge gaps, a third group of stakeholders was contacted at the later stages of the evaluation. These stakeholders included sub-national level permitting authorities who have not completed the survey.

Stand-alone interviews started during the summer of 2019 while the targeted survey was still open. Follow-up interviews mainly took place after the closure of the targeted stakeholder survey on 13 September 2019. The final group of stakeholders was contacted in December 2019. In total, 19 interviews were conducted.

d) Focus groups

Focus group discussions on the BREF process took place in Brussels on 15 October 2019, back-to-back with an IED Forum meeting, to complement the online survey and interviews. This setting made it possible to consult a wider group of stakeholders with expertise in the effectiveness of the BREF process and to explore differences in their opinions. Representatives of Member State authorities, industry associations and the NGO community took part in the discussion. Attendance at the focus group was by invitation only and the selection of the participants was in agreement with the Commission. The focus group was run twice with separate groups of attendees.

e) Stakeholder workshops

Two workshops were held in Brussels before the consultation process had started and after it had ended.

The first stakeholder workshop was held in Brussels on 22 May 2019. The workshop was web streamed in order to support access for a wider audience and stakeholders following the discussion online also had an opportunity to raise questions via an online tool (Slido). The aim of the workshop was to assist in gathering evidence, confirming the evaluation methodology, getting feedback from participants that no key issues are overlooked and raising awareness of the evaluation of the IED.

The second workshop took place on 17 December 2019 in Brussels. A background paper, summarising initial findings was circulated before the workshop. During this final workshop the initial findings of the evaluation were presented to stakeholders who were invited to provide feedback at the workshop as well as afterwards in writing.

3. Stakeholder groups participating

The key stakeholders identified for consultation fall into three key groups: industry, Member State authorities and others. These are summarised in Table A4-1:

Stakeholder Group	Stakeholders
1. EU Member State public authorities	• National level Member State authorities • Regional/ local Member State authorities
2. Industry	• Key industries in the scope of the IED • Business and trade associations for sectors in the scope of the IED • Technology providers and engineering industry associations
3. Other	• NGOs, specifically the European Environment Bureau • The general public • Academics and research institutes • Existing IED platforms, including the Industrial Emissions Expert Group (IEEG), the IED Article 13 Forum and IED Article 75 Committee • Other EU services, such as JRC and the EEA.

Table A4-1: Categories of stakeholders consulted

Specific consultation approaches were used to target different stakeholder groups. A targeted stakeholder survey was designed to target industry, Member State authorities and others involved in the IED process. This was tailored for these stakeholder groups and interviews were conducted with some respondents to collect a more detailed picture and fill in any gaps. The open public consultation was intended to capture information from those not directly involved in the IED process, including EU citizens and other interested parties.

As described in part 2 e) above, stakeholder workshops were held at two points in the evaluation period, the first was held before the surveys were conducted and used to influence the data collection. The latter was conducted after both the surveys had been analysed. Initial findings were presented and additional information was sought to fill in gaps and receive clarification on specific issues.

Figure A4-1 shows the number of respondents broken down by consultation activity. As expected, the OPC and the targeted survey received the largest number of responses. This was followed by the two workshops and finally the interviews.

There were 312 respondents to the OPC. Of these, 118 (37.8%) answered on behalf of a company or business organisation and 79 (25.3%) on behalf of a business association making 63.1% from business. The remaining 36.9% comprise EU citizens (42, 13.5%),

public authorities (32, 10.3%), NGOs (21, 6.7%), environmental organisations (8, 2.6%), academic/research institutions (5, 1.6%), trade unions (2, 0.6%) and other (5, 1.6%). Of those that selected "Other", one was a national chamber of commerce, the other four responded anonymously.

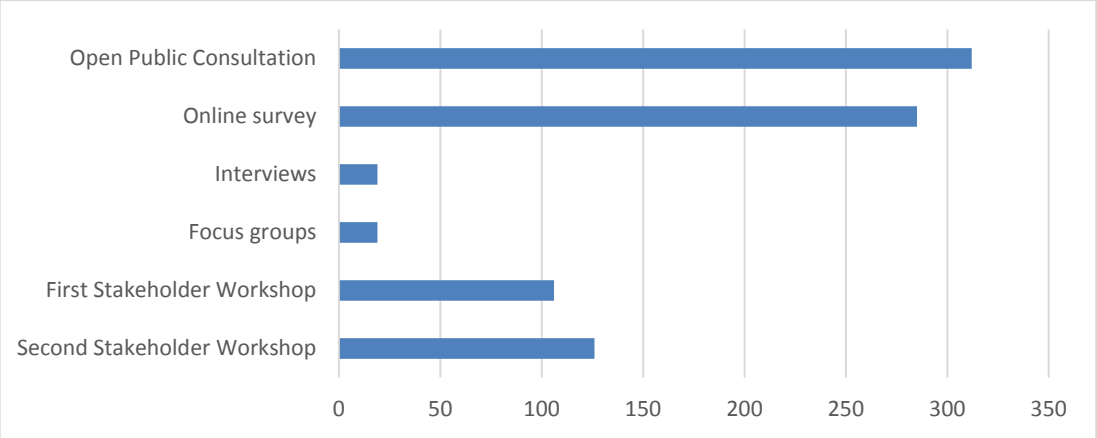


Figure A4-1: Number of respondents by consultation activity

Figure A4-2 shows the level of participation in the targeted stakeholder engagement activities, broken down by stakeholder group. The largest was the survey with 285 responses of which industry accounted for 188. Member State participants are distinguished between national, of which there were 33, and local or regional level responses, of which there were 55. There were 9 responses from NGOs and other organisations. Members States primarily contributed through the targeted survey with a small proportion, also choosing to comment through the OPC. A number of the responses to the targeted survey were chosen for follow up interviews. These interviews (like all others) were conducted to ensure an even geographical spread, a mix of both regional and national Member State authorities and to pick up on any particularly noteworthy responses.

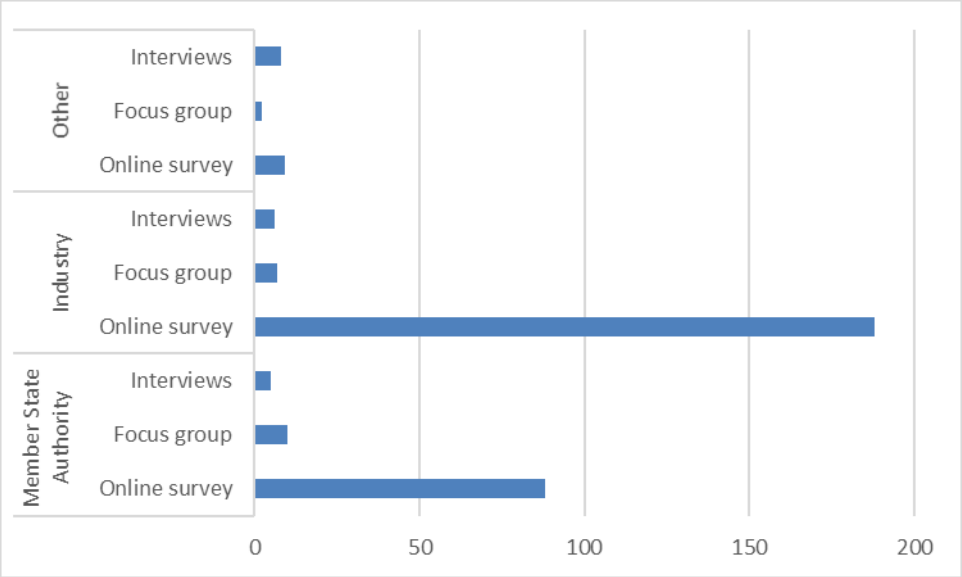


Figure A4-2: Participants by stakeholder type for three consultation activities

In additional to a significant number of companies and sectors that responded through the targeted stakeholder survey, we also saw a significant number of responses from industry come through the OPC. This includes companies tangentially related or impacted by the IED, such as other industrial firms, those in the supply chain, or those in the financial sector.

The "Others" respondents include several groups that do not fall into the previous categories. The largest group, as evidenced by the number of responses to the OPC, are EU citizens. The group also includes NGOs and research organisations that play a key role in the shaping of the IED and BREFs, including the EEB.

The number of responses also varies significantly by location. Figure A4-3 shows the breakdown by Member State, however the type of stakeholder reporting from each country may be different. For example, Belgium has a number of trade organisations and business interest groups based in Brussels that seek to influence the evaluation. Similarly, Germany also has a large industrial centre. The number of regional authorities that responded varies significantly by Member State. The largest groups of respondents from regional Member State authorities were from Sweden and Finland.

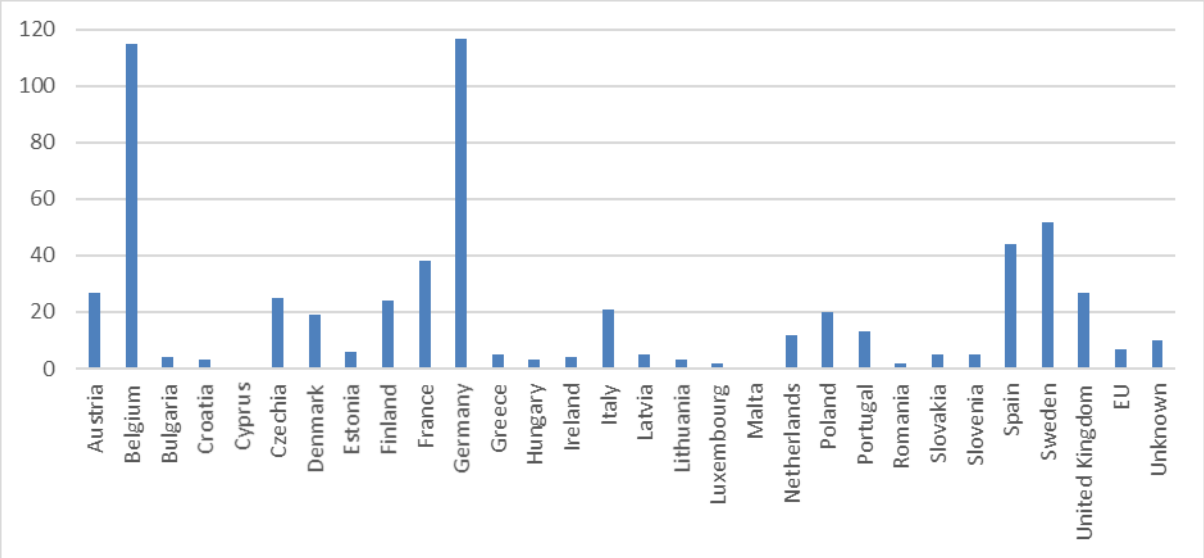


Figure A4-3: Number of responses by Member State across all consultation formats

4. Methodology and tools used to process data

Quantitative information was analysed using the contractor's analysis tools. For all surveys and consultations, this included analysis of results by stakeholder type, taking into account the imbalance in number of respondents between different stakeholder groups.

The stakeholders were grouped as follows:

- For the OPC, stakeholders were grouped by: EU Citizens, (Environmental) NGO's, Public authorities, Business organisations, and others.
- For the targeted consultation, stakeholders were grouped by: Industry, Member State: National, Member State: Local/Regional or Anonymous, and Others.

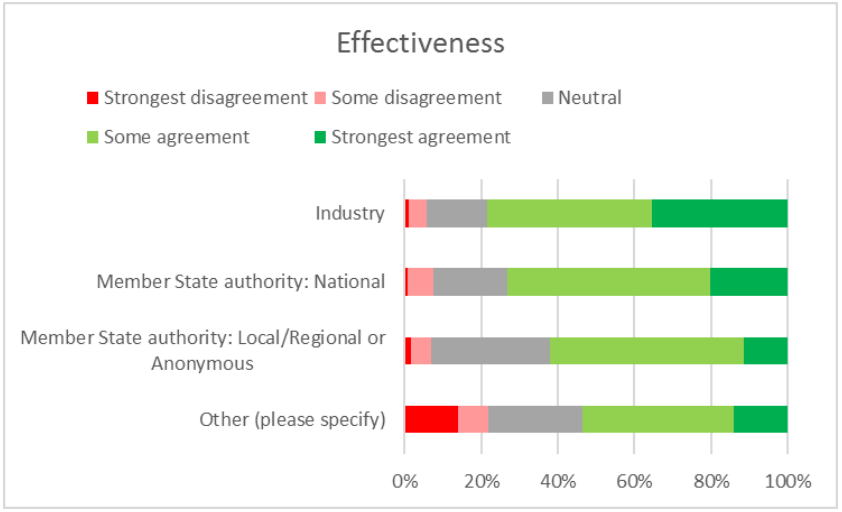
Qualitative information was received from: the stakeholder workshops, interviews, the many free text responses to the targeted stakeholder survey, the open text response to the open public consultation, and papers uploaded for the targeted stakeholder survey and OPC. This information was analysed against the five evaluation criteria: effectiveness, efficiency, relevance, coherence and EU added value.

5. Results of the consultation activities

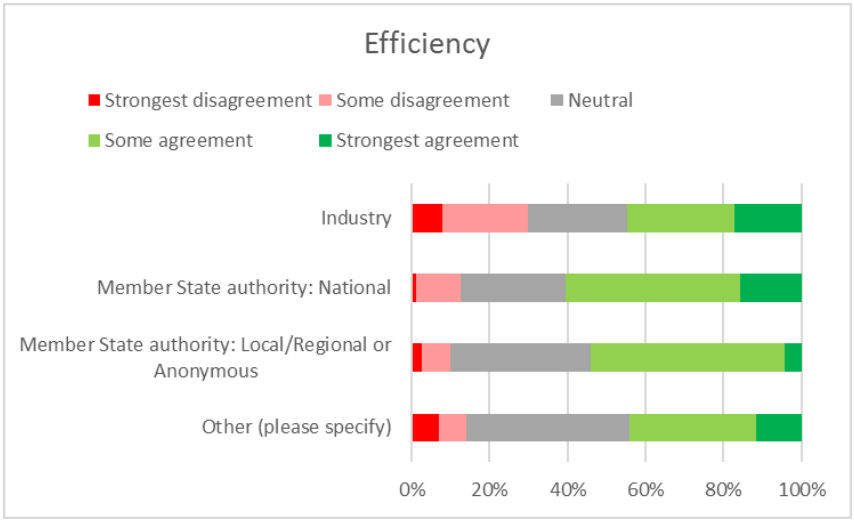
To provide a simple overview of the different stakeholder group opinions on the five evaluation criteria, a range of the multiple choice questions that are considered to address the various aspects of each criterion have been averaged and are shown in the following graphics as a single chart. The number of underlying questions varies from 36 for the effectiveness criterion to only four for the EU-added value criterion.

It can be observed that across all the criteria except efficiency, industry is most positive, Member State national authorities are second, sub-national authorities third. The responses from the category other, which include environmental NGOs are the least positive. For all the criteria, except efficiency, the average of the group responses shows around 70% with a positive view. The majority that are not positive are neutral. The "Others" category also includes the largest proportion of strong negative views for all five criteria.

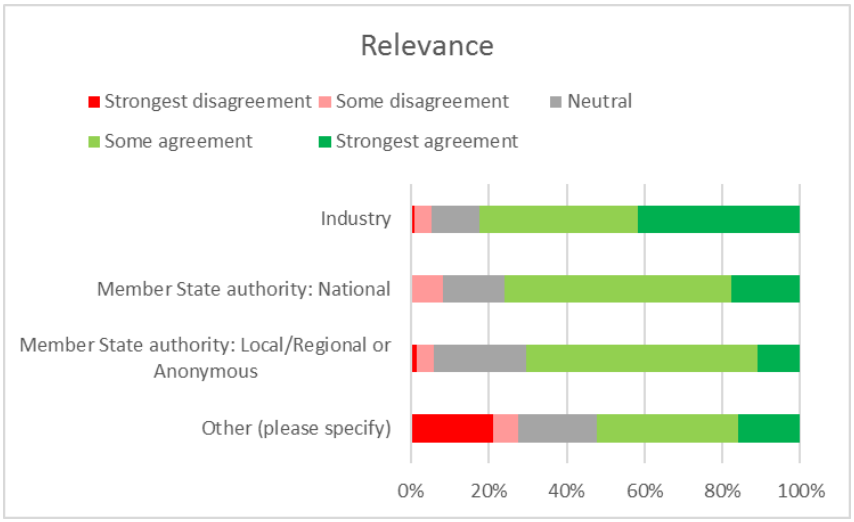
a) **Effectiveness:** averaged response to 36 questions



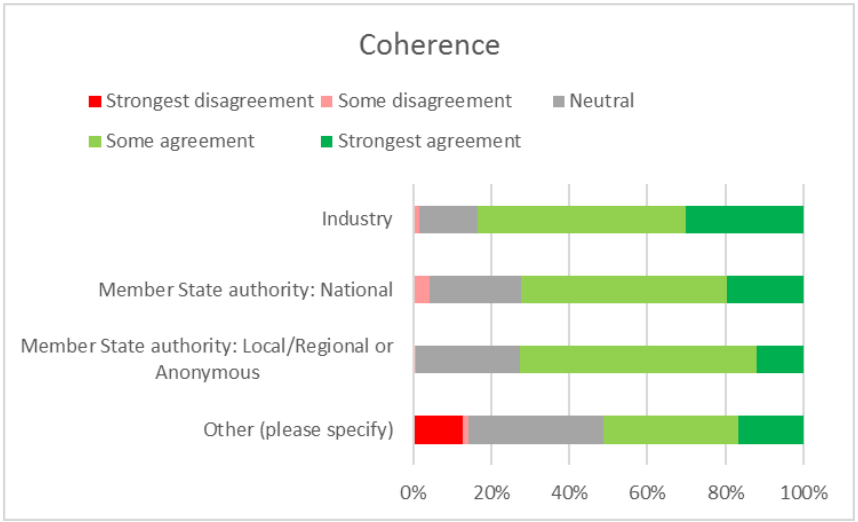
c) Efficiency: averaged response to 8 questions



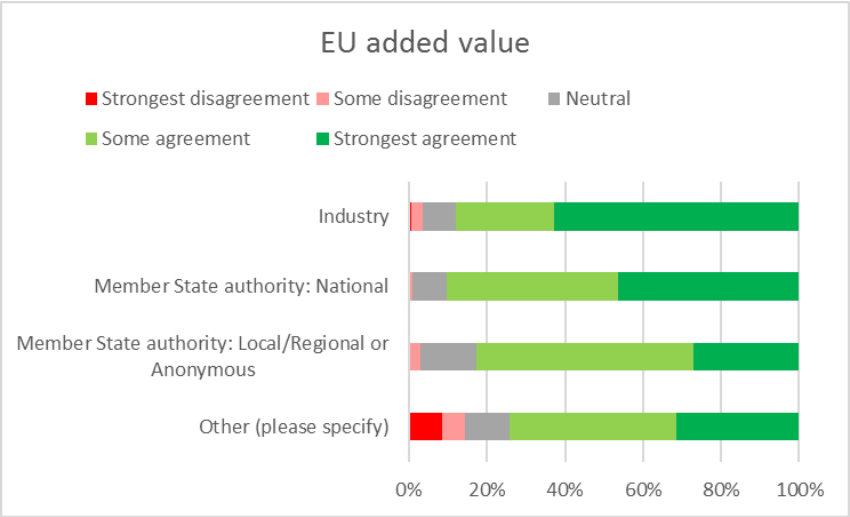
d) Relevance: averaged response to 14 questions



e) Coherence: averaged response to 9 questions



g) EU added value: averaged response to 4 questions



6. Identified campaigns for consultations

Open text responses to the OPC and targeted stakeholder survey were tested using a cosine similarity approach. This identifies sections of text in responses that are sufficiently similar, indicating that they may reflect coordinated responses from groups of respondents. For the targeted survey, responses considered to be coordinated were identified for five of the open text responses. In each case, there were several separate groups of potentially coordinated responses. The number of groups per question varied from five to nine. Individual group sizes varied from three (the minimum number considered to be a group) to 20. Most of these groups are entirely or almost entirely of business organisations, most frequently representing chemicals/petrochemicals/plastics sectors interest. There are also groups from the metals, cement, fertilisers and energy/heating/power sectors. One group of three public authorities from one Member State also provided coordinated responses to some questions. The OPC included one opportunity for open text response. In this case, eight groups were identified, where responses have sufficiently similar sections indicating that they may possibly be coordinated. Groups vary in size from three (the minimum number considered to be a group) to 45. Most of these groups are entirely or almost entirely of business organisations. The largest group comprises a broad range of stakeholders. Within this group, the (environmental) NGOs and EU citizens all point to recommendations made by the European Environmental Bureau in response to the Roadmap consultation on the IED.

7. Ad-hoc contributions

As part of the targeted survey, respondents were asked if they wish to provide any further information or ad-hoc documentation. A number of respondents did, uploading position papers and other relevant documents. A4-2 provides details of the additional sources uploaded. In addition, several organisations sent reports, position papers and other documents to the dedicated IED evaluation email. A complete list of the documents reviewed as part of the evaluation can be found in Annex 6 of the contractor's report.

Table A4-2: Documents received as part of the Targeted Stakeholder Survey

Source ID	Title	Year of Publication	Source/ Author	Type of source	Response to OPC or targeted stakeholder survey (TSS)
45	Xylem Position paper on the IED	2019	Xylem	Position Paper	TSS
68	Position paper from Veolia	2019	Veolia	Position paper	TSS
75	Position paper from VCI	2019	Albemarle Germany GmbH	Report	TSS
78	Position paper from CEMBUREAU, the European Cement Association	2019	CEMBUREAU, the European Cement Association	Position paper	TSS
79	Position paper from Glencore	2019	Glencore	Position paper	TSS
80	Position paper from Eurometaux	2019	Eurometaux	Position paper	TSS
81	Position paper from Hazardous Waste Europe	2019	HAZARDOUS WASTE EUROPE	Position paper	TSS
82	Position paper from Valmet	2019	Valmet Oyj	Position paper	TSS
85	Position Paper Improvement of Sevilla Process	2019	Federation of German Industries e. V.	Position paper	TSS
86	BioEnergy Europe Comments on the IED Survey	2019	Bioenergy Europe	Position paper	TSS
87	Dual lobbying in the Industrial Emissions Directive	2019	University of Amsterdam	Position paper	TSS
88	Position paper from International Committee for the Study of Cold Rolling of Steel Strip	2019	CIELFFA and FVK	Position paper	TSS
89	Position paper from the European Copper Institute	2019	European Copper Institute	Position paper	TSS
90	Position paper from EEB “Detailed EEB draft input to IED Evaluation v2FIN”	2019	European Environmental Bureau (EEB)	Position paper	TSS
91	Position paper from Energy UK	2019	Energy UK	Position paper	TSS
92	Feedback from Lebensministerium	2019	Austrian Ministry of Sustainability and Tourism	Position paper	TSS
93	Feedback from EUROFER	2019	EUROFER	Position paper	TSS
94	Feedback	2019	European Industrial Insulation Foundation	Position paper	TSS
95	Feedback from Energy Technologies Europe	2019	Energy Technologies Europe	Position paper	TSS
96	IED feedback	2019	Department for Environment, Food and Rural Affairs. UK Government.	Position paper	TSS

Source ID	Title	Year of Publication	Source/ Author	Type of source	Response to OPC or targeted stakeholder survey (TSS)
97	Feedback from Aurubis	2019	AURUBIS AG	Position paper	TSS
98	Industrial Emissions Directive targeted stakeholder consultation	2019	Business Europe	Position paper	TSS
99	IED evalutaion_emission rates	2019	Ministry of the Environment	Position paper	TSS
100	Feedback from VITO	2019	VITO - Flemish Institute for Technological Research	Position paper	TSS
101	Policy Paper Evaluierung IED Deutsch_16 09 2019 mit Korrekturen zu Kommentaren	2019	German Environment Agency (Umweltbundesamt)	Position paper	TSS
102	Feedback from PPC SA	2019	Public Power Corporation SA	Position paper	TSS
103	Feedback from Belgium	2019	Government of Flanders	Position paper	TSS
104	Making Europe sustainable and attractive	2019	Suez Group	Position paper	TSS
105	Summary Cost of LCP BREF in biomass and peat boilers final	2019	Finnish Energy	Position paper	TSS
106	Position paper from CEFIC	2019	Cefic	Position paper	TSS
107	European Environment Agency Draft Indicator on Industrial Emissions	2019	Swedish Environmental Protection Agency (Swedish EPA)	Position paper	TSS
108	IED Targeted survey response	2019	FuelsEurope	Position paper	TSS

Annex 5: Methods and analytical models

1. Evaluation matrix

An evaluation matrix (a summary is provided in Annex 3) was prepared based on the twelve areas for assessment set out in the evaluation roadmap with some minor adjustments. This sets out the following aspects for each evaluation question:

- **Sub-questions**: To draw out aspects of the question.
- **Assessment criteria:** The operational questions to answer for each sub-question.
- **Indicators:** This shows potential indicators to measure the respective impacts. These provide a metric to measure the different components of the intervention logic and draw on existing indicator frameworks relating to the IED and industrial emissions.
- **Data analysis approach:** This describes the approach and the methods and tools to be used to answer the question. Where possible, data is assessed at sector and Member State level before aggregating so that impacts can be considered at different levels.
- **Data sources and data collection methods:** This describes the key sources as well as the way in which the data may be gathered.

2. Data sources and analytical support documents

a. Desk research

Desk research has comprised literature and evidence assessment, as well as quantitative assessment related to emission reductions and administrative burden.

Evidence and literature has been sourced by a number of routes: from references in the terms of reference for the IED evaluation support study; from current work being undertaken by project partners; from reports and other evidence signposted by EC; from a review of literature; and from respondents to stakeholder engagement for this study through responses to the open public questionnaire, targeted stakeholder survey, interviews and focus groups.

Evidence and literature have been logged in a data register that includes an assessment of the robustness and relevance of the data. Many of the sources are reports or other documents prepared for the EC and are considered to have high robustness. There are 108 items with roughly equal numbers of documents assessed considered to have high, medium and low relevance.

b. Assessment of emission reduction

There are two criteria to assess the level of air pollution: one criterion is the change (decrease or increase) of the level of emissions from industrial activities. This has been evaluated for the IED industrial activities and for the different pollutants.

However, as the numbers of installations and the production capacities change over time, a better way to assess the reduction of emissions is the emission factor (EF, in kg or tonne of pollutant per tonne of product produced or tonne of refinery intake). The EF

provides information on emission reduction measures or process modifications and will change over time.

In a quantitative analysis, the emission reduction of the pollutants: NO_X, SO_X and dust, in EU-28 industry and in four specific sectors (i.e. glass industries, cement industries, refineries and pulp and paper industries) from 2000 - 2017 have been evaluated in Sweden, Finland, Spain, Germany, Romania and the Czech Republic.

The database for this analysis was the air emission inventories of the respective Member States according to the UNECE/LRTAP Convention and the NEC Directive, for the refineries sector complemented with energy balance data from Eurostat. Emissions in the inventories arise from activity data (AD) that is multiplied with an activity specific emission factor resulting in emissions in tonnes of pollutant. Emissions from industrial activities in the inventory are reported in two main sectors: combustion activities and industrial processes.

3. Field research

a. Open public consultation (OPC)

An online OPC offers an opportunity for interested individuals from any type of stakeholder groups to give their opinion on the main evaluation questions. The OPC was launched on the Commission's website[58].

The questionnaire started with an introduction of the Directive and the consultation process. It then presented a first set of questions that identified the respondent. It sought to understand the respondents' familiarity with the IED. The questionnaire included 20 questions about the IED. Respondents were able to answer all questions. However, there was a generic part targeted to the wider public and a specific section for participants with more extensive understanding including public authorities, business and trade organisations, NGOs, academia and relevant international organisations and third countries. Respondents had the opportunity to provide further comments in a free-text box.

Submissions to the OPC were analysed qualitatively and quantitatively. All multiple-choice questions were summarised for results by stakeholder group. A factual summary report highlighting the key outcomes of the consultation was published by the Commission in September 2019.[59]

b. Targeted stakeholder engagement: online survey

To gather information from stakeholders who have a good understanding of the implementation of the IED, a combination of targeted stakeholder consultation methods was used. A targeted online survey was used to gather the views of key groups of stakeholders, including Member State authorities (at any level of administration and IED implementation), industry (individual company or trade body) or other type of organisations (e.g. NGO, research body).

[58] https://ec.europa.eu/info/law/better-regulation/initiatives/ares-2018-4758971/public-consultation_en

[59] Available at: https://ec.europa.eu/info/law/better-regulation/initiatives/ares-2018-4758971/public-consultation_en

The questionnaire script was based on the relevant evaluation questions, but tailored to make the survey more user-friendly, and to reflect the relevant audience. The questionnaire included a range of semi-quantitative questions, based on a 5-point Likert scale, for assessing the degrees of options on an issue, and was complemented with open questions which allowed respondents to provide further explanations and wider opinions. The survey included questions grouped into 10 key themes relevant to the IED that are considered as part of the evaluation. The survey was available only in English.

The submissions to the online survey were analysed qualitatively and quantitatively. The analysis was done in parallel and with the same methodology as the OPC.

c. Targeted stakeholder engagement: interviews

Telephone interviews were used to complement the online survey and gather more in-depth views. The interviews were in two categories: stand-alone interviews with stakeholders not targeted by the online survey (e.g. EU institutions, such as EEA, JRC and relevant units of the Commission) and follow-up interviews with survey respondents who expressed an interest to further discuss their input to the survey. The interview questions built on the survey questionnaire but went into more details on specific points to ensure that more in-depth stakeholder insights were gathered, and specific data gaps were filled. Responses from interview were analysed.

d. Targeted stakeholder engagement: focus groups

A focus group discussion was organised in Brussels on 15 October 2019. This setting made it possible to consult a group of stakeholders in one setting with expertise on the effectiveness of the BREF process. Representatives of Member State authorities, industry associations and the NGO community took part. The focus group was invitation only and participants were selected in agreement with the Commission.

e. Stakeholder workshops

The first stakeholder workshop was organised in Brussels on 22 May 2019 and web streamed to access a wider audience. The aim of the workshop was to assist in gathering evidence, confirming the evaluation methodology, getting feedback from participants that no key issues are overlooked and raising awareness of the evaluation of the IED.

The second workshop took place on 17 December in Brussels which was also web streamed. The preliminary finding were presented and discussed with the stakeholders.

4. Robustness of the evidence

The level of credibility that can be placed in each source of information that has been used in the course of the evaluation varies. In principle, sources of information that are based on measured or reported information are believed to be quite certain. However, even in these cases the robustness depends on the correct measuring and reporting of the parameter concerned. It is assumed that even if there are errors, these are not systematic and there is not concerted manipulation.

In other cases, literature may draw itself on a lot of stakeholder opinion, or be based on a small sample or have other features that weaken its robustness.

Literature which originates from stakeholders with a particular vested interest are treated with greater caution. Such literature may selectively present information or present it in a certain manner to support an argument they wish to pursue.

Stakeholder opinion presents similar risks to stakeholder sourced literature. In their opinions stakeholders may be seeking to manipulate the results to support their preferred

outcome. In the case of this evaluation it is striking that industry generally has the most positive opinion on virtually all aspects among stakeholder groups. Conversely, NGOs and Others tend to have the least positive opinion. It is possible that this is an attempt to either lead to no change (probably industry desired outcome) or conclude that the legislation is insufficiently demanding (probably the NGO desired outcome). It seems relatively likely that Member States' opinions would be more objective, although individual Member States may also have specific outcomes in mind. It is therefore not surprising that Member States' opinions are largely found to lie between those of NGOs and industry.

Fortunately, stakeholder opinions can be compared across the different stakeholder groups and in view of their different interests, a composite stakeholder view can be derived that is probably more robust.

5. Level of confidence

A large amount of information sources have been used to answer the questions in the evaluation matrix. The level of confidence in the answers is a result of the robustness of each of the individual sources used and the degree to which the different sources could be used to corroborate each other.

The weakest confidence is considered to be associated with answers where the only information available is a stakeholder opinion. Because most questions are answered by all stakeholder groups, there is some certainty that these answers are not corrupted by a concerted effort to manipulate the findings. Where the different stakeholder opinions are largely convergent, we can probably have a higher confidence that they are less biased.

For many issues, the pure opinion expressed in the surveys can be supported and contrasted with the opinions expressed in interviews or in the case of the BREF process, in the focus group.

Where it is possible to compare findings from literature with stakeholder opinions, we begin to get a much higher degree of confidence in the findings.

The highest degree of confidence is provided where multiple sources of information corroborate each other and multiple stakeholder opinions. An example of that is the degree to which the IED has contributed to reducing emissions of pollutants to air. Here there is evidence from stricter emission limits, emissions reporting, a decomposition analysis for one sector and the view of all stakeholder groups.

Annex 6: Rating of robustness and stakeholder sentiment

Robustness of findings

As discussed in Annex 4, the degree of confidence that can be placed in the findings of the evaluation varies, depending on the information sources used and the degree of agreement among those different sources. To ease the reading of this document, a simple rating, **[High]**, **[Medium] or [Low]**, is provided to inform the reader without having to explain all of the underlying sources employed.

The ranking is based upon the robustness of each of the individual sources used and the degree to which the different sources could be used to corroborate each other. The criteria applied are as follows:

> **[High]** indicates that multiple independent sources of information corroborate each other and there is a good basis to compare with. This would often include official data or reports. Those are triangulated with multiple stakeholder opinions and found to agree. An illustration is the IED contribution to reducing emissions of pollutants to air. Here there is corroborating evidence from BAT-AELs in BREFs, stricter emission limits in permits, emissions reporting, a decomposition analysis for one sector and the view of all stakeholder groups.
>
> **[Medium]** indicates that either the underlying evidence is weaker or there are divergences between different sources or the absence of a clear baseline for comparison.
>
> **[Low]** generally indicates that there is no evidence other than stakeholder opinion.

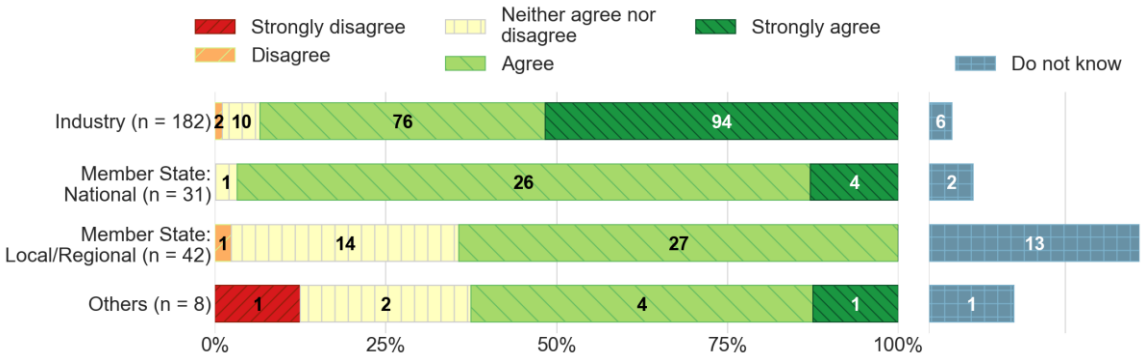
Stakeholder sentiment

As explained in Annex 3, a large amount of stakeholder opinions have been gathered. These are set out in full in the report of the supporting study to this evaluation. It is desirable to provide a simple overview of the views expressed by the four stakeholder groups (Industry, National authorities, Sub-national authorities and others (which includes environmental NGOs) and in particular the degree to which they converge or differ.

In the targeted survey there were around 70 5-point Likert scale type questions. These ask for stakeholder responses to a statement that range from strong agreement via neutral to strong disagreement. The approach that has been taken is to allocate a value to each of the 5 answers and to compile an average score for each stakeholder category. In some cases this is done for a single question and in other cases it is more appropriate to average over a number of questions (for example for the overall views on the five criteria).

To avoid misrepresentation of the responses through this simplification, a neutral answer is given the value of zero. Positive answers receive a positive value and negative ones a negative value.

A worked example is given below for responses to "*To what extent do you think that the IED has contributed to reducing and (as far as possible eliminating pollution arising from industrial activities?*" The graphic below shows the responses by stakeholder group:



Step 1: The stakeholder responses to the question are shown in tabular form including the total number of responses by stakeholder category.

Responses						
	Strongly agree	**Agree**	**Neither agree nor disagree**	**Disagree**	**Strongly disagree**	**Total responses**
Industry (IND)	*94*	*76*	*10*	*2*	*0*	182
National (MS)	*4*	*26*	*1*	*0*	*0*	31
Sub-national (REG)	*0*	*27*	*14*	*1*	*0*	42
Other (OTH)	*1*	*4*	*2*	*0*	*1*	8

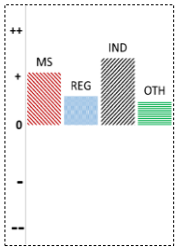
Step 2: The scoring for each answer category is multiplied by the number of responses for each to each category. These scored responses are then summed to give a total score for each stakeholder category.

Scoring of the responses (number of responses times score)						
	Strongly agree	**Agree**	**Neither agree nor disagree**	**Disagree**	**Strongly disagree**	**Category sum score**
Score	**+2**	**+1**	**0**	**-1**	**-2**	
IND	*188*	*76*	*0*	*-2*	*0*	**262**
MS	*8*	*26*	*0*	*0*	*0*	**34**
REG	*0*	*27*	*0*	*-1*	*0*	**26**
OTH	*2*	*4*	*0*	*0*	*-2*	**4**

Step 3: The total sum score for each answer stakeholder category is divided by the total number of responses for that category. The result (in the right hand column of the table below) is a score representing the average of the overall answers given by that stakeholder category. This can be equated with the raw scores given to each answer, i.e. above 1 represents "agree", 0 represents neither agree nor disagree and a negative value represents disagreement.

Normalising score for number of answers (score divided by total responses for the group)			
Category	**Total sum score**	**Total responses**	**Final sentiment score**
IND	262	182	1.4
MS	34	31	1.1
REG	26	42	0.6
OTH	4	8	0.5

The resulting scores for the four categories (Industry: IND, National: MS, Sub-national: REG, Other: OTH) are then shown graphically against a scale ranging from ++ to --. The equivalent values are ++: 2, +: 1, 0: 0, -: -1 and --: -2. The resulting graphic for the illustrated values [MS (red) 1.1; REG (blue) 0.6; IND (grey) 1.4; OTH (green) 0.5] is as follows:



Annex 7: Overview of costs and benefits identified in the evaluation

		Citizens		Businesses		Administrations	
		Qualitative	**Quantitative / monetary**	**Qualitative**	**Quantitative / monetary**	**Qualitative**	**Quantitative / monetary**
Benefit	**Expected from combined permitting**			From 2007 IA (all EU)	€30m *(shared with administrations)*		
Benefit	**Expected from streamlining of monitoring and reporting**			From 2007 IA (all EU)	€2m *(shared with administrations)*		
Benefit	**Expected reduction in administrative burden in Member States**			From 2007 IA (all EU)	€150-300m *(shared with administrations)*		
Cost	**Expected from extension of the scope of the Directive**			From 2007 IA (all EU)	€19m	From 2007 IA (all EU)	€18m
Cost	**Expected from actions to strengthen compliance and increase environmental improvements**			From 2007 IA (all EU)	€14m	From 2007 IA (all EU)	€26m
Cost (annual)	**Expected cost of permit reconsideration**					From 2007 IA (all EU)	5 yearly: €22–80m 10 yearly: €11–40m 15 yearly: €7–27m
Cost (annual)	**Expected cost of inspections**					From 2007 IA (all EU)	€80m/year
Cost (per-BREF)	**Expected cost of production of BREF**					From 2007 IA (all EU)	€5-10m

Cost (one-off)	**Baseline report (estimate based on 50 steel works and 197 Electric Arc Furnaces)**					Based on survey responses (all EU)	€19.9m [Low robustness]
Cost (per-BREF)	**Production of BREF**			Based on survey responses (all EU)	€1.6-13m [Medium robustness]	Based on survey responses (all EU)	€1.8-7.4m [Medium robustness]
Cost (one-off)	**Cost of permit reconsideration (estimate based on 50 steel works and 197 Electric Arc Furnaces)**					Based on survey responses (all EU)	€14.9m [Low robustness]
Cost (annual)	**Investment costs to comply with Iron and Steel BAT conclusions**			From detailed study (all EU)	€134m [High robustness]		
Cost (annual)	**Monitoring costs (estimate based on 50 steel works and 197 Electric Arc Furnaces)**					Based on survey responses (all EU)	€5.5m [Low robustness]
Cost (annual)	**Inspection costs (estimate based on 50 steel works and 197 Electric Arc Furnaces)**					Based on survey responses (all EU)	€4.5m [Low robustness]
Cost (annual)	**Administration BAT conclusions implementation cost**					Based on survey responses (all EU)	€5.5m [Low robustness]
Benefit (annual)	**Benefit from reduced emissions to air from compliance with Iron and Steel BAT conclusions**	From detailed study (all EU)	€932m [High robustness]				
Cost (annual)	**Investment costs to comply with IED Large Combustion Plant emission limits to air (solid fuel >300MWth)**			From detailed study (all EU)	2020: €1.0bn 2025: €0.75bn [Medium robustness]		
Benefit	**Benefit from reduced emissions to**	From	2020: €11.2bn				

(annual)	**air of compliance with IED Large Combustion Plant emission limits (solid fuel >300MWth)**	detailed study (all EU)	2025: €9.9bn [Medium robustness]				
Cost (annual)	**Investment costs in 2025 to comply with Large Combustion Plant BAT conclusions for emissions to air (solid fuel >300MWth)**			From detailed study (all EU)	Upper BAT-AEL: €0.59bn Lower BAT-AEL: €5.7bn [Medium robustness]		
Benefit (annual)	**Benefit in 2025 from reduced emissions to air of compliance with Large Combustion Plant BAT conclusions (solid fuel >300MWth)**	From detailed study (all EU)	Upper BAT-AEL: €3.4bn Lower BAT-AEL: €14.2bn [Medium robustness]				

Annex 8: Coherence with related EU legislation

The IED has a large number of interactions with other legislation and its coherence with them was assessed during the evaluation. It is to be noted that whilst there may be coherence regarding the objectives to achieve, it is not excluded that ambition levels may be different, as is discussed in Section 2.7 in relation to the European Green Deal. A brief summary of the interactions and the issues identified is given below:

With regard to the **National Emission Ceilings Directive (NECD)**, the modelling to set achievable reductions was based in part on assumptions of the use of BAT in industry. BAT conclusions contribute to achieving the reduction targets set under the NECD. However, there is no evidence of Member States systematically choosing to set stricter requirements for IED sectors to contribute to national emission ceilings.

Regarding the **European Pollutant Release and Transfer Register** (**E-PRTR)** a primary coherence issue is the divergence between the sectors covered. In addition, the value of the data reported is reduced because of the E-PRTR's high emission thresholds. Furthermore, the E-PRTR scope is limited to the pollutants listed in its annexes, which have not been adapted to technical progress, e.g. regarding emerging environmental issues, such as per- and poly-fluoroalkyl substances (PFAS). Another issue is that emissions reported in E-PRTR correspond to the facility level which may include several IED installations.

Concerning the **Aarhus** legislation, issues have been flagged as to whether the provisions of the IED have been correctly implemented to give full effect to the rights of access to information and public participation in decision making. The draft findings of the Aarhus Compliance Committee[60] refer in particular to a lack of public participation with regard to reconsiderations and updates of permits under Article 21 (3), (4), (5)(b) and (5)(c) of the IED, failing to comply with Article 6(10) of the Convention.

Regarding water legislation, there are issues about allowing priority hazardous substances to be emitted based on the use of BAT, compared with the **Water Framework Directive**'s ultimate aim to eliminate their emissions. There are also problems with the practical implementation of the interactions between IED installations and urban waste water treatment plants, because water treatment plants are mostly not fit for treating industrial waste waters and the relevant IED provision lacks clarity.

A specific issue is the coherence with **climate legislation**. At present, there does not seem to be any incoherence, since Article 9 of the IED prohibits setting ELVs for GHGs for installations under the EU ETS. However, it can be questioned whether this will be appropriate in the future, given the European Green Deal ambition. It needs to be

[60] ACCC (2019), "Draft findings and recommendations with regard to communication ACCC/C/2014/121 concerning compliance by the European Union", www.unece.org/environmental-policy/conventions/publicparticipation/aarhus-convention/tfwg/envppcc/envppcccom/acccc2014121-europeanunion.html

considered whether coherence challenges will arise in relation to future decarbonisation techniques and their impact on pollutant and GHG emissions.

Regarding the coherence of **energy efficiency** measures and the EU ETS, this has been debated widely in the past. The interaction of the two does not alter the GHG emissions reduction that will be achieved by the ETS (which is determined by the cap[61]), but may weaken the price signal. In view of this, there might have been impacts from EU energy efficiency measures such as those in the IED. However, despite our attempts to gather evidence on energy savings caused by BAT conclusions, we have no information on whether this has happened and therefore also not on the impact this might have had on GHG emissions. Consequently, we cannot draw any conclusions on this.

Energy use, which is to a degree a proxy for GHG emissions, is a factor taken into account when defining BAT, e.g. a technique reducing emissions of an air pollutant but requiring an unreasonable amount of energy would likely not be considered as BAT. This also means that a decarbonisation technique that has a positive overall environmental outcome (e.g. also reducing pollutant emissions to air), would qualify for considering as BAT under IED.

Regarding the **Montreal Protocol**, chlorofluorocarbon (CFC) and hydrofluorocarbon (HFC) emissions, have been addressed where appropriate – e.g. in the Food, Drink and Milk BAT conclusions.

Regarding the **Environmental Crime Directive (ECD)**, the penalties established under the IED, implemented after the ECD entry into force, should have been set consistent with it. However, this has not been assessed.

With regard to **REACH**, the evaluation of that legislation did not find any incoherence with the IED. No problems were identified and several consulted stakeholders, including industry respondents were less concerned, noting that there are no links between REACH and IED, except that the environmental permit needs to disclose the use of hazardous chemicals.

[61] https://ec.europa.eu/clima/policies/ets/cap_en

Annex 9: Summary of outstanding problems with the IED implementation (March 2020)

Outstanding cases	
Member State	**Current status**
	Non conform transposition
Austria	Commission assessing response to EU pilot
Czech Republic	Commission assessing response to EU pilot
Bulgaria	Letter of formal notice sent
Germany	Commission assessing response to EU pilot
Denmark	Commission assessing response to EU pilot
Croatia	Commission assessing response to EU pilot
Finland	Commission assessing response to EU pilot
Latvia	Commission assessing response to EU pilot
Portugal	Commission assessing response to EU pilot
Slovenia	Commission assessing transposition measures
Sweden	Commission assessing response to EU pilot
Slovakia	Commission assessing response to EU pilot
Poland	Commission assessing response to EU pilot
Greece	Letter of formal notice sent
	Bad implementation
Italy	ILVA Steel plant in Taranto – Breach of IPPCD AND IED
Romania	Breach of IED relating to lack of permits and compliance of 2 plants under TNP

Annex 10: List of relevant EU legislation

Term used	*Legislation title*
IPPCD	Directive 2008/1/EC concerning integrated pollution prevention and control (based on the original Directive 96/61/EC)
IPPCD implementation reporting	Commission Implementing Decision (2011/631/EU) of 21 September 2011 establishing a questionnaire to be used for reporting on the implementation of Directive 2008/1/EC of the European Parliament and of the Council concerning integrated pollution prevention and control.
LCPD	Directive 2001/80/EC on the limitation of emissions of certain pollutants into the air from large combustion plants
WID	Directive 2000/76/EC on the incineration of waste
SED	Directive 1999/13/EC on the limitation of emissions of volatile organic compounds due to the use of organic solvents in certain activities and installations
	Council Directive 78/176/EEC on waste from the titanium dioxide industry
	Council Directive 82/883/EEC on procedures for the surveillance and monitoring of environments concerned by waste from the titanium dioxide industry
	Council Directive 92/112/EEC on procedures for harmonising the programmes for the reduction and eventual elimination of pollution caused by waste from the titanium dioxide industry
IED	Directive 2010/75/EU on industrial emissions (integrated pollution prevention and control) - The Industrial Emissions Directive
Decision setting up the Forum	Commission Decision of 16 May 2011 establishing a Forum for the exchange of information pursuant to Article 13 of the Directive 2010/75/EU on industrial emissions
BREF Guidance	Commission Implementing Decision (2012/119/EU) of 10 February 2012 laying down rules concerning guidance on the collection of data and on the drawing up of BAT reference documents and on their quality assurance
First IED Reporting Decision	Commission Implementing Decision (2012/795/EU) of 12 December 2012 establishing the type, format and frequency of information to be made available by the Member States for the

	purposes of reporting on the implementation of Directive 2010/75/EU
Second IED Reporting Decision	Commission Implementing Decision (EU) 2018/1135 of 10 August 2018 establishing the type, format and frequency of information to be made available by the Member States for the purposes of reporting on the implementation of Directive 2010/75/EU (repealing Commission Implementing Decision 2012/795/EU)
E-PRTR	European Pollutant Release and Transfer Register Regulation (EC) No 166/2006
INSPIRE Directive	Directive 2007/2/EC of the European Parliament and of the Council of 14 March 2007 establishing an Infrastructure for Spatial Information in the European Community.
EU ETS	Directive (EU) 2018/410 amending Directive 2003/87/EC of the European Parliament and of the Council of 13 October 2003 establishing a system for greenhouse gas emission allowance trading within the Union.
Effort Sharing Regulation	Regulation (EU) 2018/842 of the European Parliament and of the Council of 30 May 2018 on binding annual greenhouse gas emission reductions by Member States from 2021 to 2030 contributing to climate action to meet commitments under the Paris Agreement.
Monitoring and Reporting Regulation	Commission Regulation (EU) No 601/2012 of 21 June 2012 on the monitoring and reporting of greenhouse gas emissions pursuant to Directive 2003/87/EC of the European Parliament and of the Council.
Seveso Directive	Directive 2012/18/EU of the European Parliament and of the Council of 4 July 2012 on the control of major-accident hazards involving dangerous substances, amending and subsequently repealing Council Directive 96/82/EC.
REACH	Regulation (EC) No 1907/2006 of the European Parliament and of the Council of 18 December 2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH), establishing a European Chemicals Agency.
NECD	Directive (EU) 2016/2284 of the European Parliament and of the Council of 14 December 2016 on the reduction of national emissions of certain atmospheric pollutants.
Ambient Air Quality Directive	Directive 2008/50/EC

Water Framework Directive	Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy.
Environmental Quality Standards Directive	Directive 2008/105/EC of the European Parliament and of the Council of 16 December 2008 on environmental quality standards in the field of water policy (amended by Directive 2013/39/EU).
Nitrates Directive	Directive 91/676/EEC
Groundwater Directive	Directive 2006/118/EC of the European Parliament and of the Council of 12 December 2006 on the protection of groundwater against pollution and deterioration
Waste Framework Directive	Directive 2008/98/EC of the European Parliament and of the Council of 19 November 2008 on waste.
Landfill Directive	Council Directive 1999/31/EC of 26 April 1999 on the landfill of waste.
Medium Combustion Plants Directive (MCPD)	Directive (EU) 2015/2193 of the European Parliament and of the Council of 25 November 2015 on the limitation of emissions of certain pollutants into the air from medium combustion plants.

Annex 11: Reference list (main sources)

This list shows the main sources of work carried out for the Commission which were used as evidence underpinning this evaluation[62]. All reports can be found under the following link: https://europa.eu/!nY63hc.

1. Ricardo Energy & Environment, Umweltbundesamt (AT), Milieu (2020), "Support to the evaluation of the Industrial Emissions Directive (Directive 2010/75/EU"
2. Eunomia Research & Consulting (2019), "An Assessment of IED Permitting Stringency"
3. European Commission, DG Environment (2019), BAT AEL tool
4. Ricardo Energy & Environment, Umweltbundesamt (AT), VITO (2019), "Environmental Performances of Technologies Used in MCPs"
5. Ricardo Energy & Environment (2019), "IED Implementation Report 2013 - 2016"
6. Ricardo Energy & Environment, VITO (2019), "IED Contribution to the circular economy"
7. Ricardo Energy & Environment, Umweltbundesamt (AT), VITO, ELLE (2018), "Key Environmental Issues"
8. ICF, Aether (2018), "Indicators for Industrial Emissions Policy"
9. Ricardo Energy & Environment (2018), "Summary on IED Contribution to Water Policy**"**
10. Ricardo Energy & Environment (2018), "Industrial emissions policy country profiles"
11. Ricardo Energy & Environment, Umweltbundesamt (AT), VITO, ELLE (2018), "Ex-post assessment of costs and benefits from implementing BAT under the Industrial Emissions Directive"
12. AMEC, REC (2018), "Application of IED Article 15(4) derogations"
13. Ricardo Energy & Environment, TNO, ECN, VITO (2017), **"**Technical support for developing the profile of certain categories of Large Combustion Plants regulated under the Industrial Emissions Directive"
14. European Commission (2016), "IED Success Stories"
15. AMEC, Milieu (2016), "Assessment and summary of the Member States implementation reports for the IED, IPPCD, SED and WID"
16. Ricardo Energy & Environment, EMRC, VITO (2016), "Analysis and development of methodologies for estimating potential industrial emissions reductions and compliance costs of BAT conclusions adopted under the Industrial Emissions Directive"
17. ICF (2015), "Information Exchange on Emerging Techniques"
18. AMEC (2015), "Assessing the potential emission reductions delivered by BAT conclusions"
19. AMEC, Bio Intelligence Service, Milieu, IEEP, REC (2014), "Contribution of industry to pollutant emissions to air and water"

[62] The complete list of references can be found in the evaluation support study [1].

20. ICF (2013), “IED Article 30(9) Review (LCP)”
21. AMEC (2012), “Guidance on Baseline Report”
22. Milieu (2011), “Provisions on penalties related to legislation on industrial installations”
23. AMEC, IOM, Aether (2011), “Industrial emissions of nanomaterials and ultrafine particles”