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PART 2/5

COMMISSION STAFF WORKING DOCUMENT

IMPACT ASSESSMENT REPORT

Accompanying the documents

Proposal for a
DIRECTIVE OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL
amending

Directive 2010/75/EU of the European Parliament and of the Council of 24 November 2010 on industrial emissions (integrated pollution prevention and control) and Council Directive 1999/31/EC of 26 April 1999 on the landfill of waste

and

Proposal for a
REGULATION OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL
on reporting of environmental data from industrial installations and establishing an Industrial Emissions Portal

{COM(2022) 156 final} - {SEC(2022) 169 final} - {SWD(2022) 110 final} -
{SWD(2022) 112 final}

Annex 1: Procedural information

1. LEAD DG, DECIDE PLANNING/CWP REFERENCES

The preparation of this file was led by DG Environment (ENV), with support from DG Joint Research Centre B.5's European IPPC Bureau (JRC.B.5).

The file essentially comprises a revision of existing "industrial emissions" EU legislation: the Industrial Emissions Directive (2010/75/EU) and Regulation (EC) 166/2006 on the European Pollutant Release and Transfer Register (E-PRTR).

The E-PRTR provides the most important reporting tool to track the reduction of pollutants to air, water and soil from IED (agro-)industrial installations via the IED's implementation, as well as some (agro-)industrial sectors which lie outside of the scope of the relevant annexes of the IED. Additionally, the E-PRTR has lower reporting thresholds for some activities than those that govern inclusion within the IED regime of permit-based application of "Best Available Techniques" and pollution prevention and control technologies.

This overall "industrial emissions" revision takes into account the two separate evaluations that were performed for the two legal instruments (E-PRTR and IED), and incorporates as many as possible of those recommendations that have resulted from those evaluations. In addition, the objective of the "two-in-one" revisions of existing EU "industrial emissions" legislation is to update the two instruments to be able to deliver the aims and targets of the wide-ranging and overarching policy aims as described in Section 2 (below).

Since this file comprises two combined sub-initiatives, they were included as two discrete items in the DECIDE/Agenda Planning database, as follows:

Commission proposal for revising the Industrial Emissions Directive (IED)	PLAN/2020/6608
Commission proposal for the revision of the E-PRTR regulation	PLAN/2020/8555

2. ORGANISATION AND TIMING

This joint "industrial emissions" initiative is a deliverable under the European Green Deal[1], the Zero Pollution Action Plan[2], the Circular Economy Action Plan[3] (CEAP) and has strong

[1] COM(2019) 640 final https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52019DC0640

[2] COM(2021) 400 final https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52021DC0400&qid=1623311742827

[3] COM(2020) 98 final https://eur-lex.europa.eu/resource.html?uri=cellar:9903b325-6388-11ea-b735-01aa75ed71a1.0017.02/DOC_1&format=PDF

links to the revised May 2021 Industrial Strategy for Europe[4], which in turn built on the 2020 Industrial Strategy.[5]

For E-PRTR, the **Inception Impact Assessment Roadmap** was published on 28 September 2020 with a feedback period until 26 October 2020[6].

For the IED, the **Inception Impact Assessment Roadmap** was published on 24 March 2020 with a feedback period until 21 April 2020[7].

The Inter Service Steering Group (ISSG) for the Impact Assessment was set up by the DG Environment. It included the following DGs and services: AGRI (Agriculture), CLIMA (Climate Action), ENER (Energy), ESTAT (Eurostat), FISMA (Financial Stability, Financial Services and Capital Markets Union), GROW (Internal Market, Industry, Entrepreneurship and SMEs), JRC (Joint Research Centre), JUST (Justice and Consumers), MARE (Maritime Affairs and Fisheries), RTD (Research and Innovation), SANTE (Health and Food Safety), SJ (Legal Service), TAXUD (Taxation and Customs Union) as well as ECHA (European Chemicals Agency) and the EEA (European Environment Agency). Meetings were organised between autumn 2020 and autumn 2021.

The ISSG discussed the Inception Impact Assessments from both the IED and E-PRTR sub-initiatives. Already at the first ISSG meeting (15.9.2020), it was decided to merge the Open Public Consultation process for the two sub-initiatives (see Annex 2). All ISSG meeting have covered both sub-initiatives to maximise the interaction and synergies between the two existing legal instruments, and their subsequent evolution. The ISSG meetings have discussed the main milestones in the joint process, in particular evidence gathering, coherence with other ongoing draft legislative initiatives, the consultation strategy and main stakeholder consultation activities. The ISSG has been consulted regarding, and has given input to, key deliverables from the support study, and the combined IED / E-PRTR draft Impact Assessment report prior to its submission to the Regulatory Scrutiny Board (RSB).

3. CONSULTATION OF THE REGULATORY SCRUTINY BOARD (RSB)

An informal upstream meeting with the RSB took place on 7 October 2020.

After final discussion with the ISSG, a draft of the impact assessment was submitted to the RSB on 10 November and discussed at a meeting with the RSB on 8 December 2021.

Following the positive opinion of the RSB, changes were made to the IA in order to reflect the recommendations of the Board. Table A1-1 presents an overview of the RSB's comments and how these have been addressed.

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4 COM(2021) 350 final https://ec.europa.eu/info/sites/default/files/communication-industrial-strategy-update-2020_en.pdf

5 COM(2020) 102 final https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1593086905382&uri=CELEX%3A52020DC0102

6 https://ec.europa.eu/info/law/better-regulation/have-your-say/initiatives/12583-Industrial-pollution-European-Pollutant-Release-and-Transfer-Register-updated-rules-_en

7 Industrial emissions – EU rules updated (europa.eu)

Table A1-1: How RSB comments have been addressed

RSB comments	How addressed
Main findings	
1. The report does not sufficiently explain how the revised IED and E-PRTR will interact with and support other legislation.	Additional sub-sections have been introduced in section 1 of the main report explaining the interaction of respectively the IED and the E-PRTR Regulation with relevant legal instruments. Related considerations have been fine-tuned in the rest of the impact assessment, including in Section 8 presenting the preferred policy package and its impacts.
2. The report is not clear how the 25 measures under the option supporting 'more effective legislation' have been chosen and why no alternative measures are envisaged.	For better clarity on the nature of the options and the policy decisions they entail, Option 1 has been split into four sub-options, two of which include alternatives related to some key measures. Further explanations concerning the process that has led to retaining measures has been provided.
3. The report is not clear on some relevant impacts of the envisaged measures, in particular on industrial competitiveness, Member States and consumers.	The description of potential impacts has been reviewed and clarified, where additional information was available, it has been added.
What to improve (comments summarised)	
1. The report should expand and strengthen its analysis of the coherence between the revised IED and E-PRTR and other legislation. It should improve its explanation of the interaction with the EU Emissions Trading System and be clearer about any overlap (or synergy) with the Common Agricultural Policy when it comes to adjustment costs. It should explain how IED would interact with the Effort Sharing Regulation (ESR) given that it is an EU-wide horizontal instrument imposing binding GHG reduction requirements on specific operators and sectors, while the ESR sets an overall reduction target but leaves it to Member States to determine the appropriate national mix. It should, for example, explain how methane emissions (potentially covered by both instruments) would be tackled.	As per finding 1 above. Furthermore: • The interaction of IED with the ETS has been revised in the problem definition. • The assessment of sub-option PO5-a includes explanation on eligibility of farms' adjustment costs under the CAP. • The contribution to FF55 and the longer term decarbonisation goals is discussed in section 8, presenting the preferred policy package and its impacts.
2. The report should consider alternatives for the package of 25 measures in the option supporting more effective legislation (option 1). Many of these measures are contentious or are not merely clarifying ambiguous provisions but are clearly increasing ambitions. The report should consider all options that are likely to emerge in the legislative process, including a more restricted package of measures.	As per finding 2 above.
3. The report should further develop the analysis of competitiveness impacts on industry (taking into account the high – in absolute terms – compliance costs even with only partial quantification) and assess the risk that operators may outsource their production to third countries. In particular, it should assess more thoroughly the impacts on competitiveness of the newly included industry sectors (e.g. livestock farms) and the risk that EU production will be substituted by third-country imports (benefitting from less stringent production requirements).	As per finding 3 above. The discussion of competitiveness has been extended, both in the introductory section and by introducing additional sub-sections on competitiveness impacts in the relevant sections summarising the assessment. Where costs could be quantified, this includes the discussion of their comparative relevance, including for livestock farms.

RSB comments	How addressed
4. The report should better explain, and present transparently, impacts on consumer prices (in terms of potential cost pass-through) and on third countries. It should clearly identify and analyse the impacts by Member State to reveal whether the implementation burden falls unevenly. It should assess territorial impacts, as the envisaged inclusion of the livestock sector is likely to affect in particular rural areas.	As per finding 3 above. The discussion of impacts has been extended in the assessment sections to better understand the likelihood of impacts on consumer prices, where available information allowed a comparative analysis of costs.
5. When it comes to the proportionality of the measures considered, the report should more clearly account for the fact that for some of the benefits there is a higher level of uncertainty that they will materialise when compared with the costs. The report also needs to explain better the combined impact (any synergies	The sections discussing proportionality have been expanded to better explain the assessment. In particular, the reasoning to set the threshold for covering livestock farms was added, which includes proportionality as a key parameter. The discussion of synergies between the package and climate policies has been expanded, notably in Section 8 presenting the preferred impacts and its impacts.
6. The report should be more explicit about any possible implementation issues and whether the necessary resources will be available across all Member States to ensure the consistent and effective implementation of the revised instruments.	Experience concerning availability of resources to Member States' competent authorities has been addressed in Section 1. The description of the proposed tailored permit for livestock farms has been enhanced, as well as the discussion of what this means in terms of alleviated administrative procedure for the Member States.
7. The report should better reflect the diversity of stakeholder views through the analysis and indicate how dissenting or minority views have been taken into account.	References to stakeholder views have been systematically expanded in the main report and a detailed overview of stakeholder views has been incorporated in Annex 2.

4. EVIDENCE, SOURCES AND QUALITY

To support the analysis of the different options, the European Commission awarded two **support contracts** to external experts.

For the IED Impact Assessment support, the consortium of consultants comprised: Trinomics B.V. (Consortium Lead), with Ricardo plc (Lead for the Specific Assignment), supported by VITO (Flemish Institute for Technological Research) NV, Wood plc and E3Modelling SA.

For the E-PRTR Regulation Impact Assessment support, the consortium of consultants comprised: RPA Europe srl and Risk Policy Analysts (RPA) (Lead for the Specific Assignment), Air Quality Consultants (AQC) and Aether, supported by Ökopol and ERG.

Evidence was compiled from the evaluation reports of the IED[8] and the E-PRTR[9], as well as via specific desk studies and data collection performed as sub-assignments, feeding into the overall impact assessment work.

Further information is given regarding the evidence bases compiled by the external consultants in the following annexes:

- Annex 8 (IED) – Shortlisted measures

[8] SWD(2020)181 final available at https://europa.eu/!HP74fW
[9] SWD(2017)710 final available at https://europa.eu/!bC98wG

- Annex 9 (E-PRTR) – Shortlisted measures; and
- Annex 10 (combined impact assessment of all options).

In addition, extensive consultation of stakeholders was carried out by the two teams of external experts, as detailed in:

- Annex 2 (Stakeholder consultation synopsis)

The two teams of external expert consultants worked in close cooperation with the European Commission throughout the different phases of the study, and partly in consultation with one another throughout the process, particularly in the latter stages of assembling a coherent evidence base and in assessing, screening and adjusting policy measures and options.

Annex 2: Stakeholder consultation

INTRODUCTION

The impact assessment accompanying the combined revision of the Industrial Emissions Directive (IED) and E-PRTR (European Pollutant Release and Transfer Register) Regulation was subject to a thorough consultation process. This included a variety of different consultation activities aimed at gathering the views of all relevant stakeholders and ensuring that the views of different organisations and stakeholder types were presented and considered.

This Annex describes the consultation activities that have taken place and presents a summary of views.

Part 1: Description of consultation activities

1. CONSULTATION ACTIVITIES - IED

- IED solely - feedback period via the Commission's "Have Your Say" interactive portal on the published **Inception Impact Assessment**[1] (154 responses; consultation period 24 March 2020 to 21 April 2020)

- Joint IED and E-PRTR **Public Consultation**[2] - online survey via the Commission's "Have Your Say" interactive portal (336 responses; 20 December 2020 to 23 March 2021). The survey contained 24 questions, four of which directly concerned the E-PRTR. Most were 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 "I don't know" to avoid forcing respondents into giving an opinion that they might not feel qualified giving. Five questions were open-ended, including one open question at the end, which asked the respondents for any further relevant feedback, information, or opinions they wished to share. It should be noted that respondents were able to provide comments to most questions by selecting "Other".

- IED solely - **Targeted Stakeholder Survey (TSS)**[3] consultation, which consisted of an online survey of a more detailed nature (235 responses; 8 February 2021 to 9 April 2021). The TSS questionnaire was developed in discussion and agreement with the European Commission including the Inter-Service Steering Group (ISSG). The TSS was by invitation only, to organisations with a known stake in the IED.

  The electronic questionnaire was launched using the online tool "Survey Monkey", pdfs and guidance regarding the questionnaire were hosted on a dedicated website[4] of the lead consultant, Ricardo. This consultation was carried out to enhance further the

[1] https://ec.europa.eu/info/law/better-regulation/have-your-say/initiatives/12306-Industrial-emissions-EU-rules-updated_en

[2] https://ec.europa.eu/info/law/better-regulation/have-your-say/initiatives/12583-Industrial-pollution-European-Pollutant-Release-and-Transfer-Register-updated-rules-_en

[3] https://cdn.ricardo.com/ee/media/assets/ied-ia_tss_1.pdf

[4] Revision of the industrial emissions directive – consultations (ricardo.com)

evidence base through the collection of more specialised feedback from targeted stakeholder groups on **six problem areas**, grouped by the options under consideration for the impact assessment study[5]. These problem areas are:

1. The environment is polluted (split by zero pollution ambition and non-toxic environment)
2. Climate crisis is happening
3. Natural resources are being depleted
4. Innovation - State of the art techniques cannot respond satisfactorily to problem areas 1 to 3 (above)
5. Private individuals have limited opportunities to get informed about, and take action regarding impacts caused by agro-industrial plants
6. Excessive burdens may affect the efficiency of policy instrument(s)

The questionnaire script included a number of multiple-choice questions. In many cases, respondents had the option to select an "other" option and then there was an opportunity to provide an open text response giving further information about this "other" option, or to provide further information about the response to the preceding multiple-choice question. At the end of the questionnaire, respondents also had an opportunity to provide any additional comments and to upload any supporting evidence.

Of the total 235 responses received, most of the respondents (71%) represented industry views, 21% were Member State representatives (split by national and local/regional), 3% were environmental NGOs and 5% were classified as 'Other'.

- IED and E-PRTR – Targeted stakeholder engagement via one-to-one interviews, carried out with key stakeholders from June to September 2021, to complement the other stakeholder activities and to ensure more in-depth views, specifically:
  - To gain more specific feedback, as required, on identification of options
  - To fill specific data gaps identified for the impact assessment.
- IED and E-PRTR - Targeted stakeholder engagement via **focus groups,** held in June-August 2021. The focus groups enabled stakeholders to engage in discussions at greater depth on key emerging themes. Stakeholders were selected based on their sectoral representation and a good geographical and stakeholder type distribution between environmental NGOs, industry representatives and Member States' Ministries and Competent Authorities was ensured to enable balanced discussions.
- Joint IED and E-PRTR: Two **Stakeholder Workshops** were held remotely via online meeting webinars on 15 December 2020 (IED = 350 persons registered; 253 attended; E-PRTR = 236 registered; 195 attended) and 7-8 July 2021 (IED = 395 registered; 278 attended; E-PRTR = 266 registered; 165 attended).

[5] These initial problem areas were subsequently re-structured into five problems during the latter preparation stages of this Staff Working Document. They cover the same issues with a slightly different breakdown, but the insights were easily mapped across from input reports and thus employed in the production of this SWD and associated external consultants' reports.

2. STAKEHOLDER GROUPS PARTICIPATING IN CONSULTATIONS - IED

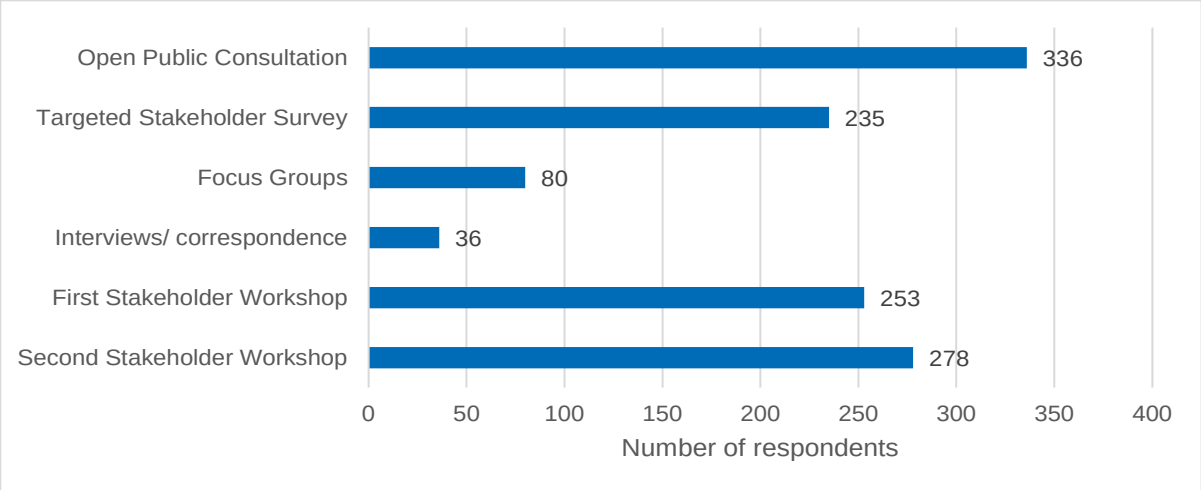
Table A2-1 below summarises the types of stakeholders who participated in the various stakeholder consultation activities.

Table A2-1: Stakeholder groups and sub-groups participating in IED-related consultations

Stakeholder Group	Stakeholders
1. Public authorities within EU Member States	• National level Member State Authorities • Regional/ local Member State Authorities
2. Industry	• Key industries involved in the IED • Business and trade associations for sectors under the scope of the IED • Individual operators of large agro-industrial plants • Technology providers
3. Other	• Environmental NGOs (main interlocutor – the European Environment Bureau, with additional climate and standards environmental NGOs) • General public/ private individuals • Workers' associations/ trade unions • Existing IED platforms, including the Industrial Emissions Expert Group (IEEG), the IED Article 13 Forum • European Commission and other EU services and expert groups/networks, such as JRC, ECHA, EEA • Technical experts, academics and research institutes • Third parties and countries with links to the IED

Figure A2-1 below illustrates the overall numbers of respondents per IED consultation activity, post-Inception Impact Assessment (noting that the Open Public Consultation and Stakeholder Workshops were joint IED/ E-PRTR consultation activities).

Figure A2-1: IED-related consultations and numbers of participants

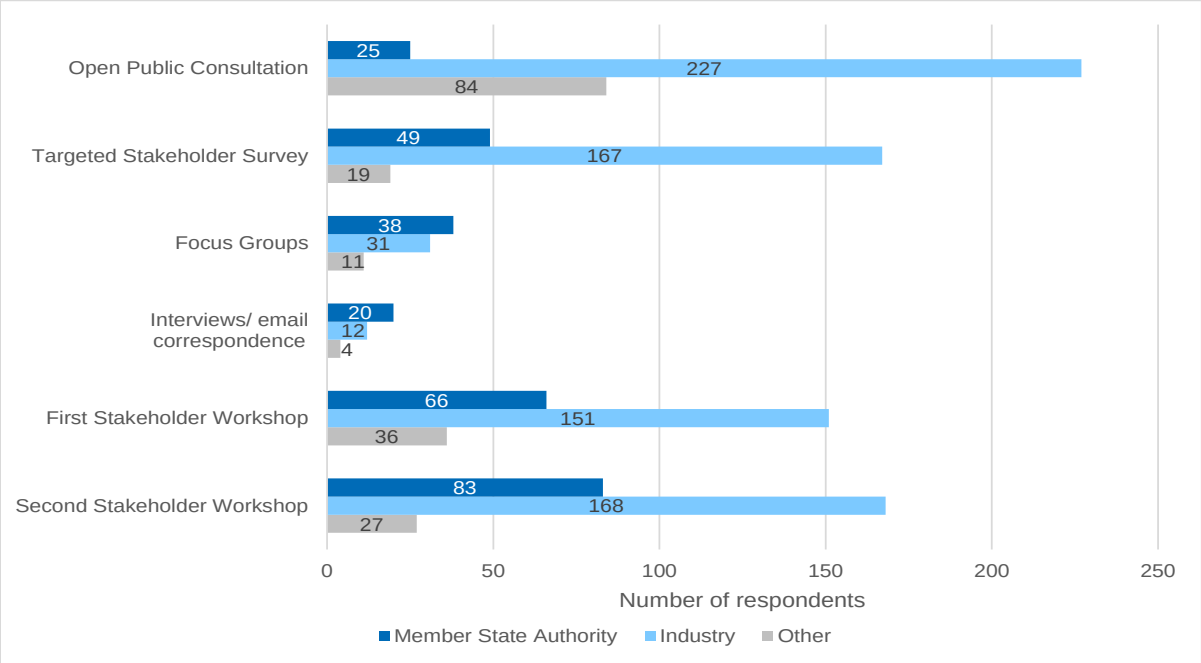


Furthermore, a breakdown of the proportion of the types of stakeholders participating in each of the consultation activities is illustrated in Figure A2-2. Figure A2-2 illustrates that there was a preponderance of industry representatives responding to, and interacting with, the

consultation activities, followed as a proportion by Member States' Authorities, and then a smaller share of "other" respondents (environmental NGOs, members of the general public, specialist independent/ consultancy/ think-tank experts, etc).

Throughout the analyses of the results, efforts have been made to compensate for the over-representation of industry and Member State respondents by not quoting pie charts of overall responses as if they were representative of a homogeneous "population" of participants. Instead, population groups are analysed separately, to explore the variations between the separate groups of respondents.

Figure A2-2: IED Consultations and breakdown of stakeholder participants by overall groups



3. CONSULTATION ACTIVITIES - E-PRTR

- E-PRTR solely - feedback period via the Commission's "Have Your Say" interactive portal on the published **Inception Impact Assessment**[6] (37 responses; consultation period 28 September to 26 October 2020)
- Joint IED and E-PRTR **Open Public Consultation**[7] (336 responses) – as in "IED" section above.
- E-PRTR solely - **Targeted Stakeholder Survey (TSS)**[8], consisting of an online survey of a more detailed nature (161 responses; consultation period 8 March to 30 April 2021).

[6] https://ec.europa.eu/info/law/better-regulation/have-your-say/initiatives/12583-Industrial-pollution-European-Pollutant-Release-and-Transfer-Register-updated-rules-_en

[7] https://ec.europa.eu/info/law/better-regulation/have-your-say/initiatives/12583-Industrial-pollution-European-Pollutant-Release-and-Transfer-Register-updated-rules-_en

[8] https://625a7483-1957-4fcd-9bee-bd29b4507dbb.filesusr.com/ugd/b48dda_9614b8ce29d74a68b10f80746e2aa845.pdf

The E-PRTR TSS questionnaire was developed in discussion with the European Commission, and subsequently put online utilising the survey tool, Alchemer. Intended to gather feedback for the impact assessment from stakeholders involved in implementation of the E-PRTR Regulation, this TSS grouped questions under six problem areas that broadly reflected the inception impact assessment, and was tailored with specific questions for the following types of stakeholders:

a. stakeholders responsible for providing data to a competent authority (facility operators)
b. stakeholders responsible for checking the data provided at national level and forwarding them to the European Environment Agency (regional and national competent authorities)
c. more general questions for all stakeholder groups.

d. E-PRTR solely – **Targeted telephone interviews**. Targeted telephone interviews, to complement the online TSS survey, took place with representatives of regional and national competent authorities, European institutions, representatives of non-EU PRTRs, representatives of the Kyiv Protocol Bureau, industry associations, civil society and other key stakeholders. The stakeholder interviews were grouped into two categories:

Stand-alone interviews with stakeholders who were not the primary target of the online survey (e.g. EU institutions, such as EEA, relevant units of the Commission, and the European Central Bank).

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 associations and national authorities.

Stand-alone interviews commenced in March 2021 while the targeted survey was still open. Follow-up interviews mainly took place after the closure of the targeted stakeholder survey between May and August 2021. In total, 36 interviews were conducted.

- E-PRTR solely – **Focus Groups**. Focus group discussions were held online in August 2021 to complement the online survey and interviews. Representatives of Member State authorities, industry associations and the NGO community took part in the discussions. Attendance at the Focus Group was by invitation only. Two focus groups were organised to tackle different problem areas.

- Joint IED and E-PRTR: Two Impact Assessment information and Question/ Answer **Stakeholder Workshops**, held remotely via online meeting webinars on 15 Dec 2020 (350 persons registered; 253 attended) and 7-8 July 2021 (395 registered; 278 attended).

4. STAKEHOLDER GROUPS PARTICIPATING IN CONSULTATIONS - E-PRTR

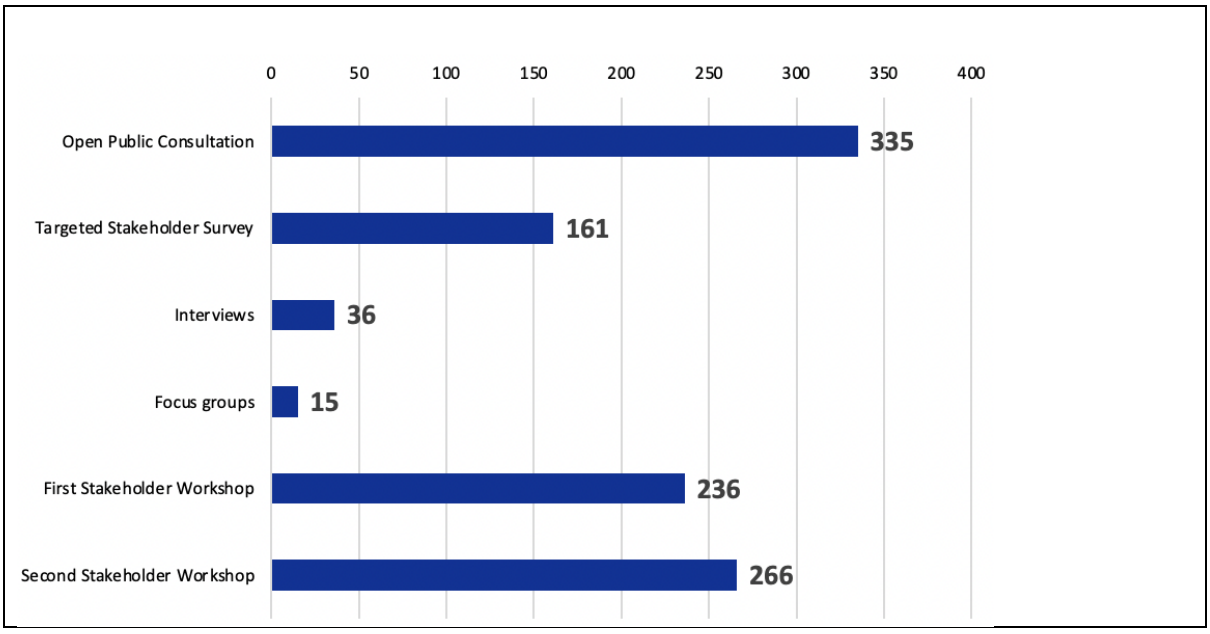
Table A2-2 summarises the types of stakeholders who participated in the various E-PRTR stakeholder consultation activities.

Table A2-2: Categories of stakeholders consulted

Stakeholder Group	Stakeholders
1. EU Member State public authorities	• National level authorities • Regional/local authorities
2. Industry	• Key industries in the scope of the E-PRTR Regulation • Business and trade associations for sectors in the scope of the E-PRTR Regulation • Public utility providers
3. Other	• NGOs, specifically the European Environment Bureau • The general public • Academics and research institutes • Representatives of the Kyiv Protocol Bureau • The European Environment Agency • The European Central Bank • Other Units within the European Commission DG Environment

Figure A2-3 below summarises the number of respondents by consultation activity for the E-PRTR and joint E-PRTR/ IED consultations.

Figure A2-3: Number of respondents by consultation activity



Part 2: Summary of stakeholder views on defining the problems

This section summarises the views of the different types of stakeholders with regard to defining the problem areas and placing relative weights of importance on them.

Civil society and environmental NGOs consider all problems to be of high relevance, in particular regarding:

- environmental impacts being insufficiently addressed by the IED
- the need to have the E-PRTR pollutant list updated more quickly to take account of new threats[18]
- limited access to information on installations' performance levels.

Limited access to information is perceived by all stakeholder groups as an important element to address.

However, differences occurred in the evaluations of industry and business associations, who were rather neutral (but not negative) in recognising problem area 3 (resource efficient and less toxic production). Industry and business associations were also rather neutral in recognising the problems of Problem Area 4 (decarbonisation) pointing to potential additional reporting costs and risks of overlaps with the ETS. For Problem Area 5 (scope), industry and business associations brought into play similar costs arguments, and claimed that existing national regimes and exiting EU legislation tackled most of the problems encountered sufficiently well already.

It is notable that a consensus of all stakeholders agreed that Problems Area 2 is a real issue that requires design and implementation action – namely, that the IED is limited in its efforts to engender, facilitate, harness and promote innovation.

Part 3: Summary of stakeholder views on the options

1. INTRODUCTION

This annex provides a summary of the views of stakeholders on the various options. The reports from the consultants supporting this impact assessment contain the full details of those consultations.

2. STAKEHOLDER VIEWS ON POLICY OPTIONS CONTRIBUTING TO EFFECTIVENESS (PO1)

This section summarises views of the measures comprising PO1 across five themes;

a. PO1: Ensuring that BAT-AELs are achieved

Almost all NGOs who participated in the OPC noted that the directive's mechanisms regarding the achievement of BAT-AELs required some changes, many changes or a complete system overhaul. Furthermore, NGOs responding to the TSS were broadly supportive of all the measures IED#1 to IED#5, which are grouped within this theme. NGOs were also supportive of shorter derogation periods if necessary.

This is consistent with NGO views provided in in the context of the environmental reporting fitness check[19], where the "*EEB also argued that reporting has informed the dissemination of*

[18] E-PRTR evaluation - SWD (2017)710

information about polluting activities, which has helped to significantly improve the performance of heavily polluting industries, as well as informing the identification of pollution hot spots and targeted measures to improve the quality of the environment and human health".

Half to two- thirds of public authorities, EU citizens and other respondents also believe that at least some changes are required to improve the effectiveness of the IED. Member State and other public authorities offer, however, more neutral or mixed views as to how that may be done, with some authorities supporting the measures proposed IED#1 to IED#5 (Table A2-3). With regard to derogations, authorities consider that any time limit should be set on a case-by-case basis.

By contrast, fewer than 20% of companies and business associations considered that at most only minor changes are required. Industry stakeholders are not as supportive of measures IED#1 to IED#5 as they believe these measures are unlikely to have any significant positive impacts. These respondents do not support a time limit for derogations or suggest that the limit should be set on a case-by-case basis if at all.

Table A2-3: Stakeholder views on PO1, Measures IED#3 to IED#5

PO1	Supportive	Unsupportive	Neutral
IED#3 Amend Article 15(1) to introduce an explicit requirement that indirect releases of polluting substances to water shall be assessed and evidence must be provided to demonstrate that such releases would not lead to an increased load of pollutants in receiving waters when compared to a scenario where the IED installation applies BAT and meets AELs for direct releases.	Only **Member state national authorities** consider the measure would have a significant impact on emissions to water. Some **Environmental NGOs** support this measure and they consider it should be BAT to monitor emissions from both direct and indirect discharges.	**Industry representatives** consider the measure would only have a slight impact across emissions to air, soil water, and GHGs. They consider a large-scale centralised system for waste water treatment the most economically efficient approach, removing pollutants more effectively than decentralised systems.	**Environmental NGOs, Member State regional authorities and representatives from other groups** consider the measure would have a moderate impact on emissions to water.
IED#4 Amend Article 18 to require that stricter ELVs are set in permit conditions in the case that environmental quality standards cannot be met by implementing existing BAT conclusions.	**Environmental NGOs** consider the measure will have a significant impact across emissions to air, soil water, and GHGs	**Industry representatives** consider the measure would only have a slight impact on emissions.	**Member State national and regional authorities**, as well as representatives of other groups believe the measure would have a moderate impact on emissions.
IED#5 Clarify Article 15(3)(a) by specifying that when setting emission limit values that do not exceed the BAT-AELs, the	**Environmental NGOs** believe the measure will have a significant impact across the environmental	**Industry representatives** thought the measure would only have a slight impact across the mediums	**Member State national and regional authorities** consider the measure would have a

[19] See page 103 of https://ec.europa.eu/environment/legal/reporting/pdf/Reporting%20and%20monitoring/support_fitness_check_report.pdf

PO1	Supportive	Unsupportive	Neutral
starting point is the lower limit of the BAT-AEL range, unless the operator demonstrates to the satisfaction of the competent authority that applying BAT techniques as described in BAT Conclusions only allows meeting a higher ELV within the BAT-AEL range.	issues examined. **Member State national and regional authorities** believe the measure will have a significant impact on emissions to air and water. **Other organisations** believe the measure will have a significant impact on all media apart from emissions to soil.	examined. They consider that it could have a detrimental effect on the IED's effectiveness as a tool to reduce environmental impacts in an integrated approach, citing BAT-AEL ranges as crucial to accommodate interactions between pollutants.	moderate impact on emissions to soil and GHG emissions.

b. PO1: Homogenising and enhancing enforcement

Almost all the environmental NGOs support these measures IED#6 to IED#7. In the TSS, environmental NGOs considered that all of the enforcement options presented in the survey would likely improve IED implementation. In particular, 100% of NGOs that provided a response thought there would be a significant improvement following the introduction of common compliance assessment rules with ELVs under Chapter II of the IED. The 'other' stakeholders also expected improvements as a result of implementing the proposed measures, with all respondents expecting at least a moderate improvement for both allowing competent authorities to suspend operation of non-compliant plants (IED#6) and for elaborating Article 79 on penalties applicable to infringements of the provisions on the IED (IED#8).

Member State authority respondents generally perceive some albeit limited opportunities for these measures to improve the IED's effectiveness. Typically, around two thirds of the local/regional Member State authority respondents anticipate at least a moderate improvement from implementing these measures. Almost all of the national Member State authority respondents expect at least a moderate improvement following from the introduction of common compliance assessment rules with emission limit values under Chapter II of the IED (IED#7). Mixed responses were received for each of the other measures, tending towards the general expectation of a slight improvement in the IED's effectiveness from the implementation of these other measures.

The majority of industry respondents consider that these measures will have no impact, that is, expect no value from their implementation. Industry stakeholder respondents anticipate a far less significant impact than NGOs, with the most used response being that there would be no impact across any of the measures.

c. PO1: Tackling transboundary pollution

All environmental NGOs and the majority of 'other' stakeholders support this measure (IED#9), and indicated that improved cooperation between neighbouring Member States could result in moderate to significant reductions in transboundary pollution from (agro-) industrial plants. It was noted that issues that currently contribute to the transboundary pollution problem include 'lack of established communication channels between Members States and coordination from the EU', and so this measure can help. One local/regional authority also added that having EU-law, covering all types of diverse scenarios that can entail pollution for neighbouring countries, can solve a great deal of uncertainty.

Industry stakeholders and Member State authorities indicate far less support for this measure (IED#9), with 76% of industry respondents, 67% of local/regional authorities and 71% of national authorities indicating that such a measure would result in slight to no impact on transboundary pollution. Stakeholders consider that one of the most important obstacles in cross-border cooperation is the diversity between EU and international rules, all applicable in different situations.

d. PO1: Improving and expanding the public's access to information and access to justice

A large majority of environmental and civil society NGOs consider that information is moderately or very difficult to access and all consider a policy option on access to information to be relatively or very important. Between about 65% and 70% of public authorities, EU citizens and other respondents to the OPC also consider a policy option on access to information to be relatively or very important. In addition, some NGOs stated, in open text responses to the OPC, that access to information is insufficient and inconsistent across MS.

Industry respondents are generally less supportive of these measures. About 50% of business associations and companies/ business organisations that responded to the OPC considered a policy option on access to information to be relatively or very unimportant. In open text responses, a group of six business associations (of 21 who provided open text responses) and three companies (of 16) argued there is a need to protect sensitive information.

Furthermore, in the **E-PRTR** consultations, stakeholders provided many comments on improving of the reporting of data. Data quality and timing of the reporting were the most discussed topics. Additionally, the significance of guidance was emphasised to improve the quality of data and general efficiency of the reporting. Figure A2-4 summarises the major themes that emerged.

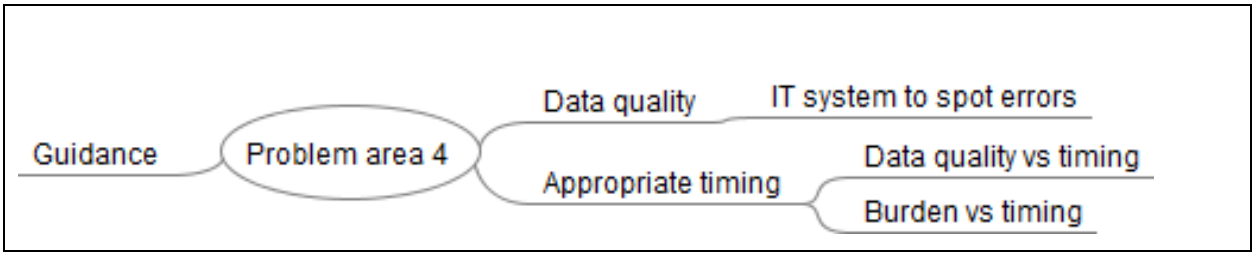
Regarding **renewed access to justice provisions** from the OPC, business associations and company/business organisations overall felt that the public access to justice functions very well for industrial activities. The opposite view is held by all NGOs who typically believe that public access to justice does not function well. A largely mixed view has been provided by public authorities and EU citizens.

Business associations thought most strongly that public access to justice functions well with respect to their right to bring a case before a court, or to ask for a judicial review in their Member State, with around 90% of business association respondents stating that this was functioning very well. A similar level of functioning was stated with respect to all public access to justice elements covered in the OPC, at a slightly lower level for individual enterprise respondents (75%) stating that it was functioning very well.

Environmental NGOs thought this access was functioning very poorly; 82% of environmental NGO respondents thought that it was functioning very poorly for both public access to justice in my Member State and public access to justice at the EU level. 93% of environmental NGOs who expressed an opinion also felt public access to justice was functioning very poorly for other related elements. A very similar level of responses was also provided by civil society NGOs, with a clear view that public access to justice was functioning very poorly across the OPC scenarios.

Public authorities and EU citizens however provided a very mixed view, with no discernible clear stance for either stakeholder group as to how public access to justice was functioning.

Figure A2-4: Themes in problem area 4



Respondents in all E-PRTR stakeholder groups observed that there were issues with the quality of the reported data, which further elaboration of the automated QA systems could help improve.

There was a discussion regarding the possibility to reduce reporting times (E-PRTR measures#47a and #47b). There were two alternatives: reduced reporting times of 3 months for either ALL facilities (E-PRTR #47a) or SOME facilities (E-PRTR #47b) facilities. Feedback from across the range of stakeholders stated that neither of these accelerated reporting schedules would be possible to implement, and that they would lead to the risk of a decrease in data quality, whilst also causing an increase in reporting costs and administrative burden in general. These two measures were screened out (see Annex 13).

e. PO1: Clarifying and simplifying existing legal requirements

Stakeholders are largely in favour of amending the legislation to clarify the scope of coverage of the IED pertaining to gasification, liquefaction, and pyrolysis plants (IED#14). Industry stakeholders commented on the ambiguity resulting from Article 42(1) (including that it has blocked the introduction of waste co-gasification solutions to the EU market for over a decade) and the classification of waste, and the need for improvements to Article 42 around the natural gas comparison and end of waste criteria methodology. A Member State authority also considers the natural gas comparison test to be subject to interpretation.

The majority of industry stakeholders (60%) and Member State authority respondents (93%) indicate that the harmonisation of averaging periods that would occur from new Chapter II rules taking precedence over other compliance assessment provisions (IED#16) would be very helpful or slightly helpful. This is primarily because these stakeholders expect a reduction in administrative burden from avoiding compliance assessment for multiple rules (averaging periods), with almost all stakeholders indicating there would be little to no environmental impacts of the change.

One industry stakeholder representing the electricity industry has an opposing viewpoint, stating that while the power sector has been advocating for aligned averaging periods, it has now been four years since the publishing of the LCP BATC and, as such, competent authorities and operators have already devised ways to accommodate the discrepancies, so any changes should be considered carefully.

Stakeholders did not generally provide opinions on whether they supported or opposed the deletion of Annex II (IED#15). The majority of industry stakeholders (66%) indicate that they primarily refer to the BAT Conclusions when reviewing and setting permit conditions, i.e., that Annex II of the IED "List of polluting substances" is not a primary reference when they consider permit conditions. However, 42% did indicate they refer to Annex II at least to some extent.

3. STAKEHOLDER VIEWS ON POLICY OPTIONS SUPPORTING INNOVATION (PO2-A TO C)

PO2-a (Facilitate the development and testing of emerging techniques): Industrial federations and operators (for example, FuelsEurope) support these measures as they introduce wider flexibilities and impose no additional requirements on IED operators.

Technology suppliers (such as Accessa) believe that this measure will not deliver any significant change in the use of innovative techniques or technologies for emission reductions. Suppliers believe that these exemptions (more months without AEL requirements) are not key drivers of investment decision-making by IED operators and their parent companies.

Member States and other public authorities were not explicitly in favour or against this policy option. In a focus group, Spain's IED focal point requested European guidelines on how to justify and allow these derogations to ensure a level playing field.

PO2-b (Establish shorter BREF cycles OR an INCITE: Most stakeholders' comments state a relatively neutral position and explain that the feasibility and efficiency of these measures will depend on the specific features and how they are implemented. For example, German representatives stated that "*if we establish the Innovation Observatory [read INCITE] it is key to institutionalise it within the IED. It should be mentioned in the expanded Article 13 where its mandate, role and procedures are clarified*." Concawe, initially unsupportive, requested in a second workshop that shorter BREF cycles only applied to new plants. The Copper Federation (in the workshop) and the Iron and Steel Federation (in the focus group) shared the same concern, as well as being concerned about the large amount of resources that would be necessary to implement these measures effectively ("*How will it be secured that the EIPPCB and Member State experts have sufficient time and resources to conduct these reviews at an increased rate, and with an increasing number of elements to be taken into account? The in-depth technical exchange to develop BREFs was highlighted during the review as a key pillar of IED success, and this should not be compromised*.").

Eurofer and Euroelectric stated in the focus group that the evidence to underpin INCITE documents might be based on a few data points or it may not be reliable if it is based on pilot plants (or low TRL assets). German representatives said in the second workshop that public authorities do not have resources to review (many) permits every five years and this could also generate negative impacts on private companies.

Certain MS focal points stated that INCITE could provide support (analysing, summarising or validating evidence) on emerging or novel techniques.

Table A2-4: Stakeholder views on PO2-b

PO2-b	Supportive	Unsupportive	Neutral
IED#19: shorter BREF cycles	No (explicit) positive feedback provided from any stakeholder	Industry had requested a clearer statement on whether this would apply to major retrofits; also expressed concern it may generate negative impact on investment cycles.	During FG event on innovation MSs focal points had (implicit) neutral position.
IED#20: INCITE	MS have been supportive explaining that information might be useful for the	Industry has requested that INCITE does not deliver legally binding decisions or deliverables (so those remain in the TWG). Concerns that data to support INCITE	Certain requests on detailed implementation decision to ensure that it is efficient.

PO2-b	Supportive	Unsupportive	Neutral
	BREF reviews and for public authorities	deliverables might be weak or based on few data points.	

PO2-c (Supporting transformation): Industrial operators (such as Concawe or Eurofer) were generally in favour of more time to implement BAT conclusions during energy transformation because this imposes no additional requirement and adds flexibilities.

The industrial operator, Eurofer, was neutral about these measures; they reiterated that sectoral transformation will take a long time, and that the IED is not the best tool to support the sector. During the second workshop, some stakeholders asked for clarity on the sectors that are planned to be covered by this measure.

German representatives suggested that transformation plans should be required as early as possible: "*2035* [the original deadline for the permit review obligation] *is not a little too late. It is much too late to come up with a plan for decarbonisation. The time is mature already now to start working on this. This decarbonisation plan needs flexibility for amendments but should show a serious consideration and assessment of options and planned investments. The plan will be a moving target since the future cannot be predicted. Work should start at the latest when the new IED will be transposed into national legislation, i.e., in the course of the year 2027*".

Table A2-5: Stakeholder views on PO2-c

PO2-c	Supportive	Unsupportive	Neutral
IED#21: Allow more time to implement BAT-C if transformation required	Industrial operators in favour of this measure since it recognises the complexity of plant retrofits.	No negative feedback for this option	Certain federations stated that this transformation may take longer than 10 years and IED might not have large impact.
IED#22: establish a permit review obligation and require transformation plans	No explicit supportive feedback	Member state suggesting that this may be needed earlier than 2035	-

4. STAKEHOLDER VIEWS ON POLICY OPTIONS CONCERNING RESOURCES AND CHEMICALS (PO3-A TO G)

Overall, environmental NGOs were in favour of the measures proposed in this policy option. They responded positively on the expected benefits and environmental impacts of the measures. For example, environmental NGOs strongly urge for more elaborate and harmonized reporting of information on resource efficiency, circular economy and the use and management of chemicals (PO3-b); for increased public access to such information; and for binding levels or benchmarks for such environmental issues (PO3-a). There are concerns that the continuous improvement requirement of environmental management systems, and their sections for resource efficiency and circular economy plans and chemical management systems, is too vague, and environmental impacts should therefore be bound in some way.

On the contrary, industry was generally not in favour of the policy measures and options concerning IED addressing this problem area, indicating that the expected environmental

benefits are small, while associated administrative and compliance costs would be significant. There are a number of concerns on the proposed measures, such as that:

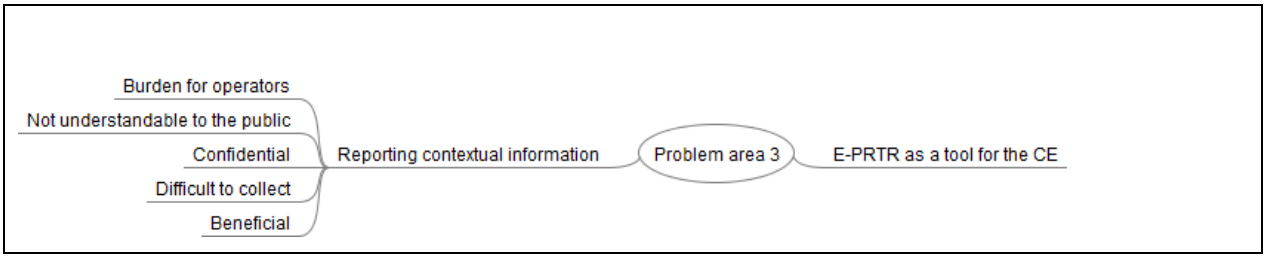
- mandatory reporting of resource efficiency and circular economy reporting could come into conflict with Confidential Business Information protection (PO3-b);
- binding BAT-AEPLs could conflict cross-media considerations for some pollutant emissions (PO3-a); and
- binding BAT-AEPLs may not sufficiently take into account differences in process or product characteristics and, as a result, limit potential innovation and development of products or processes in the future (PO3-a).

With regard to the Chemical Management Systems (CMS) component (PO3-b), industry stakeholders voiced concerns about the potential overlap with REACH and suggested that better implementation of REACH could be a more important focus rather than additional requirements under IED. This position was countered by NGO representatives, who suggested that a CMS was not an expansion of requirements, but was rather a strengthening of coherence between REACH and IED policy instruments. Further, if CMS becomes a requirement, some representatives from industry sectors associated with wastewater and waste generally commented that it would be useful that the CMS would not only record chemicals that are intentionally used, but also reactants/by-products, as these represent a significant challenge for waste sectors to manage.

Public authorities, both national and local/regional, provided a more mixed response to the proposed policy measures and options that concern IED. While expectations on administrative costs were comparable with those of industry, the expected impact of the measures was more positive. For example, some public authority representatives expressed their preference for a resource efficiency and circular economy plan, which could be linked to reporting requirements and BREF benchmarks, rather than making BAT-AEPLs binding in the same manner as BAT-AELs (PO3-a). This confirmed or echoed some of the concerns mentioned by industry. Some of these public authorities were also in favour of more elaborate reporting of resource efficiency and circular economy information. Others, however, were more in favour of binding BAT-AEPLs wherever appropriate (PO3-a), whilst it was recognized by some that derogation conditions, such as those of BAT-AELs, could result disproportionately burdensome in the case of BAT-AEPLs. Public authorities also highlighted that requirements for a chemical management plan had already been discussed and added to some BREFs (most notably the textiles BREF), and that a tailored or sector-by-sector approach may be needed to focus or adapt to the issues that are relevant for each sector and avoid undue administrative burden (PO3-b).

In the **E-PRTR** consultations, most comments related to contextual information requirements and the role of E-PRTR as a tool for tracking the progress towards the circular economy. Figure A2-5 summarises the major topics that emerged in the discussions.

Figure A2-5: Themes in problem area 3



Both industry and public authorities were mainly negative about the requirement to report E-PRTR contextual information. Respondents argued that reporting contextual information will require a lot of effort and will become a burden e.g., *"It is difficult to precisely assess the additional time that our operators would spend on reporting this information, but clearly this would be significant. We have not been able to quantify precisely what this additional time would be. It is a very demanding exercise. They are asking for very detailed information, on energy and so on."*

Additionally, industry pointed out that contextual information will not serve its purpose to inform the public because its interpretation requires specialised knowledge e.g., *"There are also issues surrounding this information being used to compare facilities which are not comparable due to differences in processes, production volumes etc. For the chemicals industry every process is unique and the provision of contextual data to make it seem like they are comparable would lead to inaccurate conclusions being drawn by end users."*

Industry also highlighted that contextual information could disclose specific business details that are confidential and publicizing such information might affect competition law,

However, there were two positive responses about including contextual information, highlighting that it could be **beneficial**, while recognising possible pressure from the industry e.g. *"Yes, there is always resistance from the industry. There should a balance between the desire of industry and that of the public. Definitions are really important; they need to be very consistent."*

Most respondents did not see E-PRTR as a tool for tracking the progress on resource use and suggested that it should be implemented by a different legislative tool e.g., *"We would encourage the use of other monitoring ideas for measuring progress towards the circular economy but do not see the E-PRTR as a tool to do this. Emissions are not linked to the circular economy."*

5. STAKEHOLDER VIEWS ON POLICY OPTIONS CONTRIBUTING TO DECARBONISATION OF INDUSTRY (PO4-A TO D)

Environmental NGOs consider that a revision of the IED has the potential to translate international and EU climate targets into legal obligations. NGOs have launched a petition on this matter[20]. Currently, the IED does not systematically address climate protection, which needs to be added explicitly. They support the inclusion of scientifically based GHG emission limit values under the scope of the IED and the introduction of mandatory energy efficiency requirements. Accordingly, the current exclusion provisions in Article 9(1) and Article 9(2) of the IED must be deleted.

NGOs note that there is no duplication of regulation between the IED and the EU ETS and believe that dedicated decarbonisation and GHG mitigation provisions for the energy intensive industries should be set as target level BAT. This could foresee differentiated compliance periods, depending on the scale of effort to be made by industry in terms of deep process switching.

Member States authorities agree that the BREF process should be more flexible and sectoral plans (and for one Member State installation specific plans) with reduction targets could be developed.

[20] https://caneurope.org/eu-industrial-pollution-law-revision-essential-to-cut-greenhouse-gases-and-pollutants/

Member State authorities would generally maintain the provisions in Articles 9(1) and 9(2), as voluntary energy efficiency agreements are in place and distortions of competition between sites covered by ETS and others could occur. GHG BAT-AELs under the IED would bring limited additional contribution in terms of carbon neutrality and an issue of double regulation could result in terms of compliance obligations. In addition, due to the ongoing revision of EU ETS there are uncertainties in estimating the future added value by IED for emissions covered by ETS. However, at least one Member State considered that the IED could take a more active role in decarbonisation.

Industry representatives agreed that a fair balance between pollution reduction and energy usage for abatement is needed. However, they consider that potential additional measures within the IED to accelerate direct and indirect GHG emission reductions from plants could hinder the effective functioning of the EU ETS, jeopardising its success and efficiency.

Furthermore, industry considers that the IED should avoid covering GHG emissions and energy efficiency where these are already covered by the EU ETS, as the IED is not suitable for regulating them. GHG emissions of IED activities which are not covered by the ETS Directive can already be addressed in the frame of the IED through the BREF (e.g., methane slip values in the LCP BREF). The current system efficiently avoids any overlaps between the two pieces of legislation while ensuring that pollutants can be regulated and reduced by either of them.

Industry emphasised that deleting the provisions under Article 9 of the IED would create uncertainties related to the investment framework and cancel the benefits brought by a market-based instrument for plants covered by the EU ETS, leaving the choice for operators to make the most cost-efficient investments. In addition, this could also have adverse effects on the carbon price signal delivered through the EU ETS. Furthermore, industry feedback indicated that by setting a constraint on GHG emissions at the level of each unit, instead of at the installation level, the IED would leave no flexibility to operators to optimize abatement options through a cost-efficient approach, making the industry less competitive. In addition, the inclusion of GHG conditions in BREFs for installations outside the scope of EU ETS would probably lead to slight environmental impacts, since those small installations are not the main contributors to GHG emissions.

In the **E-PRTR** consultations, there was little discussion about the role of E-PRTR for tracking the progress in decarbonisation but neither were there negative reactions. On the reporting of disaggregated HFCs, HCFCs, CFCs and PFCs, a significant part of two stakeholder groups – researchers, NGOs, public and authorities – noted that this was important, whereas only a small share of industry representatives also considered it to be important.

6. STAKEHOLDER VIEWS ON POLICY OPTIONS CONCERNING SECTORAL SCOPE (PO5-A TO I)

Stakeholder input is summarised at the level of the sub-options below. In addition, much factual input was provided by stakeholders, via the overall consultation process, and two specific consultations and studies performed: (i) to inform PO5-a considerations; and (ii) to inform considerations regarding PO5-b to PO5-f . This factual input has been extensively used in the sections considering IED and E-PRTR scope extension in Annex 8, pp. 184 *et seq.*

a. PO5-a: rearing of animals (cattle farming, expand IRPP AND a tailored permitting process for the rearing of animals)

NGOs are generally in favour of expanding the scope of the IED as proposed, and they are also critical of the effectiveness of existing regulation. As an example, one NGO points

out that the IED approach of using thresholds can lead to avoidance of regulation by placing farm sizes just below the threshold. NGOs also criticise the existing level of ambition of the IRPP BAT conclusions. This criticism was also echoed by some Member State authorities during focus group discussions, who mentioned that the IRPP BATC upper BAT-AELs rarely go beyond the existing national requirements.

Several Member States are also in favour of inclusion of cattle farming within the IED. For example, the German Environment Agency (UBA) has provided evidence highlighting the potential positive benefit-cost ratio of including cattle farming within the IED, already established in 2012, and provided details on environmental benefits that can be obtained from the implementation of these proposals. Albeit generally supportive of this policy option, Member State stakeholders also have concerns over introducing excessive additional administrative burden, and hence support a tailored approach to minimise burden that can accommodate those Member States already regulating smaller farms.

Further, several notes were made on the overall effectiveness of this without a "regulatory framework for the sector". This is noted because SMEs in particular are faced with increasing administrative burden via having to respond to the demands of various different EU Regulations and Directives. The tailored approach could be seen as a way to answer this, at least partially. An example is provided in that the IED is important on IRPP for its BAT on land spreading of manure, from which the Nitrates directive can benefit. Having more integration between the two directives is seen as key.

On the lowering of IRPP thresholds, a business association campaign (6 stakeholders) provided feedback on details of the existing IED regulation that they do not feel are effective, with a large focus on the reporting and monitoring measures (i.e., which could be addressed through the tailored approach). The level of feedback on IRPP scope expansion was not as detailed as on the scope extension to cattle farming, with two main points: the opinion that it is too soon to do an evaluation and update, given the 2017 publication of IRPP BATC, and repeated concerns about administrative costs.

A Member State also opposed this based on it leading to additional farms being covered under the IED, via the argument that these farms were already covered under national legislation.

On the tailored approach to permitting, overall Member States are in favour, largely based on argumentation that there is a lot of other potentially overlapping regulation and that this is an approach that could help avoid unnecessary additional administrative burden. Various specific points of feedback were given by Member States and Industry on elements of the current IRPP BATC and permitting approaches. Among NGOs, the main message was that the EC should ensure that environmental protection standards are not compromised in favour of efficiency.

Industry stakeholders have mixed views about this policy option, not wholly in favour or against. Some industry representatives highlight the continued problem of excess manure production and would implicitly support measures that helped to resolve this issue. Other industry (associations) make overt statements against further regulation (both extension and expansion), with the opinion that there already is enough environmental regulation on the sector.

On the extension to cattle farming, Business Associations are generally unsupportive of expansion of the IED into cattle or could support a "limited expansion", while they highlight issues that they see with the current implementation of the IRPP BREF and associated BATC. As an example, one association highlight that the cattle sector is already subject to

other EU regulations and, therefore, do not support this expansion to avoid regulatory overlaps or duplication. Another business association also highlighted the existing regulations and the need to avoid overlap, although they were not explicitly in favour or against. On the other hand, individual company respondents tended to be supportive of the inclusion of cattle farming within the IED, although these stakeholders did not include individual farm SMEs.

In a different context, drinking water companies and water authorities also regularly express their concerns about the continuous increase of water treatment costs, notably related to emissions to water from rearing of livestock, e.g. in relation to nitrate and pesticide removal from surface and groundwater.

Table A2-6: Stakeholder views on PO5-a

PO5-a	Supportive	Unsupportive	Neutral
IED#31 Include cattle rearing	Business case made by some MS authorities to include cattle farming. Strong support from NGOs across the board. Implied support from some businesses who highlight the extent of remaining manure issues.	Explicit feedback provided by industry associations who state not to be in favour of this option, citing the presence of existing EU and national regulations.	FG participants (MS representatives) had implicit neutral positions, as opportunity was given for vocal opposition.
IED#32 Amend capacity thresholds for rearing of pigs and poultry	Support from NGOs for all measures on the basis of observing that the IRPP sector emissions are still very high. One Member State also expressed explicit support for lowering the IED thresholds.	Two Member States did not support this measure, citing concerns on administrative cost and competitiveness of industry.	Most Member State Authorities did not express explicit support or opposition. Some acknowledged the need, but observed current IRPP BREF ambition levels may be too easy to meet. Thus, it does not capture all potential environmental benefits that could be made at reasonable cost.
IED#33 Introduce a tailored regulatory framework for installations carrying out rearing of animals	Member States are generally supportive of this measure. Almost all Member States that participated in the Focus Group highlighted that there is existing regulation and that the IED should avoid overlap.	Questions on this topic were often used to repeat the point of being against scope extensions/expansions, and little specific feedback was provided on the tailored approach by industry.	NGOs generally emphasised that the tailored approach should not result in lower environmental protection standards.

b. PO5-b: Extension of current sectoral scope in battery production, smitheries, textiles, forging presses, cold rolling, wiredrawing, ***AND*** shipbuilding and ship-dismantling.

Environmental NGOs appear generally supportive of expanding the scope of the IED to cover the sectors within this option. They consider the environmental pressures arising from the sectors that would be covered by this policy option to be significant. Further, they

consider the potential for reduction of these pressures were the policy option to be implemented as moderate to significant.

Industry respondents, however, are generally not convinced that the IED could benefit these sectors. They nevertheless generally identify the environmental pressures arising from the sectors under this policy option as being slight to moderate. They also consider the potential for reduction of these pressures if the option were implemented as slight to moderate. In addition, industry notes impacts for each of the measures on EU competitiveness, EU market share and on trade with third countries.

Member state respondents have more neutral views. Their estimates of environmental pressures and scope for reduction if the policy option were implemented tend to be similar to, though slightly higher than, the estimates from industry. These respondents generally indicate that there is some legislative basis for these sectors in their Member State and, in around 50% of cases, there are also financial instruments and voluntary measures.

Table A2-6: Stakeholder views on PO5-b

PO5-b	Supportive	Unsupportive	Neutral
IED#34 Include battery production	Environmental NGOs anticipate a significant reduction in most environmental pressures if IED provisions are applied. One MS authority supports including lithium-ion battery production, sorting and recycling plants in IED.	Industry stakeholders generally suggest that reductions in environmental pressures if IED is applied will be slight to moderate.	National MS authorities anticipate slight to moderate reductions in most environmental pressures if IED provisions are applied.
IED#36 Include forging presses, cold rolling, with capacity exceeding 10 t/h, and wiredrawing, with capacity exceeding 2 t/h	Environmental NGOs anticipate a significant reduction in many environmental pressures if IED provisions are applied. One MS authority explicitly supports inclusion of cold rolling with capacity exceeding 10t/h.	Industry stakeholders generally suggest that reductions in many environmental pressures if IED is applied will be no impact to slight. However, they also anticipate moderate to significant impacts for energy use, resource/material use and water use.	National MS authorities anticipate slight to moderate reductions in most environmental pressures if IED provisions are applied. It is also queried whether cold rolling and wire drawing are already covered by the Ferrous Metals Processing BREF.
IED#37 Include finishing activities with the existing capacity thresholds in activity 6.2 (pre-treatment or dyeing of textile fibres or textiles)	Environmental NGOs indicate moderate to significant environmental pressures from textile activities below current IED production capacity thresholds. Some mention that microplastics could be covered. One national MS authority suggests that printing and finishing be included.	Industry stakeholders generally suggest that environmental pressures from textile activities below current IED production capacity thresholds are slight to moderate.	National MS authorities anticipate slight to moderate reductions in most environmental pressures if IED provisions are extended. One national authority opposes lowering the threshold, as this would significantly increase administrative burden for industry.

PO5-b	Supportive	Unsupportive	Neutral
IED#38 Include smitheries of 20 kilojoule per hammer with no threshold for the calorific power or reduce the capacity threshold for the calorific value to > 5 MW in activity 2.3(b) (from the current limit of 50 kilojoule per hammer and where the calorific power used exceeds 20 MW)	Environmental NGOs indicate significant energy and waste generation environmental pressures from smitheries below current IED production capacity thresholds.	Industry stakeholders generally suggest that environmental pressures from smitheries below current IED production capacity thresholds are of no impact to slight impact. One national MS authority suggested no change as lowering the threshold would reduce competitiveness of companies concerned.	National MS authorities generally indicate slight to moderate environmental pressures from smitheries below current IED thresholds. One national MS authority, noting that few smitheries currently fall under IED, suggests retaining the current limit of 50kJ per hammer but removing the requirement on calorific power.

c. PO5-c: Revision of the activity's capacity threshold AND/OR adoption of BAT conclusions for landfills

NGOs (environmental and non-environmental) and civil society stakeholders endorse this policy option. In particular, NGO stakeholders consider that landfills should be covered by the IED and the associated BREFs process.

Member State and other public authorities have mixed views about these policy option. Firstly, most public authorities disagree that the threshold for inclusion within the scope of the IED should be reduced. Smaller landfills than the threshold are not considered viable, and they are already set so low that they are exceeded by a large majority of landfills that meet the requirements of the Landfill Directive (in conjunction with Council Decision 2003/33/European Commission). Further, just over half the Member State authorities consulted disagree that that BAT determination of Annex I activity 5.4 landfills should be done by adopting BAT conclusions.

However, the rest considers that moving the definition of BAT for landfills from the Landfill Directive to the IED could have improved environmental impacts. Moreover, they noted that, from a circular economy perspective, there could be economic gains due to reduced pollution and better use of resources, and considering administrative costs, if IED WT plants are operated by the same operator as the landfill sites (e.g., Sweden), many landfill operators already have knowledge of IED BREFs and BAT Conclusions, which could reduce the administrative burden.

Some authority stakeholders also mentioned that there are only a few existing landfills in operation so impacts would be insignificant (e.g., Finland), and that these landfills are currently regulated effectively, e.g., by the Landfill Directive 1999/31/European Commission in conjunction with Council Decision 2003/33/European Commission on waste acceptance.

Industry stakeholders are not generally supportive of this policy option. They consider that as landfills are regulated with permits, monitoring, etc., as part of the Landfill Directive, it does not need to be included within the IED. This includes respondents specifically from the chemicals sector. In particular, stakeholders are concerned about duplication and inefficiency and consider that moving the definition of BAT for landfills from the Landfill Directive to the IED would have negative economic impacts, increase administrative costs and technical requirements, and would not necessarily result in significant improvement of emissions when compared to the counterfactual.

The Landfill Directive is already regarded as being sufficiently detailed in prescribing techniques for landfills. Therefore, these stakeholders consider that it would be more effective to review and update the existing legislation instead of introducing additional and overlapping legislation via the IED. In fact, some stakeholders suggested deleting activity 5.4 from Annex I of the IED in order to avoid double regulation. One industry stakeholder, representing material recycling for energy production (waste incineration), supported the extension of the IED to landfills and methane emissions.

Table A2-7: Stakeholder views on PO5-c

PO5c	Supportive	Unsupportive	Neutral
IED#39 Facilitate the adoption of BAT conclusions for activity 5.4 landfills	All NGOs in favour. 78% of local/regional authorities consulted support this, and 47% of national authorities.	53% of national authorities consulted disagree. Industry stakeholders not in agreement.	Public authorities have mixed views
IED#40 Revise the capacity threshold in Annex I for activity 5.4 landfills	-	Most Member State authorities believe the threshold should stay the same. They are already set so low that they are exceeded by a large majority of landfills, and smaller landfills than the threshold are not viable.	-

d. PO5-d: Mining and quarrying

E**nvironmental NGOs support inclusion of mining and quarrying under the IED**. Their main focus is on mining of energy sources, particularly coal and lignite, where control under IED is seen as a manner of phasing out these energy sources on sustainability grounds. Some focus particular attention to control of methane and of water use. However, some stakeholders have suggested that there is a need to ensure control of mining activities related to essential services, i.e., those mining and quarrying activities that will feed into the zero-pollution ambition of the EU, focusing on renewable energy sources and electrification in general.

Member States authority stakeholders noted that the application of the IED to mining and quarrying activities would have the largest environmental impact of all potential new activities considered for the expansion of the IED's scope. These stakeholders also confirm the existence of current European and national legislation regulating the sector, and the expectation that adopting the IED would lead to an increase in regulatory burden. One Member State representative was unsupportive of this option because of the existing legislation at European and national level.

Industry representatives consider that mining and quarrying activities are already legislated (EIA, Extractive Wastes, Rehabilitation and specific national permitting processes) and the inclusion of this sector in the IED would primarily increase the regulatory burden with limited additional benefit. In addition, industry stakeholders note the heterogeneity of mining and quarrying facilities and, hence, the potential difficulty in applying commonly applicable BAT. Consequently, industry stakeholders consider that the introduction of IED permitting would primarily drive additional and potentially duplicative burden that would harm competitiveness without a significant net improvement to the environment.

e. **PO5-e: Aquaculture**

Environmental NGOs support the inclusion of aquaculture under the IED. Their main points focus on the emissions from aquaculture farms, specifically to water and soil depending on their location as well as GHG emissions and emissions from energy use, where the IED would provide definitive emissions limits and an EU-wide integrated licensing framework to support more consistent environmental regulations. Some NGOs focus on supporting the facilitation of sustainable development within the sector and contributing to the delivery of the 'Farm to Fork' Strategy.

Member State stakeholder representatives also appear supportive of the inclusion of aquaculture within the scope of the IED. In particular, authority representatives note that setting permit conditions could have a positive impact on the environment, particularly for emissions to water, energy use, materials and resource use, and waste generation. They also consider that this could happen with little to no impact on the administrative burdens of business and other economic costs. However, the evidence provided does suggest that the existing legislation regulating aquaculture in some Member States (namely the highest producers in the EU) is already burdensome for businesses and may affect the EU's competitiveness.

Industry representatives argue that, while they recognise the environmental impacts, the inclusion of aquaculture in the IED would create multiple layers of regulation and bureaucracy on top of existing legislation (Water Framework Directive, MSFD, etc.). They state that this would increase administrative costs for businesses and could introduce barriers and/or disruptive for producers. Thus, industry stakeholders consider that the inclusion of aquaculture in the scope of IED would result in economic costs that are unlikely to lead to significant, additional environmental improvements.

f. PO5-f: Upstream oil and gas

In general, stakeholders regarded upstream oil and gas as a significant contributor to emissions to air, water and soil, as well as GHG emissions. This is also the case for energy use, water use and waste generation. Stakeholders additionally expected, with high probability, that the introduction of IED provisions could significantly improve these environmental impacts of the sector.

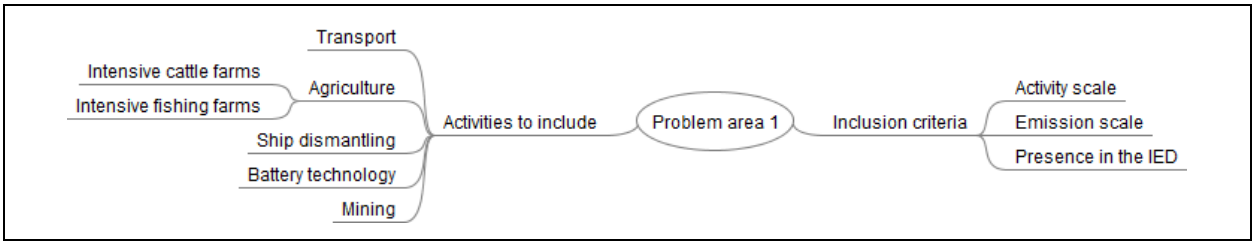
Some Member State stakeholders note that they already regulate the sector nationally. There is, therefore, some variation in how the sector is regulated across Member States. However, it appears that regulation mostly relates to the exploration and opening of new sites and does not include environmental inspections or prescription of BAT for environmental performance.

Industry stakeholders are, in general, unsupportive of expanding the IED to cover upstream oil and gas, especially as they expect that this would lead to significant increases in regulatory burden, reductions in EU competitiveness and EU's market share.

g. PO5-g: Align E-PRTR scope to IED activity descriptions

E-PRTR respondents mostly commented on activities that should be included in, or excluded from, the E-PRTR Regulation. There were no contradictory opinions in different groups of the respondents (public authorities, NGOs and industry) in this problem area. Figure A2-6 summarises the major themes that emerged in the discussion.

Figure A2-6: Themes in problem area 1



Some respondents provided general criteria that would prescribe what activities the E-PRTR should cover. **Criteria for inclusion** mostly addressed the scale of activities. However, other criteria, such as the scale of emissions, the presence of an activity in the Industrial Emissions Directive (IED) were also covered, e.g. "*If it's in the IED, it should be included. If it's not in the IED, it shouldn't be included*."

Respondents also named **specific activities** to be covered by the E-PRTR. These activities included five areas – transport, agriculture, ship dismantling, battery technology, and mining e.g. *"With regards to cattle farms and fishing farms, we have proposed a revision of the IED directive to include these two. If this happens, they should be maintained in the scope of the E-PRTR regulation."*

h. PO5-h: Revise E-PRTR activity descriptions regarding MCPs and UWWTPs

Q23 of the TSS asked '*How important is it to extend the E-PRTR activity threshold to cover combustion plants with the following capacities*?' giving response options of 1 – 5 MW; >5 – 20 MW and >20 – 50 MW. The majority of the industry stakeholders thought it was not important at all and noted that lower reporting thresholds would require a large number of plants would have to report for the first time. This would require monitoring and reporting systems to be installed and additional personnel due to higher workload and administrative burden. Although the authority representatives considered a threshold extension to plants with the capacity of 1-5 MW not important, the majority indicated that a threshold extension to >5-20 MW and >20-50 MW plants was important. All respondents in researchers and NGOs group considered it important for all capacities.

Question 24 of the TSS asked '*For the purpose of legislative coherence, how important is it to lower the existing threshold for UWWTP from 100,000 p.e. to the options below*?' and giving response options of 1,000 p.e.; 2,000 p.e.; 5,000 p.e.; 10,000 p.e.; 50,000 p.e.; and 'other'. Most industry respondents did not think it was important, whereas researchers and NGOs considered it important for all options. The majority of authority representatives thought that lowering the threshold was important for 10,000 and 50,000 p.e. plants, not as important for 5,000 and 2,000 p.e. plants, and not at all important for 1,000 p.e. plants. There was a suggestion to consider basing UWWTP reporting thresholds on actual wastewater load to the plant rather than plant capacity. Lowering the threshold to 10,000 p.e. was considered relevant by several authority stakeholders, especially for nitrogen and phosphorus. It was also noted that, for coherence with the Urban Wastewater Treatment Directive (UWWTD) and for practicability, both reporting obligations should be streamlined. Similarly, industry stakeholders suggested aligning thresholds with the UWWTD. In addition, lowering of the threshold to 10,000 p.e. was supported by some industry stakeholders.

PO5-i: Establish a dynamic system to identify and include emerging activities of concern

For the E-PRTR, NGOs and authorities support the establishment of a more dynamic instrument.

Whilst applying this option to the IED was only considered at a late stage of the impact assessment process, and was therefore not subjected to consultation, stakeholders have provided their views concerning the potential inclusion of a wide range of activities. Those views vary across stakeholder groups, depending on the particular activity as referred to above.

Part 4: Fit for Future Platform Opinion on the IED – received 6th December 2021

The Fit for Future Platform (FFFP) Opinion on the IED was submitted to the European Commission on 6.12.2021. It should be noted that the FFFP's views were given separately to the formal OPC, TSS and related Focus Group/ interviews consultations of the IED/ E-PRTR Revision Impact Assessment consultation process per se.

Summary description of Fit for Future Platform Opinion – December 2021

Table A2-8 (below) gives a summary of the FFFP suggestions, in which the European Environmental Bureau's dissenting remarks within the Platform are shown, in parallel to the Platform's suggestions. Many of the suggestions of the Platform refer to might achieve a "better implementation" of the IED, which fit in with some of the PO-1 "Effectiveness" measures as described throughout the Impact Assessment.

Subsequently, Table A2-9 summarises possible follow-up actions per suggestion of the FFFP.

Table A2-8: Fit for Future Platform views

Summary of Fit for Future Platform Views	European Environmental Bureau dissenting responses
Introductory text regarding IED Stated that the IED comprises five important pillars: 1. Integrated approach 2. Use of BAT 3. Flexibility (of permits etc) 4. Inspections 5. Public participation	Disagree with the citing of "flexibility" as a key pillar of the IED. The over-use and abuse of "flexibility" in permit conditions and derogations from BAT requires Competent Authorities administrative burden with respect to the time need for interpreting the situations and excess evaluations.
Suggestion 1 – Duration of permit process a) Increase effectiveness and speed re. provision of permits with regard to initial permits, and their updates/ revision. b) Link IMPEL to this process. To be achieved by assessing the practices of the EU-27 Member States, to engender and spread best practices.	

Summary of Fit for Future Platform Views	European Environmental Bureau dissenting responses
<u>Suggestion 2 – Duration of BREF process</u> Suggest, to accelerate and improve the BREF process: a) A more systematic methodology to achieve BAT-conclusions b) A stronger focus on main issues c) Resolving the Confidential Business Information ("CBI") issues during BAT determination.	
<u>Suggestion 3 – Digitalisation recommendations</u> Inter alia: a) Implement unified coding of IED permits. – Thus to facilitate ready readability of permits, authorisations and controls for Member States' Competent Authorities. – Also to enable easier cross-comparisons across Member States. Assess feasibility and applicability of continuous consumption and emissions monitoring to installations other than the energy sector.	
<u>Suggestion 4 – Monitoring provisions</u> a) To be clarified better in BAT-conclusions Allege that some monitoring is not clear, and is an unnecessary excess burden for operators with regard to achieving/ checking BAT use.	– Disagree with the validity of the criticism. If greater guidance is needed, it should be to more closely align monitoring with the "polluter-pays-principle".
<u>Suggestion 5: Baseline Reports–Groundwater and Soil</u> a) Suggest further guidance is necessary re. Art. 22 IED (site closure), also with regard to Baseline Reports.	– Such Baseline Reports have been required since 2010, and guidance was issued in 2014. Content of the Baseline Reports should rather be made more publicly accessible, e.g., via the EEA Industrial Emissions Portal Vers. 2.0.
<u>Suggestion 6 (noted as "5" in the Opinion) – Avoiding overlapping requirements</u> Revise Annex I of the IED where there are activities with more minor impacts that may be directly associated, to avoid overlaps.	Instead, it would be better to focus on include internalisation of external costs, including climate debt.
<u>Suggestion 7 (noted as "6" in the Opinion) – Functioning of BREF process</u> a) Utilise systematic BREF guidance Avoid 'disproportionate burden' on operators.	Rejects notion of some data being requested that is non-essential in compiling BREFs.
<u>Suggestion 8 (noted as "7" in the Opinion) – Clarity and Harmonisation [New "Revision"-type suggestion rather than solely "better implementation"]</u> a) Introduce concept of "single property" as opposed to "installation" b) Above concept to enable technical assessments for "whole site" as opposed to	– Concept too complex, and could lead to a very difficult attempted assessments of multiple risks, causing delays to permit authorisations/ changes. – "Site"-approach – suitable for Seveso-style risks instead.

Summary of Fit for Future Platform Views	European Environmental Bureau dissenting responses
several "installations" (where applicable) Revise definitions/ more thorough IED implementation.	– Retain "installations" for IED. – Harmonise, instead: o Article 15.4 derogation practices o Compliance assessment (uncertainty measurement methods) Significance thresholds for breach situations and findings of inspections.
Description/ "Global Dimension" a) Recommend a study overall of costs-benefits of implementing BREFs in sectors. This to be used to enable benchmarking of the performance of EU industry sectors with that of non-EU competitors.	Rather, modify the IED to enable industry sectors' decarbonisation commitments to be achieved and monitored.

Potential follow-up of the 2021 FFF platform opinion on IED

Table A2-9 summarises possible follow-up suggestions in response to the Fit for Future Platform's adopted opinion regarding how to improve the Industrial Emissions Directive and its implementation.

Table A2-9: Fit for Future Platform suggestions, with indicative possible follow-up actions by the European Commission and other actors

FFFP suggestion	Possible follow up
Suggestion 1: Duration of the permit process	This is considered under the baseline, as part of the European Commission's ongoing implementation and compliance support activities, in particular by facilitating the exchange between Member States of good practices to promote a swift revision of permits.
Suggestion 2: Duration of the BREF process	Post-revision of the IED, a review of the implementing act containing the guidance on drawing up of the BAT ReFerence documents (BREF guidance) is likely. This review would provide the opportunity to streamline and shorten the process as far as possible.
Suggestion 3: Entering the digital age for the authorisation and control phases	An EU-level common electronic permit is probably not feasible given the diversity of national approaches. However, the IED revision includes the assesspment of a requirement for a harmonised digital permit summary, for which the Commission could establish a common format.
Suggestion 4: Monitoring provisions	Improvement of the monitoring provisions included in BAT conclusions and ensuring their consistent application could be discussed as part of the future revision of the BREF guidance, post revision of the IED.
Suggestion 4: Baseline reports on soil and groundwater (numbering error in the FFF opinion)	Existing guidance for the Baseline reports is already in place, but there is a Commission commitment to review the implementation of the provisions on the soil baseline report as part of the Commission's implementation and compliance support activities. This review should ensure better compliance by the Member States. It should be noted that the legal base underpinning the IED already allows Member States to take stricter measures, such as requiring baseline reports in a wider number of cases.

FFFP suggestion	Possible follow up
Suggestion 5: Overlapping requirements	The problem may be due to the lack of BAT conclusions for some directly associated activities in IED sectors, rather than the wording of Annex I that defines the sectoral scope of the IED. This issue will be checked during future BREF reviews.
Suggestion 6: Functioning of the BREF process	The continuous improvement of the BREF process includes revising data collection and processing methods. In particular, the definition of key environmental information (KEI) as well as the processing of confidential business information (CBI) is the subject of agreements within each Technical Working Group undertaking the revision of a BREF. As part of the IED revision, a provision establishing clear legal rules on the processing of CBI is being considered.
Suggestion 7: Clarity and harmonisation	This assertion is not consistent with the outcome of the IED evaluation and of consultations undertaken as part of this impact assessment. On the contrary, the IED's approach to permitting individual facilities has been proven to be effective, also regarding related provisions, such as defining 'operators' and the combination of permits.
Description 8: Global dimension	Both the IED evaluation and this impact assessment have examined competitiveness aspects. No significant impacts have been identified. The EU's IED BAT approach is seen as best practice internationally; many third countries are working towards adoption of similar approaches or standards at national level. In support of such dynamics, BAT Conclusions have been posted on the web in all UN languages. The Commission also funds OECD work to exchange good practices on BAT, and publishes authoritative reports that showcase the EU approach.

Annex 3: Who is affected and how?

INTRODUCTION

This annex sets out the practical implications of the preferred policy package for the various types of stakeholders concerned. It describes the actions that the enterprise or public authority might need to take in order to comply with the obligations under the revised legislation and indicates the likely costs to be incurred in meeting those obligations, or where quantitative information is not available the nature and magnitude of such costs. It also presents the implications for the public.

1. PRACTICAL IMPLICATIONS OF THE INITIATIVE

Businesses already falling under the scope of the IED and/or the E-PRTR

At entry into effect of the revised legislation (i.e. transposition date for IED and entry into force date for the E-PRTR Regulation), installations will have to report in more detail on their environmental performance and will face enhanced scrutiny from the competent authorities. This includes more complete reporting to the E-PRTR at installation level rather than at facility level and renewed attention and wider scope of the already required Environment Management System (EMS) to better address resource efficiency and use of safer substances. Furthermore, operators will have to make environmental information easily accessible to the public on the Internet.

On the one hand, operators benefitting from IED derogations and flexibilities will have to justify the need for their continuation. In particular:

- Installations releasing substances to the sewer will have to verify that the treatment plant receiving their waters is able to appropriately handle those substances and that the load of pollution exiting the treatment plant does not exceed the pollution load of an installation which would have its own treatment plant. If this is not the case, operators will have to install additional onsite abatement techniques in their own installations.

- Installations benefitting from derogations that are not limited in time will have to plan for the end of such derogations, or justify the need for continuation to the satisfaction of the competent authority.

On the other hand, frontrunners will be able to get sufficient time to test emerging techniques.

After publication of revised BAT Conclusions, installations will have to agree with the competent authorities the Emissions Limit Value (ELV) - within the whole BAT-AEL range – that truly reflects BAT performance for their particular installation. Operators will face new requirements to reduce emissions of GHGs that do not fall under the ETS.

Frontrunners firmly committing to meet a ‘step change’ in lower emission levels via deployment of emerging techniques instead of BAT will be given more time to comply with revised BAT Conclusions.

To prepare the 2030 review of individual installations’ permits, operators of installations will have to draw up and discuss with the competent authorities their Transformation Plan, which entails an integrated consideration of future investments to optimise each installation’s contribution to decarbonisation and zero pollution, in line with the 2050 objectives for each aim.

The above concerns all installations except those active in rearing of pigs and poultry. The latter will benefit from the new tailored permitting or registration regime that will focus on key issues, and simpler reporting to E-PRTR, resulting in a significantly reduced administrative burden. However, this depends on whether Member States decide to maintain the full IED permit for those installations or to move to the proposed tailored approach.

Installations newly falling under IED

The IED will become applicable to activities newly brought under its scope when the Commission adopts BAT Conclusions for individual activities. The Commission will prioritise the drawing up of new BREFs, as well as the revision of existing BREFs, to cover installations newly falling under the revised IED. This would result in adoption of relevant BAT Conclusions between 2025 and 2030.

New installations permitted after their date of adoption will have to comply immediately with the BAT Conclusions, which would concern most the high growth sectors like battery manufacture for electric vehicles. Existing installations would have four years to comply, as is currently the case, which would concern mainly contracting or slow growth sectors, such as landfilling and textile finishing.

The cattle sector will face a new regulatory environment through the application of the IED tailored permitting and registration approach, that includes less requirements than the full IED permit. This will require operators to implement measures to meet emission levels reflecting the use of BAT.

Competent authorities

Upon entry into effect of the new legislation, the competent authorities of the Member States will have increased responsibilities in ensuring that the environmental performance of installations reflects the application of BAT.

Increased responsibilities will be ongoing, as permits are considered and installations are inspected. This includes a more rigorous examination of permits issued or reviewed to reflect ‘true BAT performance’ and to support sectoral front-runners. Additional responsibilities will also comprise a strict assessment of the need for derogations, the requirement for enhanced cooperation with authorities in charge of air and water quality, where an environmental quality standard is at stake. Related additional activities will include stricter enforcement of

permits, and more systematic and deeper cooperation with the authorities of other Member States, where installations have, or are suspected of having, significant transboundary environmental impacts.

Key additional tasks include ensuring public participation in all permit reviews that have significant environmental impacts; monitoring the continuous improvement of the environmental performance of installations through their EMS, including the implementation of energy efficiency measures reflecting requirements of the Energy Efficiency Directive; and reviewing permits to incorporate the operator's Transformation Plan.

The public

The new legal provisions should not have any perceptible impact on the cost of consumables. Hence, the public will only enjoy benefits, as the obligations under the IED and the E-PRTR solely apply to businesses and public authorities, and aim at improving the quality of the environment.

The public concerned will have more complete and easier access through the Internet to information on the operation of IED installations, in particular through the publicly available harmonised permit summary and environmental reporting by installations.

The public concerned will have the right to participate in all important permit review or issuance procedures.

Other

Experts from Member States, industry and NGO involved in the BREF process, as well as the Commission services, will have to devote increasing resources to cover in greater depth certain issues than in the past. Such issues concern especially GHG emissions, material, water and energy efficiency, water reuse and the use of safer chemicals.

New networks of experts will be set up to contribute to INCITE, which will also require additional resourcing by the Commission services, as well as the resources of the concerned experts who provide their input to the successful running of INCITE.

2. SUMMARY OF COSTS AND BENEFITS

The following table provides the summary of costs and benefits per problem area for the options included in the preferred policy package.

<table>
<tr><th colspan="4">I. Overview of direct and indirect Benefits and estimated costs (total for all provisions) – Preferred Option vs BAU</th></tr>
<tr><th colspan="2">Businesses</th><th>National Authorities</th><th>Citizens and Consumers</th></tr>
<tr><td>More effective legislation (PO1)</td><td colspan="3">PO1 will improve the effectiveness of the IED and the E-PRTR Regulation by clarifying and simplifying the IED legislative framework; improving public access to information, coherence with the broader EU legal framework and policy objectives, especially the European Green Deal, zero-pollution ambition and the Aarhus Convention; and will level the playing field and raise standards of laggard Member States, especially in environmental protection.</td></tr>
<tr><td colspan="2">Direct benefits:
The measures introduced on the E-PRTR will result in administrative cost savings for reporting – in total by 10.2 million/year. This counterbalances the additional administrative costs related to IED measures referred to below, resulting in overall limited increase in administrative costs for businesses under this option (2 million/year)
Savings stemming from clarification and simplification in the IED and the E-PRTR that could not be quantified
Indirect benefits:
Improved level playing field primarily by homogenising and clarifying the requirements that businesses should comply with and expected enforcement practices
Improved environmental performance could have operational benefits in the medium to longer term, for example, through increased energy efficiency</td><td>Direct benefits:
Less duplication of effort, taking advantage of synergies via greater cohesion with related business and environmental ministries and departments
Indirect benefits:
Clarifying and simplifying existing legal requirements will translate into reduced administrative costs
Costs:
Authorities will need marginally more resources for bringing together and sharing data and information
Total administrative burden €19 million/year</td><td>Direct benefits:
Improved quality of the environment via lower levels of emissions to air, water and soil
Participation in permitting of installations responsible for significant emission of pollutants
Indirect benefits:
Improving public access to information will increase public leverage and ability to influence the environmental performance ambition
The reduction in pollutant emissions linked to use of safer chemicals will have indirect benefits such as improving public health and labour productivity, reducing social and healthcare burden
Illustrative calculations for health benefits</td></tr>
</table>

Costs: • Installations will need to employ more resources due to an increase in the frequency and/or depth and breadth required in permit reconsiderations, derogations and exemptions. This will constitute one off costs as they will materialise once per 10 years, corresponding to a yearly average of 12.4 million/year • Operational costs may increase or will be brought forward, primarily by introducing more stringent requirements and limiting the duration and/or reducing the likelihood of approval of derogations from implementing BAT Conclusions. This will also affect CAPEX: illustrative estimations for five sectors estimate CAPEX for reducing NOx emissions to represent €210 million/year		from reductions of NOx emissions in five sectors estimate this to represent at least between €860 million and €2 800 million/year
Accelerating innovation (PO2)	PO2 is expected to introduce incentives for operators to develop, test and deploy more innovative technologies in a context of rapid technological advancement and a need for deep industrial transformation in sectors regulated by the IED. The scale of impact of this measure would depend on the take-up and the findings of INCITE.	
Businesses	***National Authorities***	***Citizens and Consumers***
Direct benefits: • Streamlined investment to develop and test innovative techniques and technologies • Effective and efficient intervention in updating BREFs through the INCITE's monitoring **Indirect benefits:** • Putting the EU's industry in the front-foot of transformation, potentially gaining first-mover advantage and exporting acquired know-how or innovative techniques **Costs:**	**Direct benefits:** NA **Indirect benefits:** NA **Costs**: • Administrative burden €4 million/year. This stems mainly from occasional one-off activities linked to permit reconsiderations following BREF reviews and inspection/enforcement	**Direct benefits:** • Access to information about state-of-the-art techniques • Improved environment through faster deployment of innovative techniques **Indirect benefits:** • The potential reduction in pollutant emissions is likely to have indirect benefits such as improving public health and labour productivity, reducing social and healthcare burden. The scale of such

• Additional capital and operating expenditures will be needed from operators, although the scale is uncertain and would depend upon the response by IED operators and the selected novel technologies • Heavy industry transformation mainly be driven by the climate policy requires significant investments. This option may lead to an increase in and/or bring forward costs for IED operators, especially capital expenditure, by encouraging industrial transformation and favouring innovative and emerging technologies • Administrative costs are estimated at €23 million/year. This stems mainly from occasional one-off activities linked to permit reconsiderations following BREF reviews, less from yearly monitoring and reporting activities (1.1 million/year)		benefits will depend on the degree of acceleration of technological progress

Contributing to a non-toxic and resource efficient circular economy (PO3)	PO3 would enhance the status of the parts of BAT conclusions whose legal status is unclear. The EMS will provide sufficient flexibility for the pertinent actors. This will encourage a more efficient and circular use of resources with the lowest possible administrative, operational and capital costs. In the longer term, installations will contribute more to a circular economy and a resource efficient model of business and will move to using safer chemicals.

Businesses	*National Authorities*	*Citizens and Consumers*
Direct benefits: • Operational cost savings in the longer term due to improved resource efficiency, reduced waste and carbon footprint • Market likely to reward good performers **Indirect benefits:** • Encouraging research and innovation **Costs**: • 60%-80% of IED installations may be affected, resulting in	**Direct benefits:** • Clarity on how to implement BAT conclusions **Indirect benefits:** N/A **Costs:** • Administrative burden: €36 million/year	**Direct benefits:** • Reduced environmental footprint of industrial installations • Increased public access to information on emission of all pollutants by individual industrial installations **Indirect benefits:**

administrative costs for those operators; costs induced by measures to improve chemicals management, circular economy and resource efficiency will depend on the complexity of installation's plans and systems • Administrative burden: at €101 million/year		• Enabling benchmarking of the environmental performance of different industrial activities • The potential reduction in pollutant emissions linked to use of safer chemicals is likely to have indirect benefits such as improving public health and labour productivity, reducing social and healthcare burden
Addressing decarbonisation of industry (PO4)	The scale of benefits of PO4 will depend on how energy efficiency and associated GHG and other pollutant emissions reductions incentivised via the IED may interact with the EU ETS framework. The benefits would include positive impacts on air quality; the efficient use of resources; waste production, generation and recycling; innovation and research; and levelling the playing field.	
Businesses	***National Authorities***	***Citizens and Consumers***
Direct benefits: • Economies of scale stemming from an integrated approach towards transformation (depollution and decarbonisation) • Improved energy efficiency **Indirect benefits:** • Encouraging more investment in developing and testing innovative techniques and technologies **Costs:** • Additional capital and operating expenditures related to energy efficiency measures implemented by operators is uncertain and would depend upon the response by IED operators, and whether those measures are needed to comply with other climate or energy law (e.g. the Energy Efficiency Directive). • Administrative burden: €28 million/year	**Direct benefits:** N/A **Indirect benefits:** • Cooperation between authorities in charge of the IED and the Energy Efficiency Directive should ease overseeing of overall implementation **Costs:** • Administrative burden: €21million/year	**Direct benefits:** • Information and better understanding of all GHG emissions (going beyond CO_2) **Indirect benefits:** • The potential reduction in pollutant emissions is likely to have indirect benefits such as improving public health and labour productivity, reducing social and healthcare burden

Industrial scope (PO5)	PO5 is the most significant option in terms of costs. It will more than triple the number of installations covered by the IED, mainly in the livestock-rearing sector. The tailored regulatory framework will significantly mitigate the associated administrative burden.	
Businesses	***National Authorities***	***Citizens and Consumers***
Direct benefits: • IED permitting provides a recognition that installations apply BAT, improving the green credentials of the company • Levelling of EU playing field **Indirect benefits:** • Encouraging more investment in developing and testing innovative techniques and technologies **Costs:** • Depending on the capacity thresholds, livestock production will bring additional 84 000-330 000 cattle farms and 77 000-187 000 pig and poultry farms under the IED scope, representing together with the farms already covered by IED less than the largest 10-40% non-subsistence farms, out of the c.1.5 million farms within these sectors. The tailored approach reduces the administrative costs associated with IED permitting by 20 to 30%, depending on the specific activity. Compliance costs will be both one-off (abatement techniques) and recurring and should be between €265-812 million/year • Other scope expansion will bring additional 1 500 to 1 900 installations under the IED that will be subject to full IED permitting, possibly including some SMEs. The associated costs for businesses should not surpass €265 million/year • Administrative costs of between €181-425 million/year stem mainly from IED related obligations (€145-390 million/year).	**Direct benefits:** N/A **Indirect benefits:** N/A **Costs**: • Depending on the capacity thresholds, livestock production will bring additional 84 000-330 000 cattle farms and 77 000-187 000 pig and poultry farms under the IED scope. The tailored approach reduces administrative costs associated with IED permitting by about 30% through • Other scope increase will bring additional 1500 to 1300 installations under the IED scope that will be subject to full IED permitting • Administrative costs: €141-385 million/year	**Direct benefits:** • Participation in permitting of installations responsible for significant emission of pollutants • Increased public access to information on emission of all pollutants by individual industrial installations **Indirect benefits:** • The potential reduction in pollutant emissions is likely to have indirect benefits such as improving public health and labour productivity, reducing social and healthcare burden • Minimum expected reductions in methane and ammonia emissions are valued at between €5 450 and €9 240 million per year (using damage costs and carbon price)

Annex 4: Analytical methods

INTRODUCTION

Due to the breadth of the sectors covered by the two policy instruments of the Industrial Emissions Directive and the Regulation on European Pollutant Release and Transfer Register, the Impact Assessment is not based on a single methodology, but rather on a variety of qualitative and quantitative approaches that have been synthesised qualitatively. Most Policy Options will likely induce various magnitudes of effects on agro-industrial operators, associated technology providers, Member States' Competent Authorities and the general public, which it is very difficult to quantify at high accuracy levels at the overall EU level. The assumptions and methods used for the assessment of these impacts are described in the respective sections in Annex 10.

The following summary of the analytical methods used subdivides the description into two parts:

- **PART A**: Industrial Emissions Directive
- **PART B**: E-PRTR regulation

A. IED - Tasks, Analytical Methods, Policy Screening, Impact Assessment of Measures and Overall Options

Overview of tasks and methods

The methods employed were developed according to the European Commission's Better Regulation Guidelines and Toolbox, adapted based on the time available to complete the Impact Assessment support work and the report team's wealth of practical experience in delivering impact assessments. For example, the report team previously led the 2019-2020 evaluation[21] of the current IED framework and was involved in the previous industrial emissions policy impact assessment completed in 2007, which are two key sources of evidence for this report.

The Impact Assessment support work was structured around seven tasks, represented in Figure A4-1 below.

Each task was based on and/or followed the EC's Better Regulation Guidelines and Toolbox. These are described below.

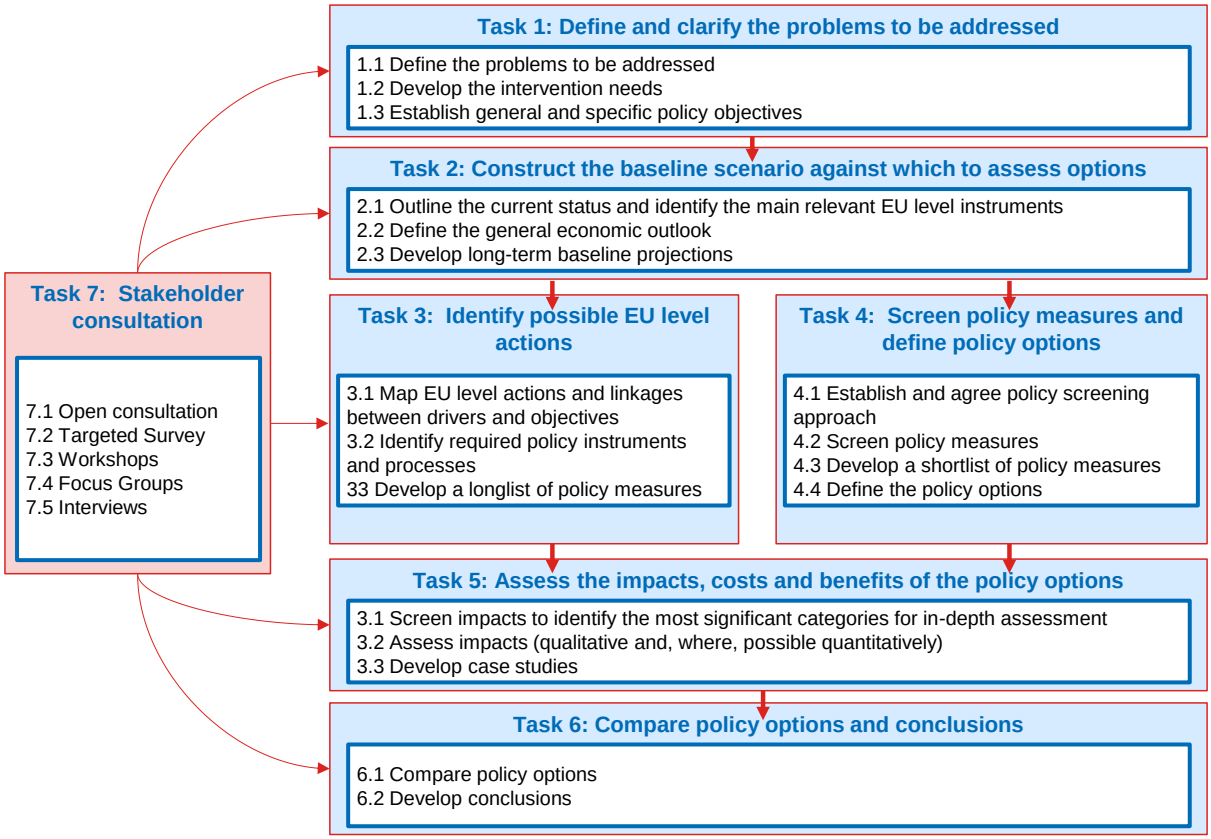
- **Task 1: Define and clarify the problems to be addressed.** The recent evaluation of the IED has been a key source of evidence to review, define and clarify the problems to be addressed as part of the revision for the IED. The approach taken to review the problems facing the IED was inspired on Tool #14 of the Commission's Better Regulation Toolbox. General and specific objectives were also set following Tool #16

[21] SWD(2020)181final: https://europa.eu/!HP74fW

and building on the European Commission's commitments as outlined within the European Green Deal and other published strategies and plans.

- **Task 2: Construct the baseline scenario against which to assess options.** The study considered how the status quo would likely evolve, including the existing problems as well as the Commission policy action without further policy change within the IED framework. This work was inspired in the broader Commission Better Regulation Guidelines, and particularly drawing from Tool #14 and Tool #17.

Figure A4-1: Overview of the tasks of the impact assessment support work



- **Task 3: Identify possible EU level actions.** Whilst the baseline was being defined, the study team engaged with the European Commission and stakeholders to develop a longlist of policy options that could address the problems identified. Tool #17 of the Commission's Better Regulation Toolbox sets out a process to consider a variety of policy measures in addition to the baseline that would address the problems and problem drivers as these might evolve, which was followed for this Study. Over one-hundred and thirty measures or actions were identified that could be adopted to address the problems facing the IED and contribute to achieving the objectives set.
- **Task 4: Screen policy measures and define policy options.** Not all policy measures or actions were viable. The report team therefore developed a screening process based on Tool #17 of the Better Regulation Toolbox. Eight criteria (see Section 3.1, this

Appendix) were established and defined, and experts employed a set of guidelines and judgement to rate each policy measure against these criteria. This screening process produced a draft shortlisted that was discussed and iterated with experts and the European Commission, and finally checked for suitability. Forty-four measures were retained for in-depth assessment and packaged into policy options that were aligned to the identified problem areas.

- **Task 5: Assess the impacts, costs and benefits of the policy options.** A longlist of possible impacts was developed and screening, based on Tool #19 of the Better Regulation Toolbox. From these, thirteen impact categories were identified as likely to be significant for a more in-depth assessment. Across these impact categories, different types of costs and benefits were considered in line with Tool #58-60 of the Better Regulation Toolbox. A multi-criteria analysis was employed, building on the policy screening process (Tools #57 and #63). An evidence-based qualitative scoring approach was taken to rate each policy measure and option.
- **Task 6: Compare policy options and conclusions.** This evidence on impacts, costs and benefits was employed to compare policy measures and options and develop conclusions as to whether a given option would contribute to achieving set objectives and generate benefits that would be likely to outweigh costs.
- **Task 7: Stakeholder consultation.** Stakeholder engagement was a horizontal task, central to this support study and feeding into all of the aforementioned tasks. The consultation activities and data analysis carried out in this Study were based on Tool #54 (and others) of the Better Regulation Toolbox. These activities included an open consultation, a targeted survey, workshops, focus groups and interviews.

Multiple methods were employed across these tasks, which may be grouped into three types:

1. Desk research and rapid evidence reviews
2. Analytical methods
3. Field research/ stakeholder feedback and validation.

The following sections describe the use of these methods in this report.

1. Desk research and rapid evidence review

Evidence utilised has been collected from literature (studies, reports, articles) to support the analyses in most of the tasks, especially in Tasks 1-5, in line with Tool #4 of the Commission's Better Regulation Toolbox. Four steps were generally followed:

- Review of the core sources for this report, such as the recent evaluation of the IED and the European Commission's Inception Impact Assessment and associated feedback.
- Carrying out an evidence mapping exercise to identify key needs and/or gasps.
- Undertaking a rapid literature review:

- Systematic web search with the use of search tools including Google, Google Scholar, Web of Science and others
- Coverage of a wide range of stakeholders' sources, such as industry, government, trade journals, etc.
- Considering a diverse set of document types, such as policy reports and studies; documents from the European Commission; grey literature (e.g. industry association briefings, etc.); proceedings of conferences, symposia, and meetings; academic articles.

- Screening of literature to determine the types of information contained and the extent that the data is reliable and sound.

The outputs of this process are the evidence base that underpins the impact assessment.

2. Analytical methods

A range of methods were employed to support this report. The following sections provide an overview to three methods employed to support the tasks outlined earlier. These are:

- Screening approaches
- Case studies
- Impact Analysis
- Standard Cost Modelling

2.1. Screening approaches

Screening exercises were employed across various tasks, especially in Tasks 3 and 4, for example, to develop long and short lists of possible and viable policy measures or options.

Each screening exercise consistent of at least five steps:

- Define the objectives of the screening process
- Develop and agree a set of screening criteria
- Carry out the screening exercise
- Review and assure outputs
- Develop conclusions

The primary screening exercise carried out was to develop the shortlist of policy options, moving from a longlist of over 130 policy measures to a shortlist of 44. Policy measures. This was an iterative process drawing on the evidence collected and expert judgement of the consultant team, experts at the Commission, and stakeholders consulted during this report.

The criteria for screening the policy measures (Task 4) were developed in accordance with Tool #17 of the Better Regulation Toolbox[22]. These criteria are outlined below.

[22] Tool #17. How to identify policy options. URL: https://ec.europa.eu/info/sites/info/files/file_import/better-regulation-toolbox-17_en_0.pdf

1. **Legal feasibility:** Policy measures must respect the principle of conferral. They should also respect any obligation arising from the EU Treaties (and relevant international agreements) and ensure respect of fundamental rights. Legal obligations incorporated in existing primary or secondary EU legislation may also rule out certain options. We have, therefore, considered whether measures were compatible with EU law and obligations arising from the EU treaties and international agreements, including by answering:
   - Is the measure compatible with EU Treaties?
   - Is the measure legally feasible to implement and enforce?
   - Will the measure respect fundamental rights?

2. **Technical feasibility**: It was considered whether the measures may be technologically and technically feasible to implement, monitor and enforce, including by answering:
   - Would the measure be technologically and technically possible to implement?
   - Is there a system in place to monitor the implementation and impact of the measure (or could it be established)?
   - Would Member State Authorities be able to inspect and enforce any possible sanctions under the measure?

3. **Stakeholder acceptability**: It was established whether the measure could garner the necessary stakeholder support for legislative adoption at the EU and MS level, including by answering:
   - Is the measure consistent with EU-level and MS policies and public positions?
   - Does the measure instil legislative certainty?
   - Could the measure cause competitive distortion (e.g. by limiting the growth of certain industries or creating discrimination between industries based in different Member States)?

4. **Effectiveness**: The external consultant team also explored the extent to which the measures could contribute to addressing the specific problem(s) and/or meeting the objectives that it is seeking to address. The following questions guided this exploration:
   - To what extent could the measure contribute to protecting the environment by reducing pollution (concerning air, water, soil and waste) and/or the use of potentially toxic substances?
   - To what extent could the measure contribute to achieving climate neutrality by 2050 and/or a more circular use of resources?
   - Does the measure directly promote or incentivise investment in technological innovation and/or rapid uptake of state-of-the-art technologies that can reduce the environmental footprint of industrial activities?

5. **Efficiency**: The external consultant team assessed at a high-level the extent to which measures can improve social, economic and environmental welfare in an efficient way, especially when compared to the alternatives. The following queries guided the assessment:
    - Could the measure have significant, positive social and environmental impacts e.g., reduced pollution, lower GHG emissions, lower use of resources, more green jobs, etc.?
    - Could the measure have a high-cost burden on consumers, businesses and/or public institutions e.g., higher price of consumer goods, lower production efficiency, etc.?
    - How do the expected benefits and costs compare?

6. **Proportionality**: The external consultant team determined the extent to which the measure can address the problem that it is targeting to explore whether this proposed way is proportionate to the costs or constraints that may arise from implementing the measure. The following questions guided this evaluation:
    - To what extent are the costs resulting from the regulatory actions taken by the EU proportionate to the potential environmental and health benefits?
    - Could the measure have a disproportionate impact on smaller companies?

7. **EU added value**: The external consultant team considered the likely advantages of EU-level intervention to resolve these problems, compared to actions at the national level, including - but not restricted to - answering the following :
    - Could the measure result in a more consistent approach across the EU than national-level alternatives?
    - To what extent could the measure help raise standards in those Member States which are lagging behind on environmental protection?
    - To what extent would the measure be more cost-effective at the EU versus national level?

8. **Coherence**: The compatibility of the measure with existing policy frameworks at the international and EU level (e.g., European Green Deal, Chemical Strategy for Sustainability, EU ETS legislation, E-PRTR, and UWWTD) was determined. In particular, the experts assessing this were guided by the following queries:
    - Is the measure compatible with EU acquis?
    - Is the measure coherent with the objectives and/or actions set out in the European Green Deal, the Chemical Strategy for Sustainability, EU ETS, E-PRTR and Urban Waste Water Treatment Directive revisions, etc.?

The experts carrying out the screening exercise scored the policy measure against each of these criteria: 5-high score, 3-medium score, and 1-low score, or any integer in between.

The external consultants' team developed general guidelines, outlined in Table A4-1 below, for what generally constituted each score for each criterion. These general guidelines were

aimed at providing some consistency to the task from the start, although the screening process was iterative and the experts carrying this out had multiple opportunities to come together and calibrate their assessment effectively based on evidence available and their expert judgement.

Table A4-1: General guidelines for scoring across each criterion

Criteria	(5) High score	(3) Medium score	(1) Low score
1 -Legal feasibility	Compatible with EU Treaties, and legally instruments to implement and enforce are available.	Compatible with EU Treaties, but some doubts as to whether legal instruments are readily available to implement and enforce.	Not compatible with EU Treaties or no legal instruments available.
2-Technical feasibility	Technology and techniques available to implement, monitor, inspect and enforce measure.	Technology and techniques available to implement measure, but doubts on how to monitor, inspect, and enforce measure.	Measure cannot be implemented technically, or measure cannot be enforced, inspected, or monitored.
3-Stakeholder acceptability	Consistent with policies and public positions, instils certainty and does not cause distortions.	Consistent with policies, but not necessarily fitting with public positions or instil certainty.	Inconsistent with current policies, not necessarily fitting with public positions, instil certainty and could cause unwanted market distortions.
4 -Effectiveness	Contributes significant/clearly to one or two of: protecting environment, climate neutrality, circular use of resources, encouraging innovation.	Contributes, potentially, to one or two of: protecting environment, climate neutrality, circular use of resources, encouraging innovation.	Doubtful contribution to any of: protecting environment, climate neutrality, circular use of resources, encouraging innovation.
5 -Efficiency	Evidence of clear benefits to limited costs or significant benefits to some acceptable/ proportionate costs.	Doubtful evidence on benefits but limited costs, or clear evidence on strong benefits and doubtful evidence on potentially high costs.	Limited expected or high uncertainty on benefits, but some or clear evidence on high costs.
6 -Proportionality	Benefits are high and/or address objectives at the lowest possible cost, based on evidence. SMEs not impacted disproportionately.	Benefits are high and/or address objectives at relatively low cost, based on evidence, but SMEs affected disproportionately.	Costs are too high for potential benefits -e.g. industry struggle to compete, etc.- based on evidence. SMEs affected disproportionately.
7 -EU value added	Bringing more consistency across the EU, raising standards across countries, and more cost-effective at EU-level.	Clear evidence on one or two of: Bringing more consistency across the EU, raising standards in some countries, and more cost-effective at	Unclear evidence on any of: More consistency across the EU, raising standards across countries, and more cost-effective at EU-level.

Criteria	(5) High score	(3) Medium score	(1) Low score
		EU-level.	
8 -Coherence	Compatible with EU acquis and coherent with EU plans/strategies' objectives.	Compatible with EU acquis and coherent with some of EU plans/strategies' objectives.	Not compatible with EU acquis or coherent with a limited set of EU plans/strategies' objectives.

The output of this exercise is a robust and consistent shortlist of retained policy measures selected to tackle the problems and drivers identified in Task 1. This shortlist of measures packaged into policy options and taken forward for an in-depth assessment of their potential impacts, costs and benefits.

2.2. Case Studies

Three sectors were selected to develop case studies of expected industrial transformation needs. The objective of the case studies was to explore with expert representatives from specific industries, Member States' authorities and NGOs what could be the expected potential impacts on emissions of GHG and other key environmental pollutants, via anticipated transformation in the specific industry sectors selected. Secondly, how might the existing IED framework, and proposed changes to the IED/ E-PRTR regulatory instruments, impact thee changes.

Sectors were selected by a process of comparing evidence on the availability of alternative processing/ production techniques with an estimate of the level of transformation that would most likely be required, on a sector-by-sector basis, as pertinent to the highly carbon-relevant IED sectors listed below:

- Iron and steel
- Glass and ceramics
- Chemicals
- Downstream oil and gas (refineries)
- Pulp and paper
- Cement
- Textiles
- Slaughterhouses

Experts within the consultancy consortium carried out a shortlisting assessment, taking into consideration the two main criteria (level of transformation needed, and techniques' availability) outlined above. This assessment concluded that the following three sectors should be taken forward, based principally on the following arguments:

- **Iron and steel** - on the grounds that a variety of decarbonisation solutions should be available to this sector in the near- to mid-term;

- **Downstream oil and gas** (refining) - with regard to the adaptation to bio-derived feedstocks and also higher percentages of bio content in end-products; and
- **Cement** - with regard to possibilities for the incorporation of additional quantities of "waste" as fuel feedstock, circular economy possibilities with regard to reused concrete "demolition waste" as an ingredient, as well as evolving cement and clinker techniques.

A case study for each of these three sectors was developed, based on the most recent publicly available evidence, expert opinion and information collected through the consultation activities carried out for this report.

2.3. Impact Analysis

The impacts of the IED and, therefore, any necessary revisions are inherently dependent upon the independent BREF process and the associated BAT conclusions. Moreover, technological progress is very uncertain; therefore, the evidence available has limitations as to the (especially future) technologies that operators might adopt as a result of changes to the IED, how much these might cost and the specific extent to which their adoption might lead to better environmental performance.

These and other limitations have meant that the impact analysis has been built on a partial evidence base, which has then been complemented by informed expert judgement and opinion.

A qualitative analysis framework inspired by both Multi-Criteria and Cost-Benefit Analysis (as per Tools #57 and #63 of the Better Regulation Toolbox) was employed. Six steps were followed, as shown below:

- Identification of the **key economic, environmental and social impact** categories for a more in-depth assessment, defined these categories practically, and selected proxy indicators that helped to build an evidence base and understanding of the scale of potential impacts.
- Development of a **qualitative scoring framework** on a scale of "-10 to +10 points" for policy measures across each impact category. Individual policy measures were qualitatively scored, summed up and amalgamated into a rating at the 'policy option' level (or combination of policy measures). The scoring reflects the direction (positive or negative) and magnitude (weakly to strongly, limited or unclear) of the qualitative assessment of the likely impacts.
- Mapping and assessment by a **team of experts** with respect to impacts of measures across the categories, each expert covering between 3-8 measures from the original shortlist of over 50 measures.
    - Experts were encouraged to use their existing specialised knowledge in their domain, as well as the outputs of the policy screening exercise, together with readily available evidence regarding the subject of the measures. This enabled the experts to score the proposed measures against the impact categories in a first and rapid two-week iteration. This iteration also centred on identifying

key evidence gaps. Sources of evidence for this iteration included, as already mentioned, the recent IED evaluation and Inception Impact Assessment, complemented by data from Eurostat, E-PRTR, the EU Registry, and a range of sector-specific literature, studies and publications.

    - Three additional iterations were conducted, each time building on any additional evidence identified and the ongoing adjustments to measures from interactions with stakeholders and the European Commission.

- A **re-calibration exercise** was carried out after every iteration from the team of experts and comments were provided by the consortium economist lead. This was to ensure that the ratings were internally coherent within teams, across teams, and challenged constructively overall to achieve consistency and consensus. The scope of the measures and evidence of the likely scale of impacts were used to test and validate the relative position of each measure in terms of its economic, environmental and social impacts.
- A **policy/ impact aggregation exercise** was implemented upon the definition of policy options. The qualitative and quantitative analyses were carried out for individual measures. It should be noted that aggregated **policy options** might combine up to as many as sixteen discrete measures (e.g., PO1). This exercise was centralised, and an index was developed to ensure that the aggregation of points across the impact categories, costs and benefits from combining policy measures could be mapped on to the -10 to +10 scale utilised.
- **Validation and quality assurance** activities were also taken forward with a team of experts within the consultant team.

Key economic, environmental and social impact categories

All key impacts of the policy measures on the core stakeholders – public authorities, industry (large and smaller businesses), citizens and workers, third countries – were identified, mapped, and screened. An assessment of the expected absolute and relative magnitude of these impacts and their likelihood was carried out in line with Tool #19 of the EC's Better Regulation.

The result of this screening of impacts was that thirteen economic, environmental, and social impact categories were selected for use in the in-depth impact assessment as part of this study, outlined in the Table below. For clarity, a brief description is provided of the specific impacts and proxy indicators considered in this assessment of options for the revision of the IED.

Table A4-2: Significant impacts for in-depth assessment and core indicators

Broad impact category[23]	Specific impact category	Description
Economic impacts	Administrative burdens on businesses	Any administrative costs, enforcement costs and/or direct regulatory charges, including but not only through the permit application, derogation and BREF processes, monitoring and reporting, hosting inspections, etc.
	Operating costs and conduct of businesses	Substantive compliance costs, that is, the additional capital expenditure and/or operating expenditure (excluding administrative burden) that are required to comply with the policy measures' requirements. This may include upgrading installations and equipment, using alternative inputs of production, etc.
	Competitiveness of businesses	Comparative advantage of the industry in an international context and how this may be affected by changes to the costs of doing business in the EU; and any impacts on the level playing field in the EU.
	Position of SMEs	Overall costs of the measures on the industry across differences in business size; that is, whether the average administrative and compliance costs per employee are comparable across larger and smaller businesses or there is a significant difference in the impacts by size.
	Innovation and research	Level of investment in Research and Development and expected innovation outcomes that may result from the implementation of proposed measures.
	Public authority impacts	Administrative, compliance and enforcement activity by public authorities and other costs related to the BREF, permit-setting and derogation-granting processes; compliance assessments and inspections; and/or ensuring public access to permit procedures, among others.
Environmental impacts	Climate	Emissions of Greenhouse Gases into the atmosphere (tonnes of CO_2 equivalent)
	Air quality	Emissions of pollutants to air, which may include NOx/SOx, NMVOC, dust, NH_3, Hg, or any other pertinent pollutant.
	Water quality and resources	Releases of heavy metals (Cd, Hg, Pb, and Ni), N and P or any other pertinent pollutant to water.
	Soil quality or resources	Emissions of pollutants to soil, which may include Arsenic, Cadmium, Chlorides, Chromium, Copper, Halogenated Organic compounds, Lead, Mercury, Nickel, Polychlorinated Biphenyls, Total Phosphorus and Zinc.
	Waste production, generation and	Volume of waste generated (tonnes) and recycled (tonnes).

[23] The assessment of social impacts and associated ratings focus on how the measures may affect employment levels across the EU. Public health and public health system impacts are indirectly related to environmental impacts and, therefore, are captured within this category and noted for completion. Similarly, reductions in polluting emissions may indirectly affect labour productivity and other economic impact categories. These benefits, where directly related to the environment and usually captured as part of the monetisation of these benefits through the use of damage cost functions, have been qualitatively captured in the environmental impacts category to avoid confusion with the analysis and interpretation of the ratings.

Broad impact category[23]	Specific impact category	Description
	recycling	
	Efficient use of resources	Volume of energy consumed (TWh), volume of "virgin" water consumed (m^3) and volume of "re-cycled" water consumed (m^3).
Social impacts	Employment	Number of employees, in full-time equivalent, in industry and/or public authorities.

Qualitative scoring framework

Having identified the thirteen impact categories of special significance for this Study, a qualitative scoring framework was developed, first on a scale of -10 to +10 points for policy options (or combination of policy measures). This was to ensure that the framework was effective at showcasing the relative significance of the impacts of policy measures, also when comparisons were made at the higher level of 'options' and 'packages of options', whilst maintaining internal coherence.

The scoring reflects the direction (positive or negative) and magnitude (weakly to strongly, limited or unclear) of each measure, option, or package of options. The language used to describe each measure's potential economic, environmental or social impacts was based on uniform descriptors outlined in Table A4-3 below, with intermediate scoring options being allowed along the spectrum.

Table A4-3: Coding used to present expected impacts

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Extremely negative	Strongly Negative	Weakly negative	No or limited impact	Weakly positive	Strongly Positive	Extremely positive	Unclear

Guidance was provided to the project team, to ensure that even though the assessment was qualitative, an iterative process with a centralised re-calibration exercise was always expected and planned from the start.

Firstly, the scope was considered:

- "No or limited impact" would be used where a measure/ option affected <1% of the installations in the baseline or equivalent
- "Weakly (negative or positive)" would be utilised where a measure/option affected 1%-10% of the installations in the baseline or equivalent
- "Strongly (negative or positive)" would be used for a measure/ option affecting 10% - 75% of the installations in the baseline
- Conversely, neither 'weakly' nor 'extremely' would be allowed in the rating scheme where a measure/option affected the above range of 10% - 75% of the installations in the baseline

- The use of the highest rating, i.e., 'extremely' (negative or positive) would be restricted to those measures/options affecting **>75%** of the installations. The most striking illustrative example of this category concerns the options expanding the IED's scope to include cattle farms and additional IRPP farms, which would affect a number of installations equivalent to more than 300% of the baseline scenario.

Secondly, the intensity of the expected impact when compared to the baseline on a per unit basis was explored via a similar rating scheme

- 'No' or 'limited' impact would relate to a measure/option that could lead to a change of <1% in a unit cost or benefit (e.g. administrative burden)
- 'Weakly (negative or positive)' would relate to a measure/option that could lead to a change of >1%-20% in a unit cost or benefit
- Neither 'weakly' nor 'extremely' (negative or positive) would be allowed to be used where a measure/option could potentially lead to a change of between 20%-75% in a unit cost or benefit
- 'Extremely' (negative or positive) would be reserved for those cases in which a measure/ option could lead to a change of >75% in a unit cost or benefit. Again, a representative example of the use of 'extremely' is the proposal to include over 160 000 additional farms in the scope of the IED via PO5a options (IED measures #31, #32 and #33) ; this yields huge environmental benefits, and at the same time is likely to increase the administrative burden considerably, even with a tailored permitting framework.

These two sets of overall guides were considered by the experts in the project team and combined with their knowledge and expert opinion. The outcome was the production of a qualitative rating that was supported by the evidence available.

Thirdly, experts carried out a scoring exercise following the scale outlined in Table A4-3, that is, on a scale of -10 to 10 points, to enable comparability and coherence between policy measures and options with very different and varied degrees of impact. These adjustments were carried out centrally, with support from the expert teams, to maximise coherence and comparability.

To avoid confusion across categories, the qualitative assessment employed focussed on direct impacts of the policy measures (or options). As an illustration, significant and direct environmental impacts from the retained policy options, especially on air quality, are also likely to have substantial and positive indirect effects on human health and the public health and social care system across the EU and potentially beyond, which would in turn yield significant positive social impacts. These impacts would also benefit the economy by improving labour productivity and other economic factors.

These indirect impacts have been captured as part of the qualitative assessment of **environmental impacts;** however, in order to avoid 'double-counting', these indirect impacts have **not** been added into the consolidated qualitative ratings for economic impacts, or social impacts.

As a further point of clarification, the qualitative scoring framework of -10 to 10 points was identified as the most effective scoring range to ensure that two complementary aims were achieved:

- Reflecting, as proportionately as possible, the differences in expected impacts across policy measures, policy options and packages of options. As an illustration, a small number of policy measures (e.g. IED #31, part of PO5a on Livestock Rearing) was assessed to have benefits of more than 10 times the points (or number of 'ticks') than other policy measures (e.g. IED #17, part of the Emerging Techniques suites of measures in PO2a). However, when balancing the overall comparison, it is necessary to broadly maintain this comparative numerical relationship in a coherent manner whilst successfully proportionately mapping the individual assessments onto the single "-10 to +10" selected point scale.
- The internal coherence of the scoring framework in difference contexts needed to be ensured, such as when it is employed to assess measures across each of the thirteen impact categories. The scoring framework needs to allow a summation of the allocated points, to enable them to be mapped, to then produce an assessment at the total policy measure level, and subsequently one step further, by summing and mapping at the higher levels of policy option, or policy package. As an illustration, three policy measures (e.g. IED #31-33, measures under PO5a –Rearing of Animals) were assessed to have benefits of three to six points (or 'ticks'); therefore, when grouped together as the policy option level (PO5-a), this agglomerated policy option has to have six points (or 'ticks') – possibly more, depending on fine tuning, to ensure internal coherence when using the qualitative scoring framework, i.e., the "-10 to +10 point" scale.

On an overall scale of impacts, the majority of policy measures (and options) are expected to have significantly lower impacts than measures and options related to expanding the scope of the IED, i.e., the PO5 series of measures and options. The end member of highest 'points' scoring is PO5-a (extending the scope of the IED to include cattle and additional installations of IRPP). Without utilising a sufficiently wide scale such as that selected (i.e., the -10 to +10 point scale), the majority of non-PO5 policy measures, of much less significance than PO5-a, would become almost *de minimis* by comparison, solely registering a score in the lower 'points' of the scale (e.g. between 0 and 1). Therefore, the chosen -10 to +10 point scale was favoured over narrower more conventional options, such as point scale ranging from -5 to +5, to enable an adequate differentiation of magnitudes to be appreciated. This is further considered in 'Policy/ impact aggregation' below.

Detail on the inputs used by the teams of experts

The teams of experts mapped and assessed impacts of measures across the categories, each expert covering between three to eight measures from the original shortlist of over 50 measures.

- These experts were encouraged to use their existing knowledge and readily available evidence to score qualitatively in a first and rapid two-week iteration where evidence

gaps were identified. Key sources already mentioned - including the recent IED evaluation and Inception Impact Assessment - were complemented by data from Eurostat, E-PRTR, the EU Registry, and a range of sector-specific literature, studies and publications.

- Three additional iterations were conducted for the measures being considered. Each iteration built on additional evidence identified during the process, also taking into account any ongoing adjustments to measures resulting from interactions either with stakeholders or the European Commission key IED/ E-PRTR team and Inter-Service Steering Group.

Re-calibration exercise

The outputs of the assessment by the team of experts were brought together and reviewed by a central team, including the lead economist of this project, after each iteration. This re-calibration exercise was performed multiple times, and also served as a way to identify evidence needs, doubts and areas for further exploration. It also allowed the team to produce overall rankings of measures/options, e.g., in terms of their scale and direction of potential net impacts, which the team could test with a wider network of experts available to the consortium of consultants, as well as with the European Commission and stakeholders.

Policy/ impact aggregation

A centralised team also used the ratings by measure to aggregate impacts up to the level of policy options (i.e., combinations of measures). An index (or mapping approach) was developed to ensure that the aggregation of 'points' across the impact categories, costs and benefits from combining policy measures could be mapped to this -10 to +10 scale coherently.

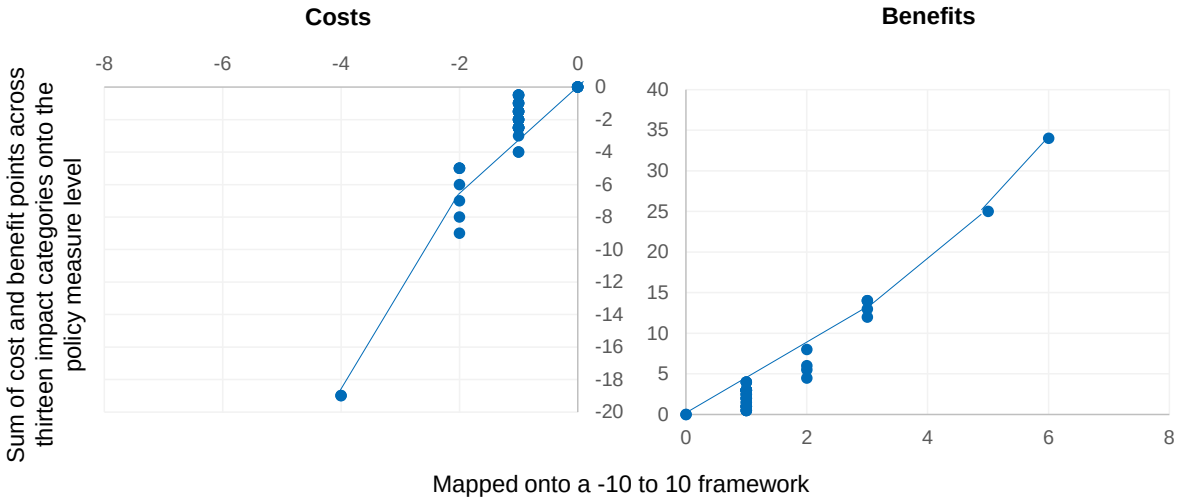
For example, "+1 to +4 points" on environmental impacts would represent one green tick, whereas a score of "-25 to -21 points" on economic impacts would represent five crosses. Finally, for internal coherence, this index had to be rated against the maximum number of ticks and crosses that could be achieved in the event of developing a package of all of the policy options available (or those alternatives with the greatest impacts) with respect to the extremities of the scale, i.e., -10 or +10 points.

Further re-calibration was also required during this policy aggregation exercise. In particular, the exercise highlighted that the weight of specific measures might not be as representative as expected. Therefore, any such doubts were reviewed and contrasted with the expanding evidence base. Generally, this exercise did not generate any *different* overall ratings or conclusions per measure, but instead improved the ability to differentiate and compare between options (i.e., combinations of multiple measures) and their internal coherence.

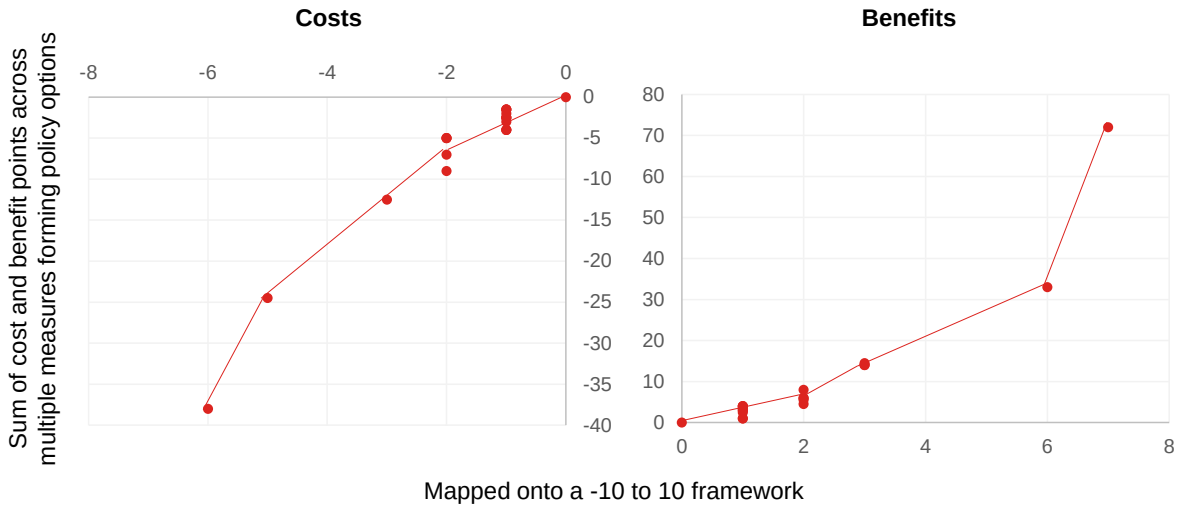
Overview Summary of Steps with Visual Depiction

To illustrate this and earlier steps, as well as the rationale for using a scale of -10 to +10 points, the descriptions provided so far are complemented by a brief recapitulation and some visual illustrations.

- First, each measure was assessed against thirteen categories using the -10 to +10 point scale to maintain the expected relative position of measures across each of these categories (e.g. relative costs and relative benefits, etc.) as much as possible.
- Secondly, having scored each measure across the thirteen categories, it was necessary to aggregate this up to the measure level for the three broad impact categories (environmental economic and social), together with the costs and the benefits, so that each measure could be assessed and compared. This meant that a mapping exercise was required between the sum of all the 'points', e.g. all the costs and benefits, onto the proposed -10 to +10 scoring scale. The figure below illustrates how this mapping was performed, to maintain a broadly proportionate position for each of the policy measures.



- Thirdly, policy options (or combination of measures) also needed aggregation of 'points' against each broad impact category, as well as total costs and total benefits for their assessment and comparison. A mapping exercise was again required between the 'sum of all the points of the measures making up each option' and the -10 to +10 point scale. The figure below illustrates this mapping and shows the limitations, whilst keeping a relatively proportionate position for each of the policy measures, on a "-10 to +10" point scale. Neither the costs nor the benefits graphs below represent one strictly linear relationship between allocated points. The explanation is because, as policy measures are progressively packaged into the options with the varying scale and/or depth of change required, the differences in relative impacts across them grow further apart. This effect can be noted most markedly between points -5 and -6 in "costs", and between points +6 and +7 in the "benefits" aggregated plots.



- Fourthly and finally, leading policy options can be aggregated into a preferred policy package. Therefore, the maximum points that could ever be obtained from any combination of policy options must map onto the overall "-10 or +10 points" scale, so that the preferred policy package can be depicted, whilst retaining internal coherence. It is at the third and fourth stages in the scoring and aggregation process that the E-PRTR-related options were added, and carefully scored in full calibration with their estimated weight of qualitative impacts compared to the IED policy options.

The value of a "-10 to +10 point" scale is that it depicts and compares concisely and proportionately the relative position of policy measures, policy options and potential packages of these options, whilst ensuring internal coherence.

Validation and quality assurance

Validation and quality assurance activities were organised with a team of experts within the consultant team. This included the review and testing of the resulting balance of costs and benefits per policy measure/ option. The overall ranking of policy options, in terms of the scale and direction of total and net benefits, as well as across impact categories, were also presented to test and validate their relative position.

Finally, where evidence was available, a more traditional cost-benefit analysis framework was employed. This was primarily the case for assessing policy option to expand the scope of the IED to also include cattle farming and more rearing of pigs and poultry installations. The methods employed follow the guidelines provided by Tool #59 of the Better Regulation Toolbox. This analysis, nevertheless, was partial and only included the core costs and benefits expected from this policy option.

2.4. Standard Cost Modelling

A bottom-up cost modelling approach was employed to estimate the additional administrative costs (or administrative burden) on businesses and public authorities that would result from the adoption of the retained policy measures or options inspired by the Standard Cost Modelling approach outlined in Tools #59-60 of the Better Regulation Toolbox.

In line with Tool #60 especially, three general steps were taken:

1. **Preparatory analysis**. Firstly, this included the qualitative identification of the scope and type of potential administrative impacts of the retained measures (and options) on businesses and public authorities. This was then followed by the identification of evidence needs, e.g., baseline administrative requirements and additional inputs required, their intensity and frequency over a period (e.g. 20 years, as used here) and unit costs. Finally, sources were identified and desk research and a rapid evidence review was carried out, building on the recent IED evaluation, the previous IED impact assessment, the consultation activities, and other key sources of evidence.
2. **Data capture and standardisation**. The data available was collated for all the parameters identified in step 1, generally structured and saved within an Excel workbook.
3. **Calculation**. A specific baseline for each measure was quantified in line with the general baseline established as part of Task 2, and the potential additional administrative costs (that is, the administrative burden) generated by the retained measures or options were calculated employing the bottom-up cost modelling approach

Where evidence was available, estimates were produced for the effects of the measures or options on administrative burden over a period of 20 years (in constant 2020 euro), and annual average figures were developed and presented for comparison. Generally, this included estimates of the additional administrative costs (or burden) and savings associated with changes to the BREF and permitting processes in intensity, frequency and/or scope (one-off costs), as well as monitoring and reporting and enforcement and activities linked to inspections (recurrent costs). These assessments were quality assured by experts in the consultant team and validated, and uncertainties and sensitivities considered.

Basic assumptions behind all calculations are provided in Table A4-4.

Table A4-4: Cross-cutting evidence-based assumptions employed in the impact assessment

Specific indicator	Evidence-based assumptions	Comments and sources
Number of existing IED installations in the baseline	**52 000**	Average of the latest three years of data available via the EU Registry
Number of new IED installations expected each year in the baseline, on average	**500**	Average based on baseline data analysis carried out for this report
Number of permit reconsiderations (and updates) every year in the baseline, on average	**5 200**	Average based on the assumption that permit reconsiderations and updates may take place at least once every 10 years, in line with the BREF cycle
Number of BREF reviews completed in a period of 20 years	**60**	Based on the assumption that a BREF occurs at least once every 10 years, thus each of 30 sectors will be reviewed at least twice in the 20-year period
BREF review costs for one sector-operators (2020 €)	**€1 million - €7 million**, with a central estimate of €2 million	Based on the recent IED Evaluation (Ricardo et al, 2020)
BREF review costs for one sector-public authorities (2020 €)	**€3 million - €14 million**, with a central estimate of €5 million	Based on the recent IED Evaluation (Ricardo et al, 2020)
One-off costs of issuing new permits -public authorities (2020 €)	**€3 250 - €35 000**, with a central estimate of €23 400	Based on evidence from the IED IA 2007 (EC, 2007), adjusted for inflation over the period (GDP Deflator sourced from the World Bank and Eurostat), and contrasted with evidence gathered through the recent IED Evaluation (Ricardo et al, 2020)
One-off costs of issuing new permits -operators (2020 €)	**€10 000 - €62 250**, with a central estimate of €28 000	Based on data collected through stakeholder engagement for this report, the IED Evaluation in 2020 (Ricardo et al, 2020), and a study to analyse differences in costs of implementing EU policy (EC, 2015)
One-off costs of permit reconsiderations and updates -public authorities (2020 €)	**€1 600 - €17 500**, with a central estimate of €11 700	Based on an assumption employed in the IED IA 2007 (EC, 2007) that permit reconsiderations and updates costed around 50% of the permit issuance costs
One-off costs of permit reconsiderations and updates -operators (2020 €)	**€1 500 - €31 250**, with a central estimate of €14 000	Based on evidence provided by stakeholders engaged for this report, and complemented by evidence from the IED IA 2007 (EC, 2007).
Annual costs for managing information and systems - public authorities (2020 €)	**€100 - €3 000** with a central estimate of €2 000	Based on evidence provided by stakeholders engaged for this report and the recent IED Evaluation (Ricardo et al, 2020)
Annual monitoring and reporting costs-operators	**€150 - €12 000** with a	Based on evidence provided by stakeholders engaged for this report and the recent IED

Specific indicator	Evidence-based assumptions	Comments and sources
(2020 €)	central estimate of €8 000	Evaluation (Ricardo et al, 2020)
Inspection costs every two years -public authorities (2020 €)	**€500 - €12 000** with a central estimate of €9 600	Based on evidence provided by stakeholders engaged for this report and the recent IED Evaluation (Ricardo et al, 2020)
Inspection costs every two years -operators (2020 €)	**€125 - €5 000** with a central estimate of €4 000	Based on evidence provided by stakeholders engaged for this report and the recent IED Evaluation (Ricardo et al, 2020)
One-off applications for derogations or exemptions - public authorities (2020 €)	**€550 - €4 250**, with a central estimate of €850	Although the burden is primarily on operators to develop and submit the application, it is assumed that public authorities spend half as much effort reviewing and engaging in the process
One-off applications for derogations or exemptions - operators (2020 €)	**€1 100 - €8 550**, with a central estimate of €1 700	Based on evidence from IED IA 2007 (EC, 2007), suggesting applications for derogations could require between 40 to 300 worker hours
One-off baseline reports - public authorities (2020 €)	**€4 000 - €20 000**, with a central estimate of €10 000	Based on an assumption public authorities would engage with baseline reports provided by operators and spend around 20% of the effort
One-off baseline reports - operators (2020 €)	**€20 000 - €100 000**, with a central estimate of €50 000	Based on the recent IED Evaluation (Ricardo et al, 2020)
Average hourly labour costs in EU-27 (2020 €/h)	**€29/h**	Latest Eurostat statistics for EU-27 (Eurostat, 2021)

3. Field research/ Stakeholder Feedback and Validation

As part of the study, a number of stakeholder consultation activities were carried out between December 2020 and Sept 2021 to confirm the problem definition and policy objectives, to gather insights and evidence on the policy measures and options identified, and assess the potential impacts of the longlisted and shortlisted policy measures and options aimed at addressing the problems identified. This enabled the potential policy measures and options to be discussed with stakeholders, as well as obtaining their feedback and validation of the draft ongoing evaluations being made.

These activities were carried out in line with the Better Regulation Guidelines (Chapter VII: Guidelines on Stakeholder Consultation and Chapter III, Guidelines on impact assessment). Four broad steps were taken across these activities.

- Development of a Consultation Strategy, mapping the scope and objectives of the consultation, listing key targeted stakeholders, consultation activities and a proposed timetable.
- Preparation of the Consultation documentation for each of the activities.
- Announcement and communication with stakeholders following due process.
- Documented stakeholder engagement.

The consultation activities are summarised in the Annex 2 synopsis, and a fuller description of the public consultations and their results is described in greater detail in Annex 12 (Extended summary of consultation activities).

These consultation activities included:

- An open public consultation launched on 22 December 2020 and open until 23 March 2021.
- Targeted stakeholder survey launched on 8 February 2021 and open until 9 April 2021.
- Two stakeholder workshops that took place in December 2020 and June 2021.
- Seven focus groups that took place between June and July 2021.
- Three case studies that were compiled in July 2021, based on feedback from three of the focus groups, coupled with external data, publicly available sectoral roadmaps and expert "foresighting"-type methods, to explore the likely evolution of three different sectors going forwards from the 2020s to the 2030s and beyond
- A series of one-to-one stakeholder interviews / correspondence between June and Sept 2021.

B. E-PRTR - Tasks, Analytical Methods, Policy Screening, Impact Assessment of Measures and Overall Options

1. OVERVIEW OF TASKS AND METHODS USED

The **analysis of problems** followed the major steps advised in BR Guidelines Tool #14. **Intervention logic**, an analytical tool used to understand and visualise how an intervention solves a specific challenge, was used to establish the links between problem drivers and policy options.

The development of the **baseline and analysis of options**, including the development of baseline, was based on the principles set out in BR Guidelines Tool # 17. In particular, an initial set of E-PRTR (sub)policy options was screened by using a set of criteria for determining which options to include or not as advised in BR Guidelines Tool # 17.

A description and, where possible, quantification of the economic, social and environmental **impacts** of the short-listed options was performed, following BR Guidelines Tool # 19. The main direct impacts were quantified and monetised (for both the baseline and the policy options under consideration). Furthermore, indirect impacts were quantified, where possible, and if not then they were assessed qualitatively with a clear indication of their nature and likely magnitude. **Costs and benefits** were disaggregated, as far as possible, according to each identifiable action under the different options and identified according to the standard typology of costs (e.g., administrative, enforcement) and benefits (BR Guidelines Tool #58 and #59). The **assessment** was undertaken in line with the Better Regulation Guidelines and, in particular, Chapter 8 of the Toolbox ("Methods, models and costs and benefits"). The overall qualitative scoring mechanism was carefully aligned with that utilised in the IED evaluation, as explained in Part A, Section 2.3 of this Annex.

Stakeholder consultation followed the advice outlined in BR Guidelines Tools # 53 – # 56. In line with BR Guidelines Tool #54, **questionnaire surveys** were used to allow the stakeholders and the public to voice their opinions on the improvement of the E-PRTR. To avoid limitations of a questionnaire survey in terms of the focus on pre-defined answer options, open questions and follow-up **interviews** were designed. **Descriptive statistics** and MS Excel were used for the analysis of quantitative data. Visual aids were used for the presentation of quantitative data. For interpreting qualitative data **thematic analysis** was applied and supported by NVivo content analysis software.

4. DATA SOURCES AND ANALYTICAL SUPPORT

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

Evidence and literature have been sourced via a number of routes: from references in the terms of reference for the E-PRTR impact assessment support study; from current work being undertaken by project partners; from reports and other evidence signposted by the European Commission; 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.

The analysis of reported E-PRTR data, to date, has also been a key source of information, providing the likely number of facilities to be impacted by different policy options.

The inclusion of additional activities and the assessment of the administrative burden has been informed by the consultation of Eurostat statistics and the EU Registry on Industrial Sites. Consultation of other EU environmental legislation and the European Chemicals Agency's databases informed the suggestions for inclusion of additional pollutants within the E-PRTR.

5. CONSULTATIONS

a. Open public consultation (OPC)

The shared IED and E-PRTR online OPC offered the opportunity for interested individuals from any type of stakeholder groups to give their opinion on the revision of the IED and E-PRTR Regulation. The OPC was launched on the Commission's website.[24]

The questionnaire included 24 questions, of which four were specific to the E-PRTR. Submissions to the OPC were analysed qualitatively and quantitatively. All multiple-choice questions were summarised for results by stakeholder group.

b. Targeted stakeholder engagement: online survey

To gather more in-depth information from those stakeholders already possessing a good understanding of the E-PRTR and it implementation, a combination of targeted stakeholder consultation methods was used. A targeted online survey was utilised to gather the views of key groups of stakeholders, including Member States' authorities (at any level of administration and E-PRTR implementation), industry sector (individual companies or trade associations) or other types of organisations (e.g. environmental or civil society NGOs, research bodies, etc).

c. Interviews

Targeted telephone interviews to complement the online survey took place with representatives of regional and national competent authorities, European institutions, representatives of non-EU PRTRs, representatives of the Kyiv Bureau, industry associations, civil society, and other key stakeholders.

d. Focus groups

Focus group discussions were held to complement the online survey and interviews. 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. Two focus groups were organised to tackle different problem areas.

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

e. Stakeholder workshops

Two workshops were held online prior to commencing the consultation process, and after the OPC and the TSS had closed.

6. ROBUSTNESS OF THE EVIDENCE

a. Overview

The level of credibility varies with regard to each source of information that has been used for the assessment. 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 that the interested party may 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 assessment, industry holds opposite views to researchers and NGOs on many of the problem areas identified. In general, industry opposes drastic changes to the scope of the Regulation, pointing to the potential for significant increases in the administrative burden. Conversely, researchers and NGOs would like to see a significant revision of the Regulation. It seems relatively likely that authorities' opinions might be more objective, although individual Member States may also have specific outcomes in mind. It is therefore not surprising to find that Member States' opinions largely lie between those of NGOs/ researchers and industry.

To deal with the above issues, stakeholder opinions have been compared across the different stakeholder groups and in view of their different interests, a more robust composite stakeholder overview has been derived.

b. Levels of confidence

The level of confidence in the assessment is a result of the robustness of each of the individual information sources used and the degree to which the different sources could be used to corroborate each other.

The weakest confidence level is considered to be associated with answers where the only information available is stakeholder opinion. Since, in this case, most questions have been answered by all stakeholder groups, there is reasonably high degree of certainty that these answers have not been corrupted by a concerted effort to manipulate the findings. Where the

different stakeholder opinions are largely convergent, we can more likely have a higher confidence level 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 focus groups.

Where it is possible to compare findings from literature with stakeholder opinions, a much higher degree of confidence can be placed in the findings.

The highest degree of confidence is provided where multiple sources of information corroborate one another, taken together with multiple stakeholder opinions.

In the case of the assessment of the administrative burden, it has not been always possible to isolate completely the burden attributable to the E-PRTR Regulation from that attributable to the IED completely. Even the stakeholders involved in the implementation of these two legal instruments found it difficult to clearly separate the tasks, and, as such, the associated respective administrative burdens incurred by the IED and the E-PRTR Regulation.

Annex 5: Detailed baseline

INTRODUCTION

Consistent with tools #12 and #27 of the Better Regulation Toolbox, the baseline option represents a 'no policy change' scenario. That is, the baseline assumes that the current EU-level and national policies and measures continue in force and that the sectors are affected by the baseline economic expectations driven by the market context (Section 5.1.1).

In more detail for the IED, the baseline is the continuation of the existing legal framework and scope coupled with the continuation of any further development of BAT reference documents and BAT conclusions in the context of the information exchange under IED Article 13 led by the EIPPCB (section 5.1.1.3). The problems that have been identified with the implementation of the IED are assumed to remain, although their evolution will be subject to the ongoing market context developments.

1. MARKET CONTEXT

The expected evolution of the market context for the IED sectors is assumed to follow the projections modelled for the 'Fit for 55' climate package by DG CLIMA and DG ENER, which considers the impact of policies associated with achieving a net 55% reduction in GHG emissions by 2030 for the EU compared with 1990 levels.

These projections were developed using the PRIMES and GEM-E3 models by E3Modelling, as well as supporting work by IIASA using the GAINS model, and have been adopted as the baseline against which to assess the policy options for the revision of the IED.

The projections consist of a reference or "REF" scenario that is based on current policy framework, and a "MIX" scenario that is consistent with the policy packages proposed to achieve the 55% net reduction target by 2030. Both of these scenarios take into account the effects of and expected recovery from the COVID-19 pandemic.

Up to and including 2030 therefore, there are assumed to be implementation tools in place – from the Fit for 55 package – driving transformation change. After this point, post 2030, the baseline assumes that the energy system continues to decarbonise, with associated GHG emissions reduced by ~80% by 2050.

1.1. WHAT DO THE BASELINE PROJECTIONS TAKE INTO ACCOUNT FOR SECTORAL TRANSFORMATIONS

The GEM-E3 model which underpins the baseline projections is a macroeconomic computable general equilibrium model. The baseline projections take into account the structure of economic growth (consumption vs investment led growth), the policies that affect the energy system, the contribution of each sector in total GDP and insights from selected sectoral industrial outlooks.

The key trend in the sectoral economic outlook is that the EU economy dematerialises and becomes even more service oriented. That is, the services sector dominates, generating slightly over 76% of gross value added in the EU by 2050, while the shares in total GDP of industry is projected to decline slightly by 2030 and more so by 2050.

The baseline assumes the economy becomes more open to trade, i.e. the total share of imports and exports of GDP increases. Lower value added products such as textiles or ceramics are imported and trade is mostly focused on higher value added products such as equipment manufacturing. Construction and the demand for non-metallic minerals follows the pattern of investment growth, with the share of investment to GDP increasing over time.

Further, energy-related industries and, in particular, fossil fuel-based energy industries are assumed to be affected by the EU's existing climate and energy policies. Oil, gas and coke production is reduced over the projection period and, hence, their share in total value added is reduced over time. Specifically, as the fossil-based industries (coal mines in the short term and oil in the medium term) are forecast to decline, clean energy sectors are assumed to expand in the baseline, such as batteries, electric vehicles, photovoltaic and wind energy generation. The share of the total energy sector in total gross value added is expected to remain broadly unchanged as the substitution from imported fossil-fuels to higher-valued added domestic electricity production is expected to continue.

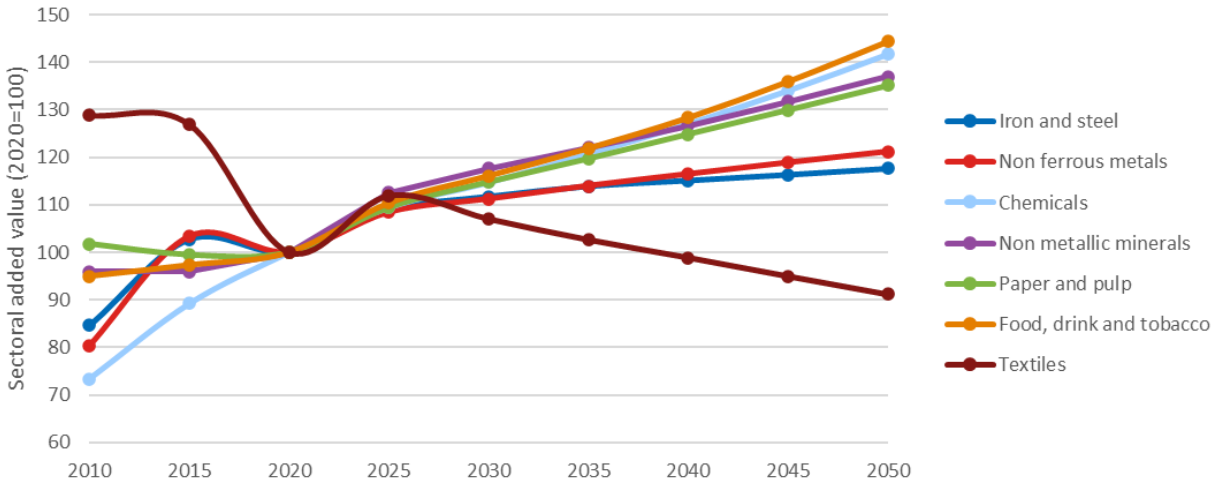
A full description of the PRIMES modelling is provided in supporting studies for the impact assessments of policy packages led by DG CLIMA. The sector classifications in PRIMES do not correspond precisely with those of the IED activities, and do not include all IED activities, but can be used to provide a high-level indication of the development of some of the industrial sectors and power generation.

Detailed projections for the industrial sectors in the baseline are provided covering sectoral added value, energy consumption (total), energy consumption by fuel type, energy intensity, carbon emissions and carbon intensity. Specific remarks are made on the embodied assumptions for the three spotlight sectors covered in the case studies, as well as on the context of the industrial transformation.

1.2. QUANTITATIVE OUTPUTS OF THE BASELINE

Sectoral added value is estimated to steadily increase in both the REF and MIX scenarios for most sectors from 2020 to 2050, although the textiles sector is expected to decline in value added from 2025, returning to levels closer to 2020 by 2040 but continuing to decline thereafter (Figure A5-1).

Figure A5-1: Sectoral added value of industry sectors in MIX scenario from 2010 to 2050 (2020=100)



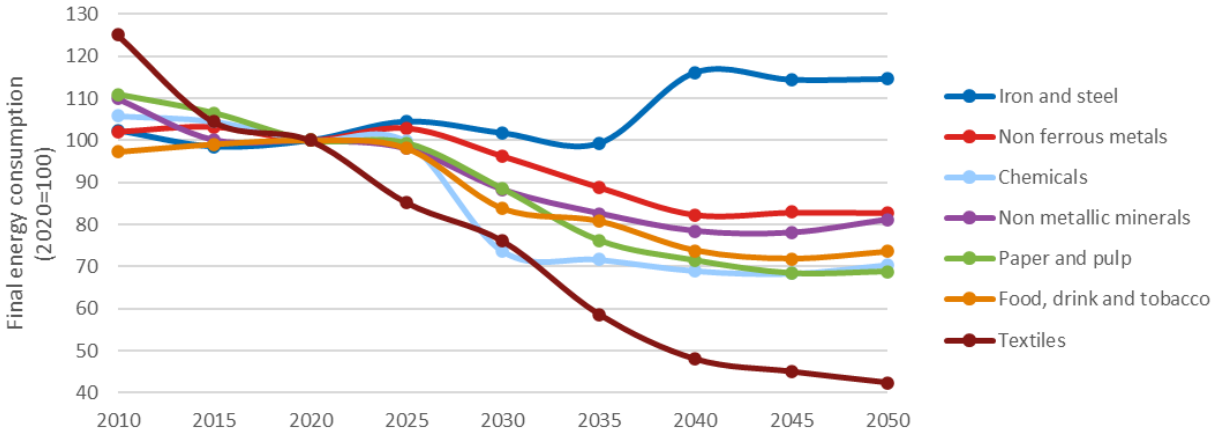
Source: PRIMES

Energy consumption for most industry sectors is expected to increase or stay relatively constant from 2020 but only in the short-term, and final energy consumption will generally decline thereafter to 2040, until remaining relatively level to 2050 (Figure A5-2). There are some notable exceptions. For example, energy consumed in the textiles industry will decline from 2020 and over the period. The iron and steel industry, however, will consume more energy than in 2020 in the shorter term to 2025, although this consumption is expected to decline to 2020 levels by 2035. Thereafter, final energy consumption for this sector would, once again, rise. The chemicals sector is also expected to have a slightly different energy consumption pattern. The sector's consumption of energy would decrease to 2030 and stay broadly constant to 2040.

The **iron and steel** sector is expected to experience a reduction in energy intensity from 2020 to 2035 but return to 2020 levels by 2040. The sector's energy consumption is expected to decline up to 2035, but rise thereafter. However, carbon intensity does not. This is due to the assumed adoption of new production processes in the iron and steel industry of higher energy intensity and lower carbon intensity – specifically the adoption of hydrogen for direct reduction of iron replacing the process of blast furnace and basic oxygen furnace steelmaking. This result appears surprising but it is not that the hydrogen is less energy

efficient but it is the accounting rules for reporting energy balances from Eurostat that leads to this result.[25]

Figure A5-2: Energy consumption of industry sectors in MIX scenario from 2010 to 2050 (2020=100)

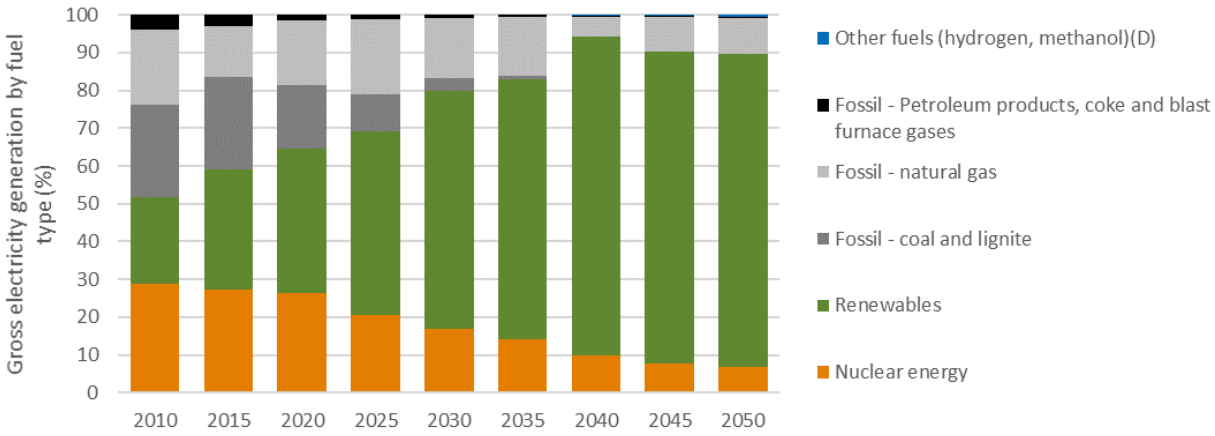


Source: PRIMES

The electricity generation mix by fuel types is expected to show significant expansion of renewable generation (from a range of sources, dominated by wind) to 2040, with commensurate reductions in fossil derived sources (Figure A5-3). The decline in use of fossil fuels for power generation is particularly marked for solid fuels, which drops to 3.5% by 2030 and projected to decline to less than 1% by 2035. Natural gas is assumed to remain present in the electricity mix in 2050 to the tune of 9 to 10%. This will come with a commensurate carbon reduction for those IED sectors using electricity to power their processes.

[25] Specifically, it means that the input used to the blast furnace process is not reported as the final energy consumption of Iron and Steel but reported separately as transformation input in blast furnace plants. The majority of the emissions in the Iron and Steel sector come from the blast furnace and the coke plant. The coke plant produces coking coal, which is used in the blast furnace both as a heat source and to reduce iron. The energy input used in the blast furnace to reduce iron are not reported in the final energy consumption of Iron and Steel but the emissions include these processes. The hydrogen used to reduce iron is reported on the Iron and Steel final energy consumption. Overall there is an increase in final energy consumption and a decrease in emissions as the carbon intensive process of BF-BOF is replaced by a clean process H2-DRI.

Figure A5-3: Gross Electricity generation by fuel type in MIX scenario from 2010 to 2050 (%)

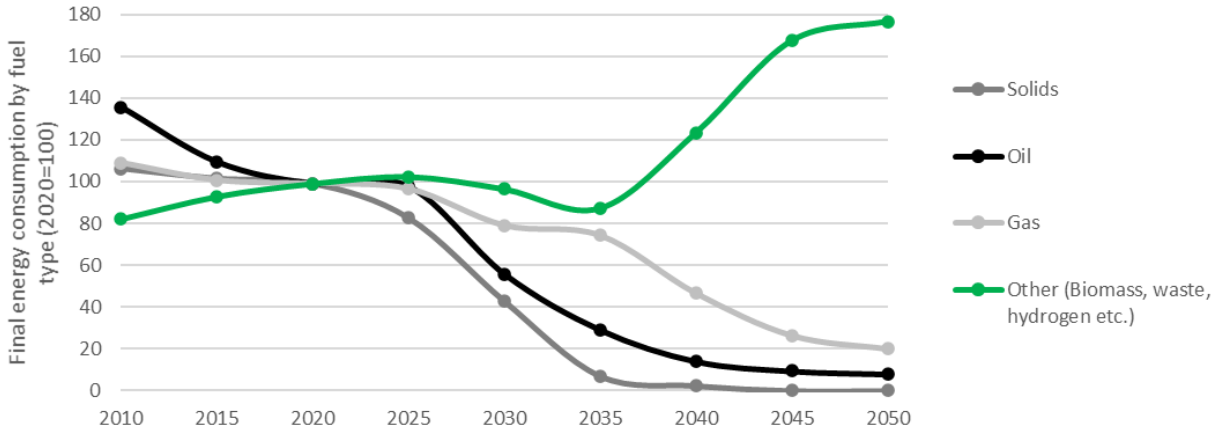


Source: PRIMES

The forecast of **energy consumed by fuel** for all industry sectors in PRIMES suggests that solid fossil fuels and oil will decline sharply over the period when compared to 2020 levels, with solids dropping to near-zero or zero from 2040, and oil down by 90% compared to 2020 levels by 2045. Gas consumption is expected to drop more slowly over the period, whilst consumption of other fuels, such as biomass, waste and hydrogen, is forecast to stagnate in the short-term, even suffer a slight decline in the early 2030s and rise sharply from 2035 onwards (Figure A5-4). This analysis excludes electricity and heat from Combined Heat and Power sources.

Broadly speaking, the reduction in consumption of fossil-derived energy sources for IED sectors would be expected to be commensurate with reduction in combustion related products such as SO_2, NOx and PM_{10}. Where sectors' energy needs switch to being fulfilled by other energy sources (biomass, waste, hydrogen), the relationship is not quite as clear. For those cases where hydrogen, a clean burning fuel, is expected to be used, such as in the steel sector, associated air pollutant emission reductions would also be expected. Where the switch is to biomass, some pollutant emissions deriving from fuel impurities such as heavy metals or sulphur would be expected to decline, whilst others forming over combustion conditions such as NOx would continue.

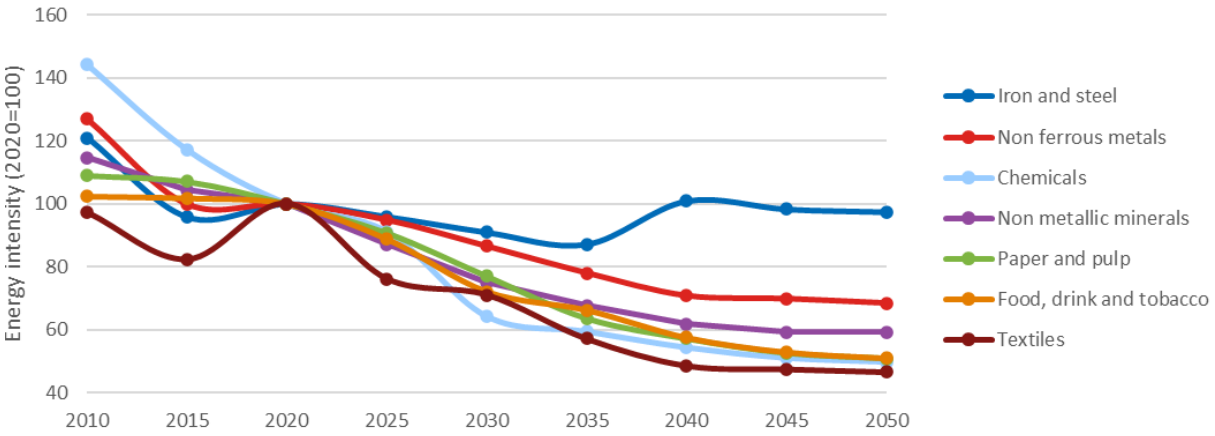
Figure A5-4: Energy consumption by fuel of industry sectors in MIX scenario from 2010 to 2050 (2020=100)



Source: PRIMES

The **energy intensity**, calculated as energy consumed per unit of gross value added per sector, is forecast to decline for most sectors over the period, reaching in the MIX scenario between 50% and 70% of 2020 levels, with the exception of the iron and steel sector as noted above (Figure A5-5).

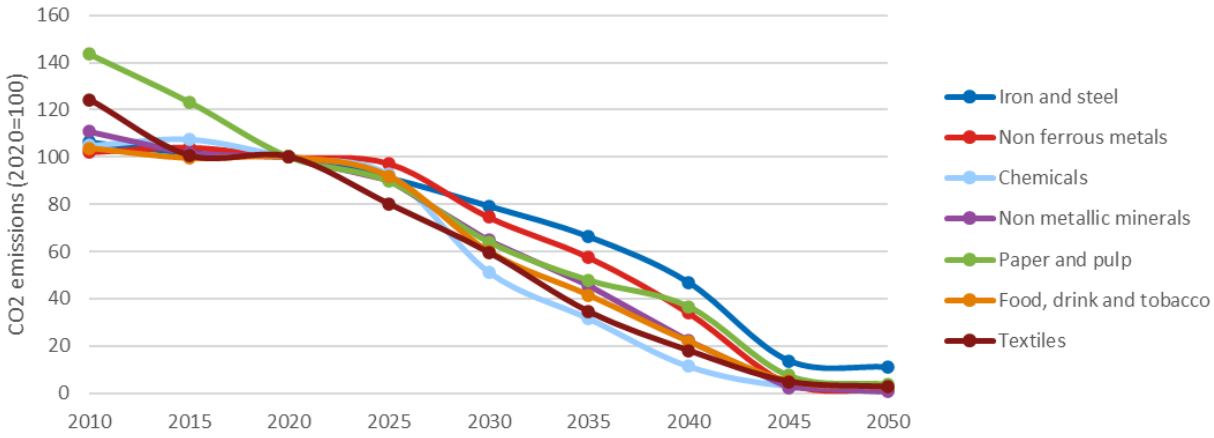
Figure A5-5: Energy intensity of industry sectors in MIX scenario from 2010 to 2050 (2020=100)



Source: PRIMES

Building on this and the expected fuel mix, the associated **carbon emissions** of the industry sectors, is forecast to drop significantly and steadily from 2025 to 2045 after which it is projected to plateau at 3% to 14% of 2020 levels (Figure A5-6).

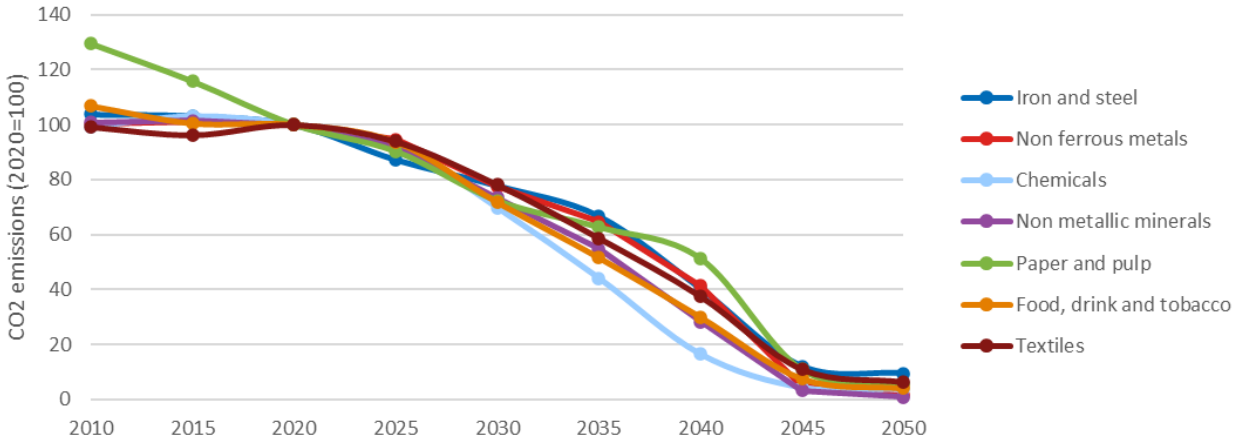
Figure A5-6: Carbon emissions of industry sectors in MIX scenario from 2010 to 2050 (2020=100)



Source: PRIMES

The associated **carbon intensity** of the industry sectors, calculated as tonnes of carbon dioxide equivalent emissions for each tonne of oil equivalent energy consumed per sector, is forecast to drop in both the REF and MIX scenarios, reaching in the MIX scenario between 70% and 80% of 2020 levels by 2030, and 1% to 10% of 2020 levels by 2045/2050 (Figure A5-7).

Figure A5-7: Carbon intensity of industry sectors in MIX scenario from 2010 to 2050 (2020=100)



Source: PRIMES

1.3. BASELINE ASSUMPTIONS FOR SPOTLIGHT SECTORS

For the **iron and steel sector**, the key change assumed in the MIX scenario related to the transformation changes to this sector is the switching away from the carbon-intensive process of steelmaking through the blast furnace / basic oxygen furnace route to a clean process using hydrogen for direction reduction of iron. This is assumed to occur after 2030.

The **cement** industry is expected to reduce emissions significantly when progressing towards 2050 both in terms of energy and process emissions. In the short term period the main options are fuel switching and efficiency improvements. For the medium to long term the following process are envisaged and included in the policy scenario:

- Fuel switch: use of alternative fuels (e.g. refuse-derived fuel, industrial waste, biomass waste) instead of fossil fuels; biomass is already being increasingly used)
- Reduced carbon intensity of processes: process replacement (dry instead of wet), material replacement (use of decarbonised raw material for clinker production and clinker substitution in cement production and reduction of clinker-to-cement ratio)
- Carbon Capture and Storage/Utilisation (chemical absorption, oxyfuel technology, calcium looping) is an option, particularly for remaining process emissions
- Electrification for process heat is challenging (high flame temperature 2 000°C), while plasma technology is under research; expected to occur only at the end of the time period
- Hydrogen is an option under study for use to fire kilns producing clinker

Regarding the oil **refining** industry, in the longer term demand for petroleum based products is assumed to decrease considerably reducing the need for refineries. Hence the number of refineries is expected to reduce over time and remaining refineries to shift their production processes. For the shorter time period waste heat recovery and overall horizontal process efficiency is the main option assumed to reduce energy consumption and CO_2 emissions from refineries. For the medium to long term, the measures assumed include:

- Deployment of Carbon Capture and Storage/Utilisation (oxyfuel combustion)
- Fuel substitution: furnace electrification (under study), hydrogen fuel for combustion in furnaces
- Use of biomass, hydrogen for feedstock substitution

1.4. INDUSTRIAL TRANSFORMATION

At a high level, the graphs in the previous sections suggest that economic growth in all but the textiles sector is expected to rise from 2025, and that this is against a backdrop of declines in energy consumption, energy intensity, carbon emissions and carbon intensity that begin in the 2020s, continue through the 2030s, and largely plateau to projected minimum values in 2040 (energy consumption and intensity) or 2045 (carbon emissions and intensity). Clearly, to continue to achieve sustained sectoral growth but with stark and significant reductions in carbon emissions, transformation changes across these sectors will be needed. This suggests that transformation change for IED industrial sectors that will begin during the 2020s to reach the Fit For 55 ambition targets of 2030 will need to continue along similar trajectories to achieve the overarching 2050 ambition level, and with these elements being achieved from an outcome perspective (GHG emissions) by 2045.

The IED could play a role in helping to cement and continue this transformation, and it has been noted how trends in reducing pollutant emissions would be expected to be correlated with such decarbonisation trends related to the use of fossil fuels, typically affecting NOx, SOx, PM_{10} and heavy metals (e.g. mercury). And it is not just related to fuel switches. The

innovative techniques needed to decarbonise would be expected to also impact on pollutant emissions, further aligning decarbonisation and zero pollution ambitions.

The three case studies described above in section 3 on the iron and steel, cement and refining industries make it clear how innovative and breakthrough decarbonisation techniques in these three energy intensive industries will also in many cases deliver dramatic reductions of overall pollutant emissions to air. Consequently, in the future iterations of BREFs and BAT conclusions of sectors where substantial breakthroughs of decarbonisation techniques have occurred which impact on IED scope (e.g. with effect on air pollutants, water releases, resource consumption etc.), Technical Working Groups (TWGs) may need to set BAT-AELs for pollutant emissions on the basis using those decarbonisation techniques as a reference. If this occurs, the usual IED permit review within four years of BATc publication would occur, potentially triggering the need for investment by industrial operators in decarbonisation techniques that have substantial co-benefits in terms of pollutant emissions or other environmental issues. This means that even if GHG emissions within the ETS scope remain unregulated by the IED, the obligation to apply BAT (i.e., to optimise overall pollution control) would drive investments into what could be considered primarily as breakthrough 'decarbonisation' techniques. In other cases, decarbonisation techniques may have overall negative impacts on pollutant emission and require definition of BAT to address those negative impacts. As one example, several sectors are considering the potential for how carbon capture techniques could be utilised for their decarbonisation pathways. This will consequently require the definition of BAT to address potential environmental issues such as potential leakage.

2. CURRENT STATUS, SCOPE, AND IMPLEMENTATION OF THE IED, AND EXPECTED EVOLUTION

The latest analysis of IED implementation reporting (2018) confirmed the recent status and trends (Ricardo, 2021). The IED implementation reporting is the key source of data and evidence employed to develop our understanding of the baseline for industry sectors at the level of granularity covered by the IED framework (Annex I).

On the number of installations within scope of the IED:

There are around 52,000 installations that fall within the scope of the IED (Table A5-1), of which ~50 300 are in operation. The number of IED installations increased slightly from 2015 to 2017 but declined from 2017 to 2018. The decline in number of IED installations was driven by the following sectors:

- Oil and gas refining installations (10% reduction between 2017 and 2018)
- Ceramic manufacturing (28% reduction between 2015 and 2017)
- Disposal of hazardous waste (19% reduction between 2015 and 2017)
- Landfills (10% reduction between 2015 and 2017)
- Combustion installations (1% reduction between 2015 and 2017 and 2% reduction between 2017 and 2018).

The largest number of installations is reported for 'other activities' owing to the large number of installations for rearing of poultry or pigs (IRPP) – making up around 40% of all the IED installations in the EU.

The changes observed in the total number of IED installations over recent years has not been significant at the EU level.

Table A5-1: Number of IED installations reported by EU27 (except Slovakia) to the EU registry (2018)

	IED activity	2018
1	**Energy industries**	**3 494**
1.1	Combustion	3 193
1.2	Refining	261
1.3	Production of coke	29
1.4	Gasification or liquefaction	11
2	**Metals production and processing**	**5 683**
2.1	Metal ore	31
2.2	Pig iron or steel	239
2.3	Processing of ferrous metals	824
2.4	Ferrous metals foundries	580
2.5	Non-ferrous metals	1 171
2.6	Surface treatment of metals or plastic	2 838
3	**Mineral industries**	**2 411**
3.1	Cement, lime and magnesium oxide	544
3.2	Asbestos	0
3.3	Glass	363
3.4	Mineral fibres	79
3.5	Ceramic products	1 425
4	**Chemicals industries**	**4 983**
4.1	Organic	3 012
4.2	Inorganic	1 087
4.3	Phosphorus-, nitrogen- or potassium-based fertilisers	154
4.4	Plant protection products	124
4.5	Pharmaceutical products	552
4.6	Explosives	54
5	**Waste industries**	**11 374**
5.1	Disposal or recovery of hazardous waste	2 368
5.2	(Co-) incineration of waste	754
5.3	Disposal/recovery of non-hazardous waste	2 796
5.4	Landfills	2944
5.5	Temporary storage of hazardous waste	2506
5.6	Underground storage of hazardous waste	6
6	**Other activities**	**28 262**
6.1	Pulp, paper, or wood-based products	920

	IED activity	2018
6.2	Textiles pre-treatment or dyeing	276
6.3	Tanning	29
6.4	Slaughterhouses, food products and milk	3 875
6.5	Disposal of animal carcasses	364
6.6	Rearing of poultry or pigs	21 309
6.7	Surface treatment	1084
6.8	Production of carbon	61
6.9	Capture of CO_2 streams	7
6.10	Preservation of wood and wood products	104
6.11	Independently operated treatment of waste water	233
	Total all activities	**56 207**

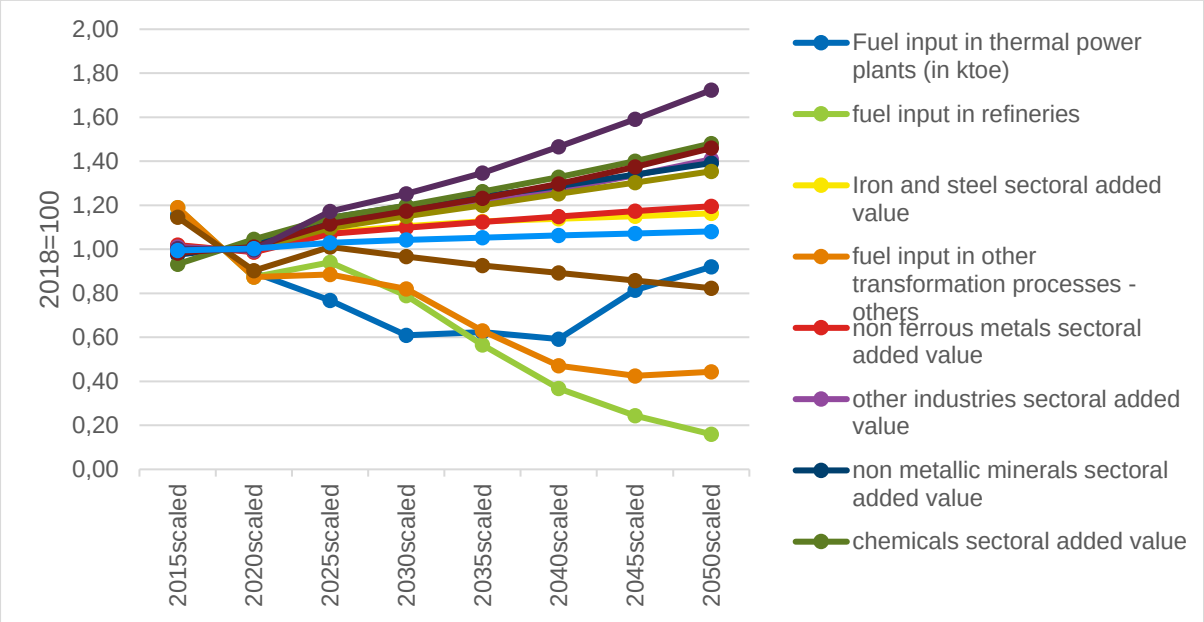
Source: EEA Registry Industrial Reporting Database v4 – version March 2021.

Possible future changes in the number of installations could be forecast to trend with the sectoral gross value added as per Figure A5-1. The number of installations in the baseline of the EU Registry have been projected forward based on their sectoral added value in most cases (source: PRIMES), using the most relevant indicator to each IED activity. The indicators used for this projection are shown below in Table A5-2.

Table A5-2: Indicator used to project number of installations (source: PRIMES)

PRIMES sector	Indicator from PRIMES MIX scenario
Thermal power generation	Fuel input in thermal power plants (in ktoe)
Refineries	Fuel input in refineries
Iron and steel	Iron and steel sectoral added value
Other transformation processes	Fuel input in other transformation processes - others
Non ferrous metals	Non ferrous metals sectoral added value
Other industries	Other industries sectoral added value
Non metallic minerals	Non metallic minerals sectoral added value
Chemicals	Chemicals sectoral added value
Paper and pulp	Pulp and paper sectoral added value
Textiles	Textiles sectoral added value
Food, drink and tobacco	Food, drink and tobacco sectoral added value
Market services	Market services sectoral added value
Agriculture	Agriculture sectoral added value

Figure A5-8: Indicators used to project number of installations, 2018=100 (source: PRIMES)



The results of projecting the installation numbers from the EU Registry to future years are shown in the table below.

Table A5-3: Projected number of installations

IED activity group	2017	2018	2020	2025	2030	2035	2040
1	3 117	3 494	3 124	2 740	2 191	2 180	2 025
2	5 567	5 683	5 629	6 233	6 457	6 662	6 858
3	2 241	2 411	2 451	2 757	2 884	2 992	3 104
4	4 903	4 983	5 208	5 699	5 973	6 288	6 616
5	11 058	11 374	11 305	12 859	13 506	14 165	14 916
6	27 194	28 262	28 339	29 678	30 303	30 907	31 535
TOTAL	**54 080**	**56 207**	**56 055**	**59 966**	**61 316**	**63 194**	**65 054**

On the BREF process and development of BAT Conclusions

The European Integrated Pollution Prevention and Control Bureau (EIPPCB) has led the development of BREFs and BAT Conclusions for the last decade, leading to the publication of around two BAT Conclusions documents each year on average since the inception of the IED. The evaluation of the IED found the 'BREF process' to be largely working well, with previous deficiencies having been addressed through the programme of continuous improvement that the EIPPCB has been running since 2014. It would be expected that the BREF process would continue in this way, with further minor improvements and development of new BAT Conclusions for the remaining IED activities not yet with BAT Conclusions (1st BREF review cycle) and would begin the process of revising BAT Conclusions already published (2nd BREF review cycle).

For the baseline, the BREF process and BAT Conclusions would be expected in the future to continue:

- Being coordinated by the EIPPCB, with Technical Working Groups numbering 60 to 250 people, comprised of the same mix of stakeholders as composed to date (representatives of EU Member States, industry, environmental NGOs, the European Commission, and the EEA and observer countries)
- Identifying the BAT that are most effective for achieving a high level of environmental protection
- Producing BAT Conclusions with BAT-AELs expressed as ranges from lower to upper levels, but with limited identification of which techniques can be used to achieve the lower end of the BAT-AEL ranges
- Not including BAT-AELs on GHGs
- Identifying (but sometimes to a limited extent) BAT-AEPLs (Ricardo et al, 2020) – though this is increasingly common for more recent BREFs e.g., increasingly setting requirements to monitor/manage water resource efficiency. Noting that AEPLs would continue to be viewed as non-binding by some Member States
- Accounting for cross media effects in a rather limited way (Ricardo et al, 2020)
- BREF cycle of 10 years (i.e. 60 BREF reviews to be completed in a period of 20 years)
- Being of the same average duration (3 to 5 years) for new BAT Conclusions, although revisions to existing BAT Conclusions would be expected to be shorter
- Having administrative costs per BREF of around €8m per BREF (range: €3.6m to €20.6m) as estimated in (Ricardo et al, 2020). With the advent of the COVID pandemic, recently the TWG meetings have been online, which may continue to some degree following easing of travel restrictions and which could be expected to have had a minor impact on the administrative costs.
- With a focus on identifying BAT and less emphasis on identifying emerging techniques
- Not quantifying human health and environment benefits of implementing BAT for each BAT Conclusion

On permitting of IED installations:

The IED obligates the operational installations to be permitted. Based on information reported by Member States, the statistics reported on the **proportion of permits issued** were:

- Around 87% of the total installations were reported as having a permit; these data were available split by sector. The Commission is clarifying whether this reflects non-compliance or under-reporting and will take appropriate action;

- The key gaps in permitting were, at a country level, in Germany, and at a sector level, for IRPP. It would be expected that these gaps would diminish in the future baseline with further implementation of the IED.

The most recent analysis of permitting under the IED was limited in the conclusions that could be drawn on the **timeliness of permit reconsidering / updating** due to the data reported. Based on the evidence available, it would be expected that the majority of permits (perhaps around three quarters, although the evidence is not firm) would continue to be reconsidered and, if necessary, updated within the four-year implementation window following the adoption of the BATC.

The costs of permitting were estimated in the IED evaluation for large steelworks at €50 000 to €100 000 per installation (Ricardo et al, 2020, p. 135). The costs for permitting IRPP farm installations was estimated (uplifted to 2020 EUR) to be €8 000 to €9 000 per installation(Amec, 2012). The 2007 IED IA estimated total permit reconsideration costs of €11-40 million/year if reconsiderations occurred every 10 years.

Based on updated information received during the consultation for this impact assessment, the final assumptions on baseline costs for permitting are:

- One-off costs of issuing new permits -public authorities (2020 €):€3 250 - €35 000, with a central estimate of €23 400
- One-off costs of issuing new permits -operators (2020 €): €10 000 - €62 250, with a central estimate of €28 000
- One-off costs of permit reconsiderations and updates -public authorities (2020 €): €1 600 - €17 500, with a central estimate of €11 700
- One-off costs of permit reconsiderations and updates -operators (2020 €) : €1 500 - €31 250, with a central estimate of €14 000

The following already-identified implementation issues regarding the conditions set in permits would be assumed to continue leading to several instances of **BAT-AELs continuing to not being achieved:**

- The majority of permit ELVs will continue to be set at the upper end of the BAT-AEL range
- A negligible number of installations would have permit ELVs set to achieve greater emission reductions than those achievable by the use of BAT in the adopted BATC
- Permit ELVs are sometimes set above BAT-AELs (Ricardo et al, 2020)
- There is variation among Member States in how flexibilities offered by the IED are interpreted and taken up
- This includes derogations under Article 15(4). A proportion of installations would be granted **derogations under Article 15(4) -** For the year 2018, 133 Article 15(4) derogations were reported for 98 installations; this has increased in reporting year 2019 to 203 derogations for 130 installations. This increasing trend would continue as

BAT conclusions are implemented in permits. The following was observed for reporting year 2018**:**

- Derogation durations extend up to 10 years, and with some granted seemingly without end points
- The proportion of installations granted derogations will vary by BREF (e.g., 83% of derogations reported in 2018 as granted were for two BREFs)
- The proportion of installations granted derogations will vary by country: around half of Member States have granted derogations for selected cases, but 40% of derogations reported in 2018 as granted were for one Member State)
- The degree of public access to at least some information regarding derogations would continue to be available for two thirds of Member States granting derogations, and relatively limited number of Member States providing full justification of their reasons for granting derogations

Access to information on permitting would continue to vary by Member State. Whilst the evaluation of the IED concluded that central permit repositories have been developed and used at national level for 19 Member States, for the remaining Member States the coverage is either partial (e.g., provided at regional level for some regions) or missing. Where information is provided publicly about installations, the ease of access to permits would continue in the future to be hampered by (Ricardo, 2021):

- The format of the documentation sometimes being non-searchable scanned PDFs
- Having multiple permits and permit documents for each installation
- Being without standardised structure and content of the permit documentation, leading to variation not only by Member State but also by region within a Member State.

The costs assumed in the baseline are:

- Annual costs for managing information and systems -public authorities (2020 €) €100 - €3 000 with a central estimate of €2 000

On monitoring and reporting

All IED installations' permits must include suitable emission monitoring requirements (Article 14(1)c). All IED installation operators are obliged to supply the competent authority regularly, and at least annually, with emissions monitoring results (Article 14(1)d).

In the IED evaluation, estimates of the costs of monitoring for installations ranged from €15 000 to €50 000 per year per installation (Ricardo et al, 2020). Based on evidence provided by stakeholders engaged, lower costs than this are to be expected. The costs would be expected to continue going forward on an annual basis.

The current access to monitoring data would be expected to continue without further action. Based on 2018 reporting, around half of the Member States have made emissions monitoring data available online for at least some installations, and in varying formats. Only two Member States have, to date, used central permit repositories to publish emissions monitoring data to help facilitate access to the reports at installation level, and only one Member State

uses a common report template to facilitate access. Other variation in implementation among Member States that potentially hampers ease of access to monitoring data includes (Ricardo, 2021):

- Making data only available upon request (3 Member States)
- Publishing data on restricted webpages that are not publicly accessible (3 Member States)
- Using a database for emissions monitoring data that is independent from other installation documentation (2 Member States)
- Publishing reporting only for some regions in a Member State (2 Member States)
- Publishing annual reports on emissions monitoring data independently from other installation documentation (1 Member State).

The costs in the baseline for monitoring and reporting have been assumed to be:

- Annual monitoring and reporting costs-operators (2020 €): €150 - €12 000 with a central estimate of €8 000

On compliance and enforcement:

Regarding compliance assessment, there is variation among Member States in how compliance assessment is carried out, leading to variation in the stringency of compliance (e.g. if and how measurement uncertainty is accounted for when comparing monitoring results to permit limit values). Without action to harmonise this variation, it would be expected to continue.

Regarding inspections, on average, around half of installations receive an environmental inspection each year (Ricardo, 2021). This would be expected to continue without action. There is wide variation among Member States and among sectors as to the average frequency of inspections, with some Member States inspecting every installation every year, and others less frequently. (It isn't possible to conclude with the information already reported on whether the environmental risks posed by installations would require inspections more often than every 3 years.[26]). Inspection costs range from €15 000 to €30 000 each (Ricardo et al, 2020); lower costs were provided during this impact assessment study; the costs would be expected to continue.

As to making public the information related to compliance and enforcement, the information available online to the public regarding site visit reports would be expected to remain limited in its relevance, and varying by Member State, as per the current status (Ricardo, 2021). The information available online to the public regarding emission monitoring data will also remain limited in its relevance, and varying by Member State (Ricardo, 2021).

[26] IED Article 23(4): 'The period between two site visits shall be based on a systematic appraisal of the environmental risks of the installations concerned and shall not exceed 1 year for installations posing the highest risks and 3 years for installations posing the lowest risks. If an inspection has identified an important case of non-compliance with the permit conditions, an additional site visit shall be carried out within 6 months of that inspection.'

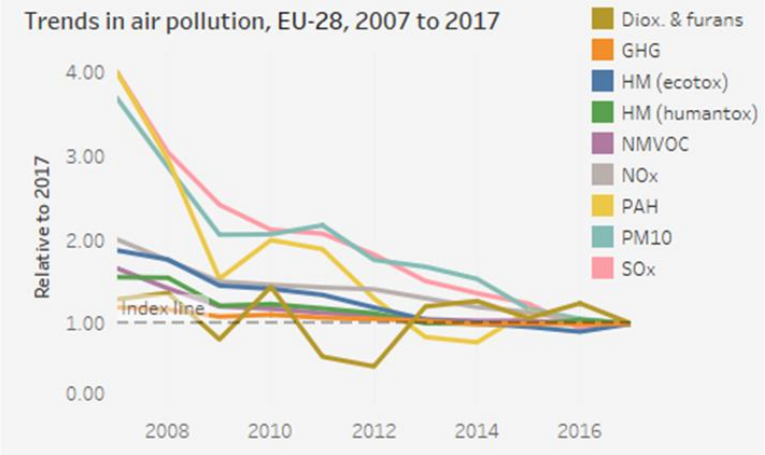
The costs in the baseline for inspections have been assumed to be:

- Inspection costs every two years -public authorities (2020 €): €500 - €12 000 with a central estimate of €9 600
- Inspection costs every two years -operators (2020 €): €125 - €5 000 with a central estimate of €4 000

On contribution to emissions

The evaluation of the IED (Ricardo et al, 2020) confirmed that, under the IED, industrial emissions to air and releases of water pollutants have generally decreased in recent years (Figure A5-9). Furthermore, these reductions of key pollutants have been shown to have occurred against a backdrop of economic growth (Ricardo et al, 2020).

Figure A5-9: Indexed emissions to air for industry (EU-28)



Note: The data emissions reported by NFR codes which do not include thresholds for reporting (whereas some IED activities do). Source: (Ricardo et al, 2020) *and originally from EEA* (2020) *[data source: CLRTAP]*

Despite these declines, industrial sectors remain key sources of air pollutants. Based on the UN-ECE's Convention on Long-Range Transboundary Air Pollution (CLRTAP), national emission inventory reporting (which doesn't align precisely with the IED Annex I sectoral scope), industrial sectors were responsible in 2017 for over half the emissions to air of CO_2, SOx, NMVOC and the heavy metals cadmium (Cd), mercury (Hg) and lead (Pb) and were key sources of NOx (32%) and PM_{10} (28%) (Ricardo et al, 2020). The IED currently regulates about 5% of the total methane emissions in the EU-27, a fraction which mainly originates from waste management (other than landfill sites), wastewater treatment and from rearing of pigs. Overall for the whole of the EU economy, methane represents about 10% of GHG emissions.

With the continued development of further BAT conclusions for IED sectors, and the continued implementation of the IED with permit ELVs based on BAT, and the decoupled nature between industrial sector gross value added and emissions, it would be expected for the sectoral emissions from IED industries to decline further over time.

To try to estimate at a very high level the typical (or possible) emission reductions for a sector as a whole associated with implementation of BATCs for key environmental issues (KEI), specific analysis on three sectors has been conducted. This has focussed on three sectors (pulp/paper, cement, glass) for which the sectors have completed the four year implementation period following BAT Conclusions publication. Emissions data for three pollutants identified as KEI for each of these sectors have been extracted from E-PRTR and benchmarked against the activity (production) statistics reported for these sectors. The findings of this analysis, shown in Figure A5-11, suggest that reductions in emissions intensity (emissions per unit of production) dropped following implementation of the BATC by 37% to 67% (average 47%), with annual average reductions of 7% to 14% (mean 10%).

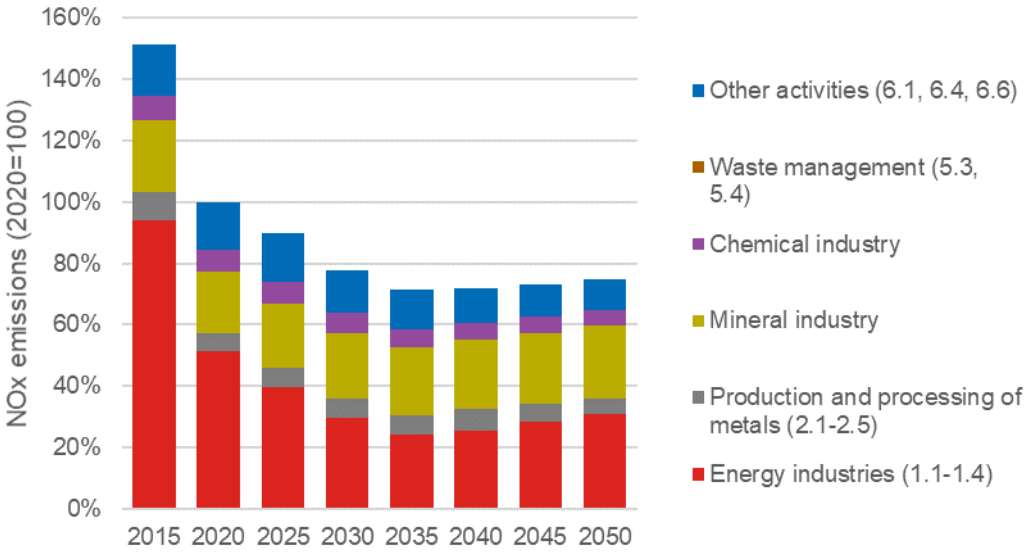
Specifically, Figure A5-11 shows for the pulp and paper sector that most or all of the emission reductions appeared to occur prior to the 4 year BATc implementation period concluded. In contrast, for the glass sector, the figures suggests that a large proportion of the emission reduction occurred after the 4 year implementation period concluded, which may be consistent with the larger than average number of derogations granted for the glass sector, which would have acted to delay the compliance date. For the cement sector, emission reductions occurred both before and after the 4 year implementation period.

A second version of a BREF (and BAT conclusions) for a sector would not be expected to have such significant impacts on emission reductions as the first BAT conclusions. Following BATc implementation, it would be expected for there to be less divergence among installations' emissions performance. Hence the percentage emission reductions identified as having occurred in the sector during the period of (first) BAT conclusions implementation (averaging 47%) would be unlikely to be achieved for a subsequent (second) BAT conclusions, unless transformational techniques (or processes) were identified as part of that BREF process.

The projected continued decline of carbon emissions in the baseline would be expected to be commensurate also with continued reductions in other key air pollutants, particularly for those processes involving combustion of carbonaceous fuel.

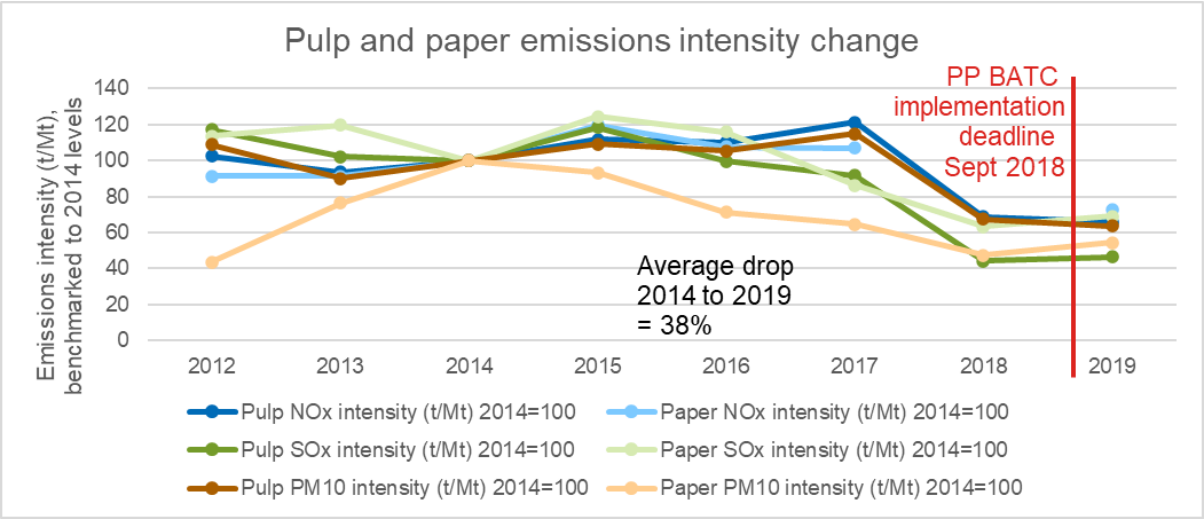
However, as part of the Commission's Fit for 55 policy package, NOx emission projections were undertaken by IIASA using the GAINS model. Mapping the sectoral split from those projections (reported against UNFCCC CRF sector) to the IED activity groups from Annex I (energy, metals, minerals etc.), and excluding the emissions from sectors outside the IED scope, has allowed the emissions projections shown in Figure A5-10 to be developed. It is important to note that not all the IED activities are directly represented by CRF sectors on a 1:1 basis, and some smaller activities under IED activity group 6 are excluded. The results nevertheless cover the majority of the larger polluting industries and show substantial declines forecast in the MIX scenario from 2020 through to 2035, after which the decline reverses and NOx emissions increase again, driven primarily by the energy industries, suggesting the need for further longer-term policy action to have effect from the 2030s.

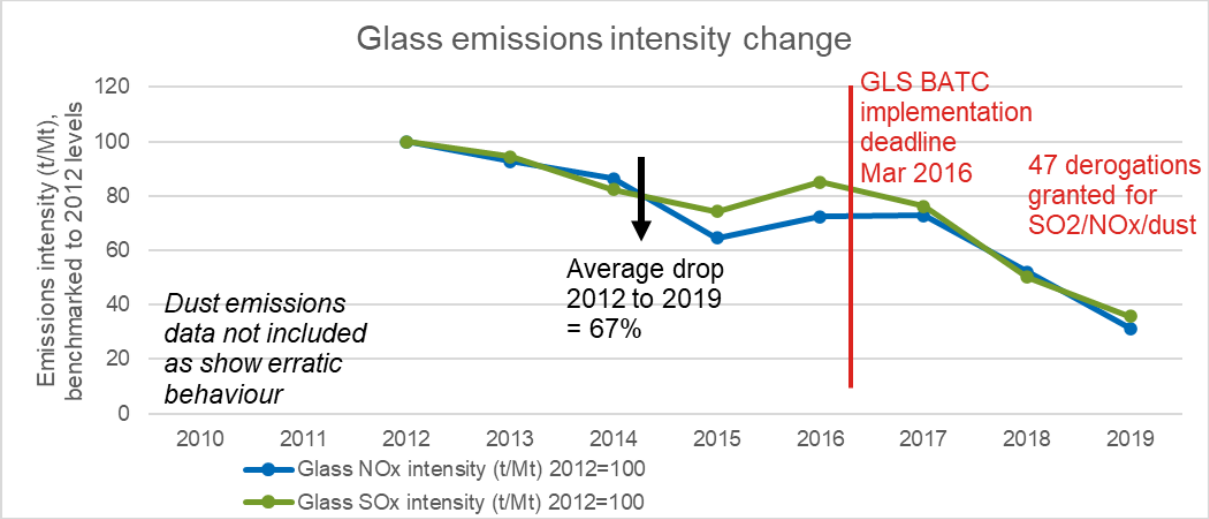
Figure A5-10: MIX scenario NOx emissions projected by the GAINS model to 2050 (2020=100)

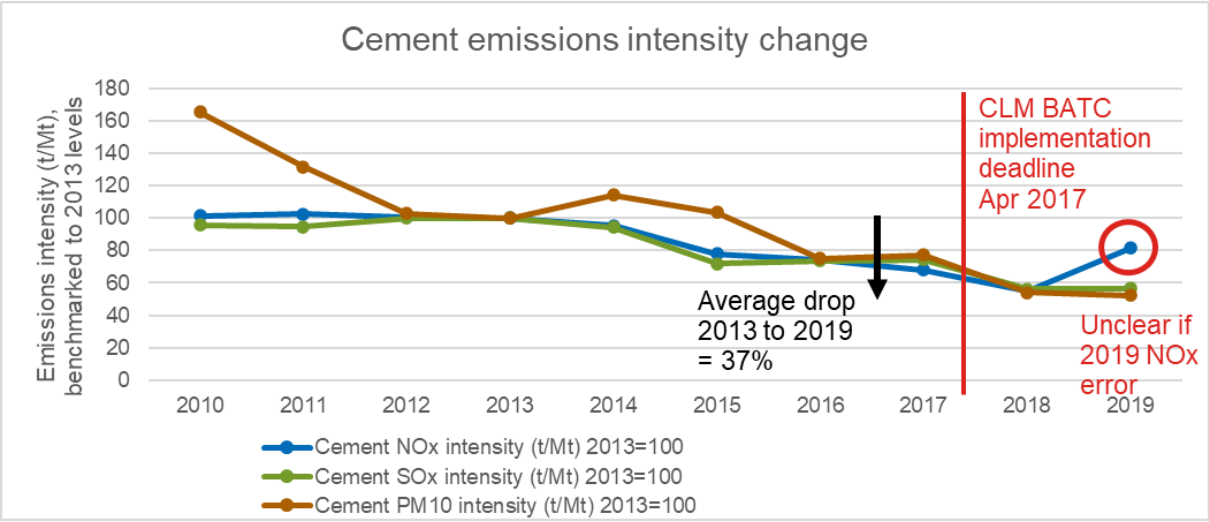


Source: GAINS

Figure A5-11: Analysis of emissions intensity of key environmental issues of SO2, NOx and PM10 emissions as (source: this report)







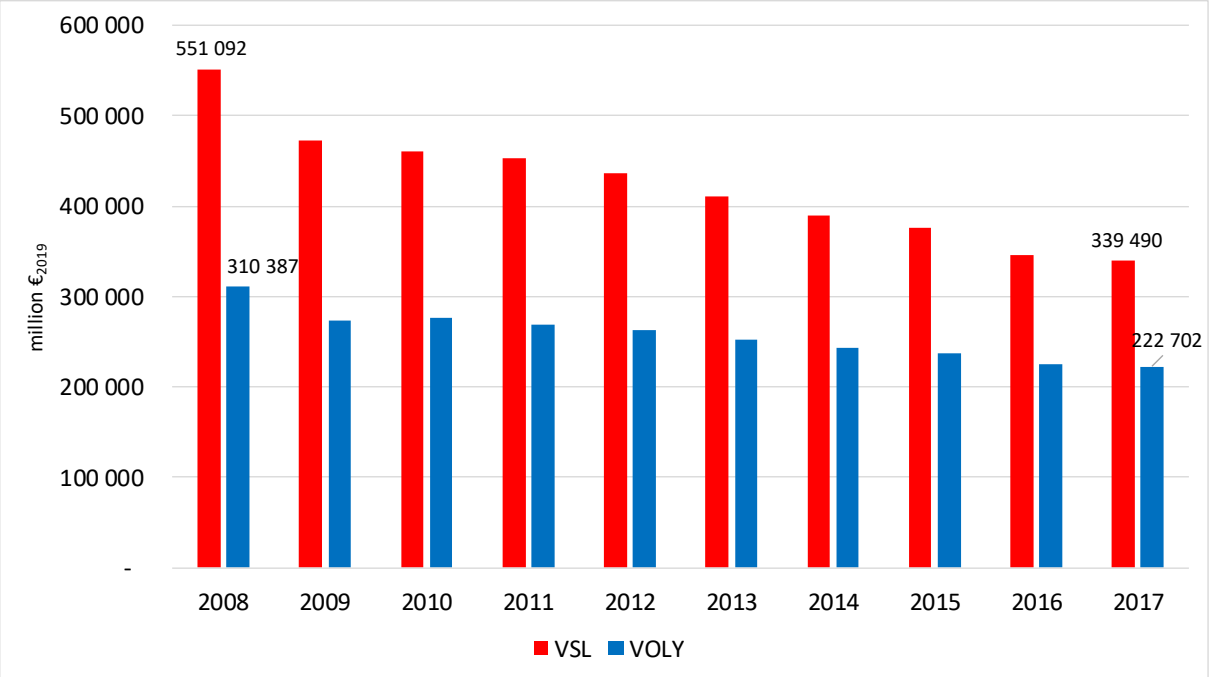
Estimating the future reductions in pollutant emissions has not been carried out, although the estimated carbon intensity reduction has been estimated.

On the costs of air pollution from industrial facilities

These trends in the reductions in emissions are reflected in analysis conducted of the aggregate damage costs of the air pollutants released from industrial facilities. Based on emissions data from E-PRTR, for a consistent set of ~5 000 facilities over the period 2008 to 2017[27], work by the EEA (Schucht, et al., 2021) has shown reductions in the total damage costs by around 30% over this period, when aggregating the damage costs for main air pollutants (NH_3, NOx, PM_{10}, SO_2, NMVOCs), greenhouse gases (CO_2, CH_4, N_2O), heavy metals (As, Cd, Cr, Hg, Ni, Pb) and organic pollutants (benzene, dioxins and furans, PAHs). This is shown in 12. Again, these trends would be expected to continue beyond 2017.

[27] Note that these costs are for only 5000 facilities for which consistent time series are available. The overall damage costs are higher when considering all installations reporting in one year.

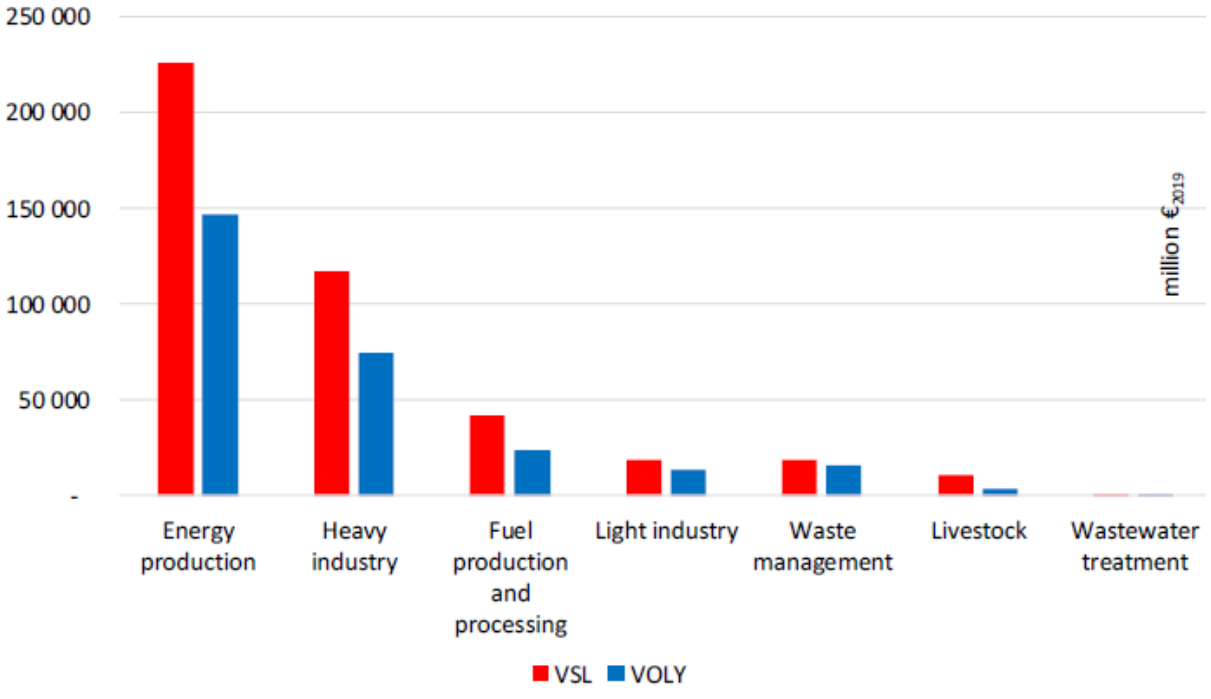
Figure A5-12: Damage costs aggregated over the four pollutant groups from 2008 to 2017 (million €2019) – identical facilities reporting over the whole period



Source: (Schucht, et al., 2021)

Figure A5-13 shows these damage costs presented split by EEA sector for year 2017. The largest contribution to damage costs arise from energy production, followed by heavy industry, then smaller contributions from other sectors.

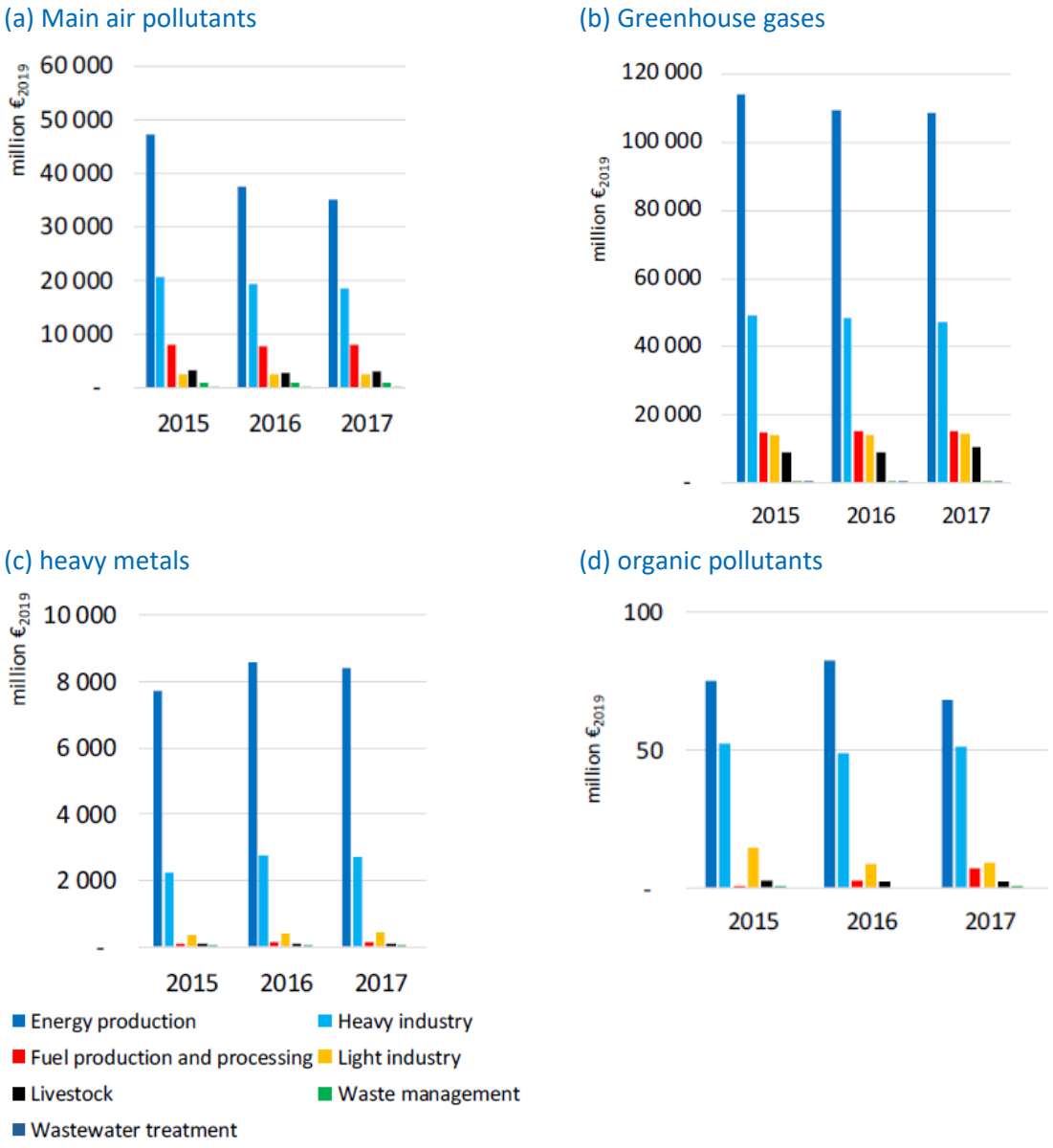
Figure A5-13: Damage costs by EEA sector aggregated over the four pollutant groups for 2017 (million €2019) – identical E-PRTR facilities reporting over the whole period



Source: (Schucht, et al., 2021)

Further information on the split of total damage costs from all sources, split by sector and by pollutant group are also presented in Schucht et al. (2021), and reproduced for years 2015-2017 in Figure A5-14. This information suggests that the majority of the total damage would appear to come from IED related activities, and that the dominant valuation comes from GHG impacts (total ~€190-200 bn/year), followed by the impact of the main air pollutants (~€65-70 bn/year), then heavy metals (~€11 bn/year) and finally from organic pollutants (~€0.1-0.2 bn/year).

Figure A5-14: Damage costs for each of four pollutant groups from 2015 to 2017 (million €2019) split by sector – note different scales for each panel chart



Source: (Schucht, et al., 2021)

Given that the largest component of the damage costs from industrial facilities is from GHG emissions, and that the baseline projection of carbon emissions (Figure A5-6) is estimated to fall significantly between 2020 and 2045, the overall damage costs from industrial facilities would be expected to drop considerably in the baseline from the 2017 figures presented

above up to 2045. In addition to the baseline projection of carbon emissions, downwards trends in main air pollutants would also be expected over this period.

3. EVOLUTION OF THE SECTORS NOT COVERED BY THE IED

Without action, the drivers behind the problems described would continue to be present. Further information is provided here for those sectors not currently under scope of the IED, but which are considered in problem area 5 as possible additional coverage.

Some agro-industrial activities that pollute the environment would remain outside the IED and not subject to pollution control. The agro-industrial activities that are polluting the environment, but which are not covered by the IED would continue with business as usual. Specifically, the factors affecting the baseline of these activities in the absence of change to the IED are listed in Table A5-4.

Table A5-4: Factors affecting future evolution of sectors considered for possible additional scope expansion of the IED

Activity currently outside IED scope	Factors affecting baseline of these sectors in the absence of IED policy action	Approximate number of installations	Key environmental issues
Cattle farming	• The number of cattle farms has been declining over time in most EU Member States[28] whilst cattle production has remained broadly static over the last 15 years[29].Hence an intensification of the farming practices has occurred over time and would be expected to continue. • The size of milk-cows rearing installations is increasingly growing with a large concentration of animals. The current and future CAP does not and will not have impact on those large animal rearing installations because they do not receive the direct payments (as they do not have agricultural land) and the conditionality cannot be applied to them. Whereas the Member States can address environmental, climate and animal welfare issues related to those installations through other EU and national legislation. • The variation across Member States in regulating cattle farming would continue (no level playing field). • Some Member States may need to implement additional measures addressing cattle farming emissions to meet NECD obligations, as well as to address methane emissions as part of climate targets and due to its contribution to air pollution as ozone precursor. • It may be more challenging (costly) to deliver the objectives of the Methane Strategy[30] at EU level without EU wide control of methane from cattle farms.	• 84 000 (>150 LSU) • 19 600 (>300 LSU) • 8 000 (>450 LSU) • 4 200 (>600 LSU)	• **Climate**: CH_4 emissions and to a lesser extent N_2O emissions. agriculture makes up 13% of EU27 GHG emissions; two major sources of methane, enteric fermentation (livestock) and manure management are the major components of this. Enteric fermentation of feed in the stomachs of livestock (particularly cattle) is the largest single source of CH_4 in the EU • **Air quality**: NH_3 emissions. Two thirds of EU27 total NH_3 emissions are from livestock. • **Water quality**: nutrient loading (nitrogen and phosphorus from animal excreta); organic matter (oxygen demanding substances such as livestock excreta); pathogens (E coli etc); metals (selenium etc) and emerging pollutants (drug residues, hormones and feed additives).

[28] Source: Eurostat table ef_olslsureg https://ec.europa.eu/eurostat/web/products-datasets/-/ef_olslsureg
[29] Source: Eurostat table apro_mt_lscatl http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=apro_mt_lscatl&lang=en
[30] COM(2020) 663 final

Activity currently outside IED scope	Factors affecting baseline of these sectors in the absence of IED policy action	Approximate number of installations	Key environmental issues
Aquaculture	• The EU supports developments in the sustainable aquaculture sector through structural funds, e.g. European Maritime and Fisheries Fund for the period 2014-2020. In this most recent period, public funding per value of farmed fish has doubled compared to 2000. • The EU supports a more sustainable and competitive aquaculture sector for the period 2021 to 2030 (EC Communication COM(2021) 236 final of 21 May 2021). This will be supported through the new European Maritime Fisheries and Aquaculture Fund (EMFAF). • EU production volume in 2016 was 8% lower than in 2008, yet the value of the farmed products rose by 39%. Also, the gross value added of the sector to the economy, number of enterprises and employment rose between 2008 and 2016 (Guillen et al., 2019)[31]. The demand for seafood is expected to increase and it is expected that European aquaculture can help to meet that demand. • At the same time, the sector contributes to nutrient emissions (N and P). The share of the sector's total releases of nitrogen and phosphorous compared to the total for sectors reporting under the E-PRTR is approximately 3% and 5%, respectively. Other environmental impacts from the sector relate to the introduction of non-indigenous species, organic matter, contaminants including pesticides and litter, the disturbance to wildlife, and the possibility for escape of farmed fish.	• 55 to 250 installations of production capacity >1 000 tonnes/year • Total of 15 000 installations	• **Water quality**: nutrient loading, caused by excessive release of Nitrogen and Phosphorus into the natural environment, leading to eutrophication • **Other**: Introduction of non-indigenous species
Mining / quarrying industries	• Waste from mining and quarrying is regulated by Directive 2006/21/EC on the management of waste from	• About 700-900 installations	• **Air quality**: dust emissions (c. 4.4% of total industrial emissions covered by the IED in 2019 (E-

[31] https://www.sciencedirect.com/science/article/pii/S0308597X18309400

Activity currently outside IED scope	Factors affecting baseline of these sectors in the absence of IED policy action	Approximate number of installations	Key environmental issues
	the extractive industries • Demand for critical minerals and base metals is set to soar over the next two decades as the world pursues carbon neutrality goals; expected rise by as much as 6 times. It is the clean energy transition that drives mineral demand growth. Recycling will not be providing sufficient amount of the secondary raw materials in the short to mid-term to supply emerging applications that are needed for greening the economy, therefore the supply of primary materials will remain crucial, continuing to place demands on specific mining from installations in the EU, and from outside of the EU[32]. • Environmental pressures from mining and quarrying activities relate to air emissions (dust), surface water pollution, waste and emissions to soil and groundwater, notably with regard to heavy metals, noise and vibrations. Furthermore, the activities can have an impact on the structural stability and biodiversity. • Mining and quarrying installations may lead to substantial emissions of PM10 equivalent to around 4.4% of total industrial emissions covered by the IED (based on E-PRTR data).	(metallic and industrial minerals)	PRTR, 2019), and to a lesser extent combustion products (NOx and SOx, with a potential contribution of c. 0.85% to 1% depending on the year assessed (E-PRTR, 2017-2019).), • **Noise and vibration** • **Water quality**: suspended particles, metals, metalloids, other dissolved substances • **Soil quality**: releases to groundwater • **Resources**: water consumption • **Other**: Habitat degradation
Upstream oil and gas industries (extraction)	• EU Methane Strategy was adopted in October 2020; as part of fulfilling this strategy, an EC proposal is forthcoming in 2021 to address methane leaks in the energy sector. • Several offshore installations would remain within the scope of the E-PRTR, owing to the exceedance of capacity	• 1 000 to 2 000 installations	• **Climate**: source of CH_4 emissions (fugitive, venting) and CO_2 (flaring). OSPAR inventory provided details of 12.7kt CH_4 in 2017 from 133 installation, equivalent to ~1.6% of total CH4 reported to E-PRTR from IED sites. • **Air quality**: source of PM2.5, NOx, SO2, NMVOC.

[32] EU raw materials policy as expressed in COM (2020)474, COM (2021)350 final, SWD (2021) 352 final

Activity currently outside IED scope	Factors affecting baseline of these sectors in the absence of IED policy action	Approximate number of installations	Key environmental issues
	thresholds for other activity definitions, such as thermal combustion. • The best practices in this largely international/multi-national industry that have environmental benefits, but which are driven by health and safety regulations, would continue. • Conventional offshore oil and gas extraction is contracting as a sector, although potential for unconventional gas to expand. • Baseline scenario projections (REF) suggest that, compared to 2020 levels, EU production of oil will be 10% lower in 2030 and accelerating to 40% decrease in 2040. For natural gas, the EU production is expected to drop by 20% by 2025 compared to 2020 levels, and then remain at this level to 2040 (source: PRIMES). • Emissions from the sector would drop in parallel to the contraction of the sector.		LRTAP reported data for EU27 for year 2019 from fugitive emissions as well as emissions from venting and flaring of 0.2 kt of $PM_{2.5}$, 8.1 kt of NOx, 18 kt of SOx, and 102 kt of NMVOCs. • **Water quality**: chemical and oil spills to water • **Soil quality**: metals and sulphates, and other chemical releases • **Resources**: chemical consumption • **Waste**: Extractive waste can contain chemical residues including nitrates, cyanides, xanthates and residues of caustic soda
Battery production	• The use of batteries will be a major contributor to reducing emissions in the mobility and energy storage sectors. • Battery manufacturing is expanding significantly due to increased demand from the electrification of road transport primarily, but also due to increased use of batteries in other transport modes, personal electronic devices and home energy storage. • The total production capacity in the EU ranges between 69.5 and 143.5 GWh. Plans have been revealed to build more than 20 large-scale battery factories in the EU in the coming years, with an expected production capacity of 600 GWh. • The main environmental pressures from the sector are	• 45-95 expected future installations of production capacity >1GWh/year by 2040	• Water quality • Soil quality • Water consumption • Waste generation

Activity currently outside IED scope	Factors affecting baseline of these sectors in the absence of IED policy action	Approximate number of installations	Key environmental issues
	energy consumption, use of hazardous substances, water pollution and waste management, use of raw materials / circularity of the materials used and re-manufacturing of products.		
Ship building (other than coating) and ship dismantling	• Most of the world's shipbuilding capacity is outside of the EU. The largest ships worldwide are typically constructed in shipyards in the Far East. Nevertheless, there are shipyards in the EU, and the decarbonisation pathway for the shipping industry is expecting to demand greater uptake of efficiency measures in new ships, and alternative designs to accommodate alternative fuels. This could provide an increase in the rate of ship building in the EU, but it is unclear whether this potential additional demand would be met outside of the EU..	• 175 to 325 installations (best estimate: 275)	• **Air quality:** metal working activities, which includes: thermal metal cutting (emissions of dust and hazardous air pollutants associated with the fumes); welding (emissions of GHG, toxic chemicals, O_3, dust, CO, NOx, SO_2 and Pb); and, grinding (emissions of harmful pollutants present in the abrasive tools/materials and substrates). • **Water quality:** from ship maintenance and repair activities, such as bilge and tank cleaning. Similarly for ship dismantling, as well as various pollutants entering the environment: oils; toxic paint chips and dust; and hazardous materials such as asbestos and heavy metals. • **Waste**: the management of waste water and waste and accidental releases.
Downstream ferrous metal processing activities of forging presses, cold rolling, and wire drawing	• No specific information on the potential underlying trends for demand in these specific processes • These activities would continue to have an impact on energy use, noise, emissions to air, GHG emissions, and resource consumption.	• 250-400 installations	• Air quality • Water quality • Water consumption • Waste generation

4. CURRENT STATUS, SCOPE, AND IMPLEMENTATION OF THE E-PRTR, AND EXPECTED EVOLUTION

1.

This section provides an overview of the information items required for the definition of the baseline.

4.1. NUMBER OF REPORTING INSTALLATIONS BROKEN DOWN BY SECTOR, MEDIA AND POLLUTANT

Figures 15 and 16 below present the current status of reporting to the E-PRTR. The baseline numbers were sourced from V4 of the EEA's industrial reporting database. The number of reporting facilities is based on data reported to the EU Registry, which is not impacted by pollutant thresholds, and where available, data reported for reporting year 2019 were used. However, 2019 data were not available for all countries, 2018 data were used for Italy and 2017 data were used for Lithuania, Portugal and Slovakia. The number of releases and transfers were based on data reported to the integrated E-PRTR/LCP reporting and, as with the number of facilities, data from reporting year 2019 were used where available. However, 2018 data were the latest available for Italy and 2017 data were used for Germany, Latvia, Lithuania, Portugal and Slovakia.

Figure A5-15: Facilities reporting to the EU Registry / E-PRTR

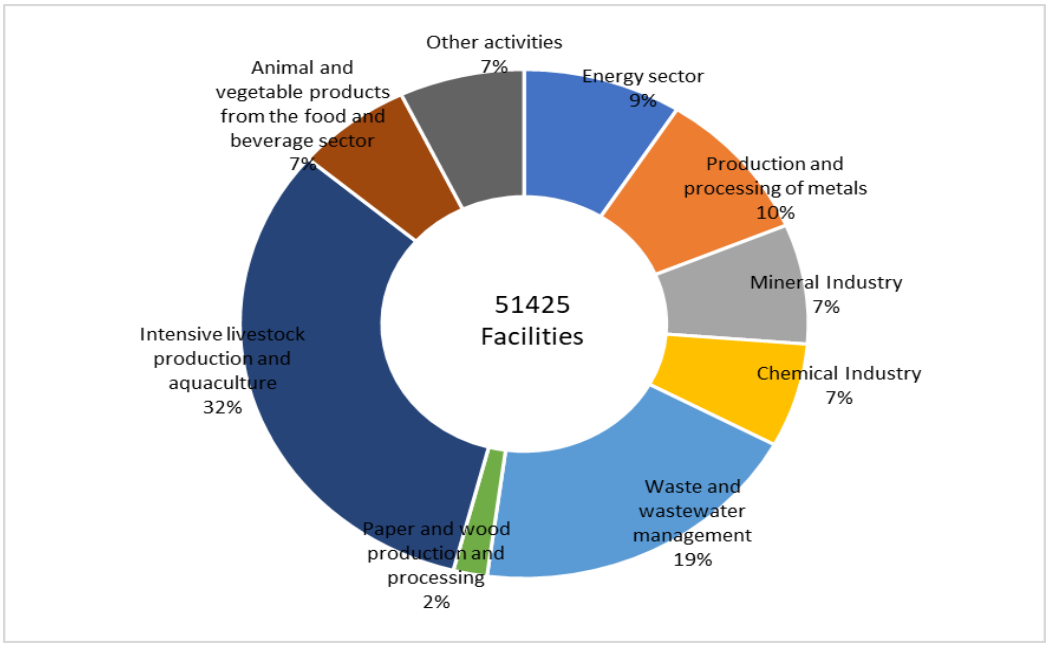
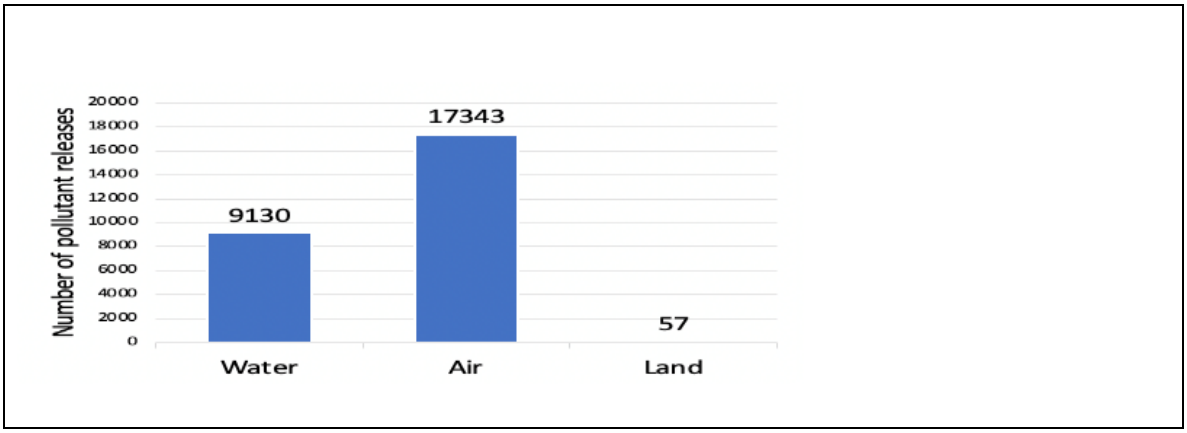


Figure A5-16: Number of pollutant releases reported by medium



4.2. ADMINISTRATIVE BURDENS

The administrative burdens associated with the requirements of the E-PRTR Regulation derive from the following activities: data collection and reporting for the operators, quality assurance and data management for Member States competent authorities and the EEA, with the later bearing the costs for website maintenance too.

The EU Standard Cost Model estimates the costs of these tasks as:

Administrative cost = Σ P x Q
where P (for Price) = Tariff x Time;
and where Q (for Quantity) = Number of businesses x Frequency

In relation to the reporting under the E-PRTR, the costs elements are:

- Tariff = hour salary for relevant staff
- Time = hours to perform the reporting activity
- Number of businesses = number of facilities that have to report
- Frequency: once per year expect for measures/options including more frequent reporting

At the generic level, reporting activities also comprise one-off costs, which relate to adapting the data collection, calculation and reporting systems, training, instruction and similar activities needed to enable the annual reporting. For one-off costs, the frequency is one, otherwise the costs are estimated with the same formula used for recurrent reporting costs.

Table A5-5 describes the assumptions and values used for the definition of the baseline and the options assessment.

Element	Value	Reference
Salary rate	40 EUR/hour	Rate for professionals - Eurostat data
Discount rate	4%	Better Regulation Guidelines
Lifetime of one-off activities	20 years (unless specified for a particular activity)	Expert assumption – used for annualising one-off costs.

The specific administrative costs include the following elements:

- Business: Reporting by facilities
- Member State CAs: Data checking and QA
- EEA
  - Data checking
  - Publishing new data or revising webpages by EEA

Reporting costs for business

To estimate the time required for reporting, results from the evaluation were used and this points to around 22 hours per operator (facility) per year. Findings from the targeted stakeholder survey (TSS) suggests resource use that is slightly higher than this estimate. There are specific data from the Netherlands that have estimated the total costs for all operators at €12m per year. As the Netherlands have about 3,400 facilities, the average annual costs per facility is in the order of €3,500. This is somewhat higher and corresponds on average to about 70 hours per facility per year.

It is therefore assumed that the average for an EU facility is somewhere between the 22 and 70 hours referenced above. Hence, 50 hours is assumed to be representative of a medium complexity facility, where complexity for a reporting facility is determined at a sector level, considering factors such as:

- Likely number of activities and processes per facility;
- Number of plants / installations;
- Number of stacks;
- Number of pollutants to be reported per environmental media; and
- Number of waste / waste water transfers.

It is assumed that a low level of complexity requires half the resources as the medium level, while high complexity is double the hours used for medium complexity reporting. The estimated hours per facility are therefore:

- Low complexity reporting: 0.5*50 hours = 25 hours
- Medium complexity reporting: 50 hours
- High complexity reporting: 2* 50 hours = 100 hours

Testing of cost assumption through stakeholder focus group

The estimated unit costs and supporting assumptions have been tested with a focus group. Stakeholders generally felt that the order of magnitude seemed right. There could be very complex installations where the reporting costs could be higher than that has been estimated. It was also noted in the focus group discussion that, in addition to the level of complexity of the facility, the degree of automated reporting IT infrastructure is important. Gathering data manually can be very time consuming so the presence of automated systems (often in the more complex facilities) reduces the reporting costs. There are no data on which type of facilities has, or is more likely to have, such automated reporting systems.

Data management by Member State CAs

Data from the TSS covers estimates from 12 Member States and provide a basis for assessing the average costs. Though not all Member States are represented, the data cover both small and large Member States, as well as the regions.

Based on these data, the average number of working days per facility has been calculated. The estimate is 0.4 working day per installation, which is equivalent to about 2.8 hours per installation. The resource use for CAs can be estimated using similar assumptions to those used for operators: low level of complexity implies half the number of hours than for the average facility and high level of complexity means twice the resource use.

Data management by EEA

The activities that the EEA performs in relation to the E-PRTR includes:

- Managing the IT systems
- Developing and maintaining the reporting tools
- QA/QC of the data reported by Member States
- Support to Member States
- Use of data and publication.

The estimates of resources and costs are presented in the table below.

Table A5-6: Unit costs for CAs for a new activity adding new facilities

Activity	Resource use in FTE	Costs in €
IT	1	100,000
Reporting tools	0.2	18,750
QA/QC	0.9	93,750
Support to MS	0.4	37,500
Use of data and publication	1.0	100,000
Total	3.5	350,000

4.3. DATA QUALITY BASED ON EEA VERIFICATION ACTIVITIES

ICF et al. (2020) assessed the quality of reported information and drew some recommendations for improvements. There are three method classes (Measurement, "M"; Calculation, "C"; or Estimation, "E") used to categorise reported data. The type of release quantification method used (method class) can have a significant impact on the quality of values reported to the E-PRTR. Measurement and Calculation are usually more accurate than Estimation. However, over 50% of Measurement and Calculation reports are not transparent. Incompatible combinations of method class and methodology used are also common. Variations in the methods used can also impact the quality of the E-PRTR data time series and comparability between facilities. For the most commonly reported pollutants, methods remain stable over time while for the least commonly reported pollutants, methods vary over time, sectors and facilities.

ICF et al. (2020) also recommends improvements to the E-PRTR Guidance document and reporting tools. Some of the recommended actions have been assumed to be part of the baseline, as they would be / are being implemented even in the absence of new EU-level action i.e.:

- Promote the use of sector-specific release factors for some activities;
- Provide guidance on methodology for calculating releases, especially indirect releases to water;
- Add completeness checks for the reporting of which methodology is used;
- Add a description field for accidental releases;

- Develop guidance on how to report M/C/E for multiple release sources;
- Add an indication of whether the facility is registered under the EMAS Regulation.

4.4. USER STATISTICS FOR THE E-PRTR WEBSITE

The supporting study to the evaluation of the E-PRTR Regulation (Amec and IEEP, 2016) analysed access to the E-PRTR website. Between July 2011 and January 2014, a total of 221,712 sessions[33] were recorded, corresponding to an average of 242 sessions per day. Over a quarter of these sessions were from new users, around 9% of sessions corresponded to second visits and only around 2.4% of sessions to users visiting the site more than 200 times. Direct acquisition (sessions accessing the website by typing the URL or from a previously saved bookmark) was the main acquisition channel, followed by referral from other websites and organic search (via search engines). Sessions reaching the website from social media were only a minimal fraction.

It should be noted that in June 2021, the EEA has launched a new Industrial Emissions Portal and this now provides access to E-PRTR data in conjunction with IED information. To date, there has been no assessment of user statistics for the Industrial Emissions Portal but an initial quantification, using a different analytical method, estimated 160 website visits per day.

4.5. E-PRTR POLLUTANTS

The E-PRTR's Annex II lists 91 pollutants and the associated annual thresholds that invoke a reporting obligation. The pollutant list reflects environmental concerns when the Regulation was adopted and is therefore now rather outdated since the list has not been updated in the intervening 15 years. Likewise, the Annex II reporting thresholds are outdated as there have been significant emission reductions since the thresholds were initially set to capture 90% of industrial arisings i.e. for some pollutants there is incomplete reporting.

The E-PRTR pollutants cover a substantial proportion of pollutants listed in other EU environmental protection initiatives. However, analysis of the IED and Best Available Techniques (BAT) conclusions, European environmental legislation and international recommendations, other PRTRs and the scientific literature identified a number of new pollutants for potential addition to the E-PRTR (ICF et al, 2020). E-PRTR may also have the potential to better align with controls set under the REACH Regulation (Registration, Evaluation, Authorisation and Restriction of Chemicals, EC 1907/2006) and updates of the Environmental Quality Standards Directive (2008/105/EC). This would help ensure that the E-PRTR continues to be a relevant instrument that evolves to current needs such as collecting data on industrial emissions of new interest e.g. PFAS.

5. FURTHER COMMISSION ACTION AS PART OF THE BASELINE ADDRESSING THE PROBLEMS

The problems that have been identified with the implementation of the IED are assumed to remain, although their evolution would be subject to action taken by the Commission to try to limit the extent of the problems and their consequences. Such measures would be issuing of guidance and encouragement of voluntary improvements of the existing

[33] Amec and IEEP (2016): *Google defines a session as "a period time a user is actively engaged with the website" and as "the container for the actions a user takes on the site". In practical terms a session is equivalent to a user navigating the webpage until s/he leaves or becomes inactive.*

processes. Whilst this could lead to some degree of improvement, it is expected to remain marginal given the voluntary nature of the measures. Furthermore, it is likely that issuing guidance on unclear legal provisions would be a complicated, lengthy and burdensome process.

The Commission will look to implement a number of actions in collaboration with Member States under business-as-usual to address the identified problems. The measures that have been identified as existing activities that are already underway or planned by the Commission to address the problems identified are shown below in Table A5-7.

Table A5-7: Measures incorporated in the Baseline

Measure	Addresses problem				
	1	2	3	4	5
Provide guidance on the implementation of BAT conclusions in permits focussed on establishing a more consistent approach across the EU	X				
Provide guidance on the implementation of IED provisions concerning monitoring requirements specifically for indirect releases to water and emissions to soil (Articles 14, 15 and 16)	X				
Provide guidance on how environmental inspections shall be carried out across the EU (Article 23)	X				
Facilitate peer to peer support among Member States Competent Authorities for undertaking mutual/joint environmental inspections	X				
to link and share their installations' continuously monitored emissions data with Member State Competent Authorities and making such information available to the public on the Internet	X				
Produce guidance on the compliance assessment relating to "effective operating time" outlined in Annex VI, part 8, point 1.2 for installations subject to waste (co)-incineration provisions	X				
Produce guidance to address potential administrative overlaps between the IED, the ELD and Seveso Directive	X				
Produce guidance on the definitions of 'combustion installation', 'combustion plant', and 'co-incineration'	X				
Update guidance on information exchange to address issues associated with sharing potentially confidential business information when setting BAT-AEPLs			X		
Encourage the systematic inclusion of information on chemical substances of concern developed under other legislation related to IED and the availability of safer chemicals in the BREF process and BAT conclusions			X		
Undertake systematic data collection on GHG emissions at the IED installation level within the BREF process, for those installations and/or emissions covered by the EU-ETS at an EU level				X	
Develop BAT-AELs systematically for direct and indirect GHG emissions not covered by the ETS. This would include emissions of non-ETS GHG by ETS installations and emissions of any GHGs by non-ETS installations				X	

Problems represented by each number are:

1. *Insufficiently effective legislation: The IED is not as effective as it could be, in terms of ensuring reduced pollutant emissions from industry, public access to information and participation, and coherence in implementation.*
2. *Ineffective promotion of innovation: The IED is not dynamic enough and does not support the rapid deployment of innovative technologies*
3. *Insufficient contribution to resource efficiency and less toxic production: The IED has not been effective at addressing the use of hazardous chemicals, resource efficiency or the circular economy*
4. *Insufficient contribution to decarbonisation: The IED has not been effective at reducing greenhouse gas emissions*

5. *IED sectoral scope coverage is too limited: The IED does not regulate some highly polluting (agro-)industrial sectors.*

Annex 6: Problems and drivers

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1 THE PROBLEMS - IED

The EU's economy will undergo a major transformation to become climate neutral and circular. This evolution requires an appropriate legal framework. The recent evaluation of the IED has identified a number of broad areas where the operation of the legislative framework might be improved to better contribute to those goals. The problems to be addressed, the drivers of these problems and how these may evolve without any further policy intervention are considered in the following sub-sections.

The IED was evaluated in 2020 to check how it was functioning (Ricardo et al, 2020). Findings from this evaluation included:

- Pollution is still occurring across the EU from large (agro-)industrial plants (including emissions to air, water and soil; and use of harmful substances)
- Member States are implementing EU IED requirements in a heterogeneous manner, including the stricter BAT conclusions measures. The result is that the environmental ambition varies across the EU's Member States
- There is insufficient public access to information, participation in decision making and access to justice with regard to permitting decisions and revisions
- Greater coherence and synergies with other EU legislation (e.g., the Emissions Trading System, the Landfill Directive, the Urban Waste Water Treatment Directive and others) could be exploited
- The IED may be able to promote new production processes, technologies and innovation more proactively
- Large industrial and agricultural facilities could contribute more to a circular economy, and their exploitation of natural resources could be reduced
- Further efforts could be made to support the decarbonisation efforts of large-scale industries and agricultural activities as a whole
- Extending the IED to other sectors or activities could be appropriate, or thresholds at which plants become subject to the IED might be changed, in order to reduce significant pollution.

The problems and drivers are further analysed in more detail in the following sub-sections, with a focus on description of the problem, the relevant drivers and how the problem may evolve without any further policy intervention. Assumptions and the methodology underlying the latter are detailed in the Annex 5.

1.1 The IED has not been as effective as it could be

The IED has not been as effective as it could be in terms of:

- Ensuring reduced pollutant emissions from industry, which includes issues such as BAT-AELs not being achieved, inconsistencies in implementation, and transboundary pollution remaining ineffectively addressed;

- Public access to information and participation;
- Coherence in implementation.

These problems are further elaborated below.

1.1.1 BAT-AELs are not achieved

1.1.1.1 What is the problem?

The European Green Deal aims to protect Europe's citizens and ecosystems, by moving towards a zero-pollution ambition, to better prevent and remedy pollution. As part of the European Green Deal, the Commission has adopted an 'EU Action Plan Towards a Zero Pollution Ambition for air, water and soil' in 2021. The Action Plan seeks to move towards a zero-pollution ambition via:

- Focussing on measures to strengthen implementation and enforcement
- Considering the need to improve the existing health and environment legislation
- Seeking improvement to the governance of pollution policies.

The Action Plan Towards a Zero Pollution Ambition states that the Commission will consider a need for improvements to industrial emissions legislation. Industrial emissions continue to be a source of pollution, and therefore remain pertinent to the zero-pollution ambition to be adopted.

The evaluation of the IED found that the IED has supported Member States in implementing BAT-based permitting. It also noted that the tendency appears to have been for permit emission limit values to be set on the basis of upper BAT-AELs more commonly than lower BAT-AELs, which has been set out in national guidance in some Member States. There is some evidence available that indicates variation across the EU as to whether or not the BAT-AEPLs (i.e., other than BAT-AELs) from the BAT Conclusions are included within permits although this is only known for some Member States. Article 15(4) derogations allow more cost-effective implementation. A limited proportion of installations have been granted derogations, although there is some variability in approaches across the EU. There is also evidence that very few permits have been set with stricter conditions than those achievable by the use of BAT in order to achieve Environmental Quality Standards (EQS) under Article 18.

1.1.1.2 What are the problem drivers?

The problem driver is the flexibilities allowed in setting permit conditions and granting derogations.

(Agro-)industrial plants continue to pollute the environment. Whilst the IED has led to reductions of pollution from (agro-)industrial plants, BAT and their associated emission levels (BAT-AELs) may not always be achieved because:

- ELVs are often set in permits by default at the upper level of the BAT-AEL range, without consideration of whether BAT could lead to lower emissions closer to the lower end of the range
- Some industrial plants are granted Article 15(4) derogations from specific BAT-AELs, which leads to higher levels of emissions than required by BAT

Conclusions. The use and approach to granting these derogations varies between Member States.

- Varying interpretations of how to set permit conditions in accordance with:
    - IED Article 15(1) flexibilities (when setting permit conditions for indirect releases of polluting substances to water)
    - IED Article 15(3) flexibilities (when setting different ELVs in permit conditions in terms of values, periods of time and reference conditions)

In addition, regarding Article 18 of the IED, it is insufficiently clear what the 'stricter conditions' than those achievable by the use of BAT should be, including what the 'additional measures' should be added to the permits to comply with EQS. This has led to varying interpretation when setting permit conditions.

1.1.1.3 How would the problem evolve?

The table below outlines the expected development without intervention.

Table A6-1: Development without policy intervention for the problem "BAT-AELs are not achieved"

(Sub) Problem	Development without policy intervention
BAT-AELs are not achieved	Ongoing use of Article 15(4) derogations and specific exemptions (and in some cases their potentially increased use) resulting in industrial processes which are exempt from certain requirements of BATC Ongoing risk of ELVs being set above the upper end of the BAT-AEL range and inconsistent implementation of the provisions across the EU Member States Ongoing risk that industrial releases continue to contribute to exceedances of EQS because permit conditions are not setting conditions stricter than BAT where needed

1.1.2 There are inconsistencies in the implementation of the IED across Member States

1.1.2.1 What is the problem?

The evaluation of the IED identified potential inconsistencies in how Member States were implementing the IED, more specifically with regards to the permitting process, monitoring and reporting, and enforcement.

The evaluation concluded that Member States draw on the BREFs and BAT Conclusions when setting monitoring requirements in permits. There is variation in implementation across the EU, in particular in relation to compliance assessment. The evaluation noted that more recent BAT Conclusions contain consistent approaches to specifying BAT for monitoring. Member State reporting shows that monitoring frequencies are respected in permit conditions. This has helped to improve transparency and consistency. There are

some data gaps in terms of whether the IED and BAT Conclusions monitoring and reporting requirements have improved compliance. Information is typically not publicly available via the internet in a lot of Member States, so it is unclear if it is being reported consistently and used for compliance assessment. Based on the evidence that is available, the differing application of compliance assessment rules risks creating distortions.

Although the evaluation also concluded that the IED has contributed to a more level playing field when compared to the IPPCD, it noted that there remain variations in implementation among Member States, particularly on compliance assessment, the granting of derogations, and on setting permit ELVs at upper BAT-AELs versus lower values within the AEL range. Some Member States appear to have granted a greater number of derogations than others and some don't allow them. Stricter permit conditions than 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 (and benefits). Differences between Member State approaches to conducting inspections have been improved under the IED with greater establishment of inspection plans.

Finally, the IED evaluation acknowledged that IED provisions are more explicit in relation to environmental inspections than under the Integrated Pollution Prevention and Control Directive (IPPCD), and that provisions relating to environmental permits have indeed been strengthened. However, it noted that it is unclear whether enforcement has really been strengthened in practice.

1.1.2.2 What are the problem drivers?

The driver for this problem is lack of clarity and guidance on the permitting process and monitoring and enforcement requirements. There are a number of sub-issues:

- Lack of clarity and guidance for permitting processes: Permitting practices differ across the Member States. While the binding nature of BAT Conclusions has led to an improved harmonisation in permitting across the EU compared to IPPC Directive, there remains scope for different interpretation and implementation of the requirements. Inconsistencies lead to a varying level of environmental protection achieved through implementation of BAT Conclusions across the EU Member States.
- Varied interpretation of enforcement and insufficient guidance: Practices related to inspection and enforcement of environmental permits vary across the EU Member States often owing to differing interpretation of the compliance assurance rules and insufficient guidance at EU level on how inspection and enforcement should be implemented.
- Varied interpretation and not using latest techniques for monitoring and reporting: The IED and the BREFs have contributed to a further harmonisation of monitoring provisions. However, practices related to monitoring of environmental permits continue to vary across the EU Member States. Added to this, while the use of latest available techniques to monitor emissions supports online reporting of real time continuous monitoring data, the extent to which this is integrated in Member State reporting is limited.

1.1.2.3 How would the problem evolve?

The table below outlines the expected development without intervention.

Table A6-2: Development without policy intervention for sub problems of the problem "There are inconsistencies in the implementation of the IED across Member States"

(Sub) Problem	Development without policy intervention
Lack of clarity and guidance for permitting processes	The Commission would seek to provide clarity and guidance given the shortcomings identified as part of the evaluation of the IED. This guidance and clarifications would reduce significantly the scope for different interpretation and implementation of the requirements. Inconsistencies driven by this sub-problem would be likely reduced or addressed
Varied interpretation of enforcement and insufficient guidance	Ongoing challenges with non-compliance
Varied interpretation and not using latest techniques for monitoring and reporting	Heterogenous approaches to monitoring and reporting emissions data, and to site visits and checking compliance with permit condition.

1.1.3 Transboundary pollution that remains ineffectively addressed

1.1.3.1 What is the problem?

Long range transboundary pollution is an ongoing environmental concern. Under Article 26 of the IED, it is possible for Member State authorities to request information from a neighbouring state if they believe a given facility is creating emissions that cross over political borders. However, how effective Article 26 is in practice is debatable, particularly for air emissions. For water emissions, bi-lateral initiatives have been set up for some of Europe's biggest river systems, such as the Danube[34] and the Rhine (IPCR, 2021), but communication and collaboration is less comprehensive on a more local level, undermining the zero pollution aims. For instance, a number of inefficiencies with regards to dealing with transboundary pollution have been raised in the TSS. These include non-homogeneity of applications and permits, particularly where citizens of other Member States try to consult the information, as well as bureaucracy, administrative barriers and lack of established communication channels between the Members States. Moreover, a number of reasons have been mentioned that may contribute to delayed notification of transboundary pollution, including political, economic and conflict of interests as well as the diversity in the EU and the international laws.

1.1.3.2 What are the problem drivers?

The problem driver is the lack of application in practice of taking into account of transboundary effects during the permitting process, which may (but not necessarily) be contributed to by the flexibilities allowed in setting permit conditions and granting

[34] https://www.danubecommission.org/dc/en/

derogations. No evidence has been identified in IED implementation reporting by Member States (i.e., (Ricardo, 2021), (Ricardo, 2019), (Amec, 2016)) that transboundary pollution is taken into account in general when granting permits. That said, while no specific questions have been targeted on this particular topic either in prior implementation questionnaires, some evidence in (Amec, 2016) suggests some monitoring and modelling is carried out by some Member States to check / assure transboundary effects

Whilst the IED has led to reductions of transboundary pollution from (agro-)industrial plants, this continues to be relevant as Member States take limited action on IED Article 26.

1.1.3.3 How would the problem evolve?

The table below outlines the expected development without intervention.

Table A6-3: Development without policy intervention for sub the problem "Transboundary pollution that remains ineffectively addressed"

(Sub) Problem	Development without policy intervention
(Agro-)industrial activities continue to contribute to transboundary pollution	Transboundary emissions continue, failure to meet zero pollution targets Transboundary damage to ecosystems and biodiversity Knock-on consequences for other ecosystems and humans

1.1.4 The IED does not sufficiently provide for access to environmental information, participation in environmental decision-making and access to justice

1.1.4.1 What is the problem?

A core element of the IED relates to public access to information on industrial installations operating within each Member State, including details of permits and their environmental performance. This is to enable effective public participation in decision-making, whereby relevant opinions and concerns are factored into the decision-making process, leading to greater accountability and transparency in the permitting process and contributing to greater public awareness of environmental issues. Multiple provisions are set out in IED Article 24 to ensure early and effective opportunities for public participation in the permitting process (Article 24[1]) via information access (Article 24[2]).

Adding to this, IED Article 25 allows for public access to a review procedure before a court of law or another independent and impartial body to challenge the legality of decision-making. The IED specifically acknowledges environmental non-governmental organisations (NGOs) as meeting these conditions and therefore able to access to this review procedure. Article 25 constitutes the provisions of the IED concerned with access to justice.

Further IED provisions requiring public access to information are:

- Requirement for the public to be consulted when an installation has applied for a derogation from the BAT Conclusions under Article 15(4) of the Directive.
- Additional requirements for competent authorities to make available information on the measures taken by the operator when an installation is closed (with reference to Article 22 which covers site closure and soil and groundwater contamination).
- More specific requirements on the type of information that should be made available to the public when a decision on granting, reconsidering, or updating of a permit has been taken, including information on how permit conditions have been determined.

The IED evaluation found that overall public access to information has improved under the IED (compared to its predecessors). Most stakeholder groups consulted during the IED evaluation, including industry and Member State competent authorities, considered that access to information has improved with IED implementation. However, issues remain where some permits are not publicly available online, some information is available online but difficult to locate, or in some Member States authorities have requested fees for access to permits. A key document that brought the provisions on access to information to the attention of the Commission is the European Environmental Bureau (EEB)'s report, 'Burning: The Evidence', published in 2017 (EEB, 2017). The report focussed primarily on permit access, rating the online systems of individual Member States against set criteria, and identifying, in EEB's view, systems where permit access was inadequate.

There are three aspects to this problem.

- Public access to information: There are heterogeneous approaches between and within Member States when providing public access to information, with cases of restricted access, information being made available only upon request, or for a fee, appearing to go against the phrasing of Article 24(2) of the IED. In addition, information is presented in complex formats, which makes it potentially challenging to the public to identify relevant information, or to track changes in permit content over time.
- Public access to information on the environmental impact of derogations: There is a growing need to establish and understand the environmental impacts that the use of derogations is having. Currently, there is insufficient information made publicly available to monitor the impact of Art. 15(4) derogations.
- Public engagement: The current scope for public participation, as defined by IED Article 24(1), does not cover all permitting procedures (e.g., there is no requirement to invite the public to participate in cases where a permit is updated to reflect BAT conclusions).

1.1.4.2 What are the problem drivers?

In summary, the driver for this problem is that EU industrial emissions legislation does not sufficiently provide for access to environmental information, participation in environmental decision making and access to justice (Aarhus rights).

Since the IED evaluation, an assessment of Member State reporting to the EU Registry on Industrial Sites (hereafter the EU Registry) has been undertaken – including among other

things a review of Member State reporting on how information has been made available to the public with respect to permits, Article 15(4) derogation decisions, site visit inspection reports and emissions monitoring data. Initial findings from the assessment of Member State reporting to the EU Registry (Ricardo, 2021) show that:

- Public access to permit documentation (including decisions on Article 15(4) derogations) is widely provided via national permit repositories (19 Member States), but gaps remain where relevant URLs have not been reported and permit documentation is not available for IED permitted (agro-)industrial plants. Public access to site visit reports and emissions monitoring data is more limited, with relevant URLs reported by 15 Member States for the former and by 13 for the latter.
- Ease of access to permit documentation is limited by several factors, including format (particularly scanned permit documentation), publication of multiple permit documents for one (agro-)industrial plant without indicating how the permit conditions interact between the documents, and heterogenous approach between (and within) Member States to structuring permit documentation.

Ongoing reporting to the EU Registry is expected to help to resolve the limitations identified by the IED evaluation, although there are fundamental challenges at Member State level, particularly as regards public access to information on emissions monitoring data.

Regarding access to justice, the IED did not change the provisions on public access to justice compared to IPPCD. The IED evaluation findings were that public access to justice is working to some extent when new permits are considered, but limitations can occur in challenging revisions to existing permits and interpretation of what constitutes 'substantial change', and whether the public can challenge a decision that a change is determined as 'non-substantial'. Other issues relate to the ability of the public and environmental NGOs to challenge omissions to act by competent authorities, such as permits that have not been issued for an installation.

In its findings in a legal case between the NGO, the International Institute for Law and the Environment, and 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, notably in relation to reconsiderations and updates to permits within 4 years of the publication of BAT Conclusions (ACCC, 2020). The IED is therefore not fully compliant with the provisions of the Aarhus Convention.

1.1.4.3 How would the problem evolve[35]?

Without revision to the IED, changes to the availability of information via information technologies (IT) could contribute to addressing aspects on availability of information. Otherwise, the following are expected:

- Public Access to information: Heterogenous approaches will likely continue. Ongoing efforts to expand access with the EU Registry will likely improve how the

[35] See also Annex 5.

information is made available to the public and ease of access over time. Ongoing assessment to clarify and simplify, where possible, Member State reporting will help to improve the relevance of the EU Registry as a mechanism for providing public access to information.

- Public access to information on the environmental impact of derogations: It is anticipated that there would be ongoing use of Article 15(4) derogations (and in some cases their potentially increased use) with limited information made available to the public as to the impact such derogations are having on the environment.
- Public engagement: A heterogenous approach will continue between Member States and within regions, which gives an issue with implementation and compliance with IED.

1.1.5 There is incoherence between industrial emissions policy and related environmental policies that has emerged over time, and some provisions may be obsolete, complicated or represent unnecessary burden

1.1.5.1 What is the problem?

The recent evaluation found that the IED framework is not completely coherent, which has led to differences in implementation within and between Member States (MS).

In the achievement of environmental objectives, the IED places burden on different aspects of industry, ranging from the BREF and permitting process, to Member State authorities and installation operators. One objective of the IED (compared to its predecessors) is to reduce, where possible, administrative burden through simplification and removal of unnecessary burden. However, the evaluation of the IED (Ricardo et al, 2020) found that, compared to the IPPCD, some additional administrative costs have been incurred for additional requirements under the IED. As part of the consultation activities undertaken for the IED evaluation, more than half the respondents indicated that administrative costs to Member States and operators have increased under the IED. The evaluation identified a number of opportunities for the streamlining of administrative burden without compromising the objectives of the Directive. These opportunities relate to a number of themes:

- Variation among Member States in assessing compliance
- Internally conflicting provisions within the IED
- Incoherence between Industrial Emissions policy and related environmental policies
- The definition of some activities is unclear
- Clarify thresholds for some (agro-)industrial activities.

These problems, therefore, relate to issues of efficiency and internal and external coherence.

Variation among Member States in assessing compliance

For large combustion plants (LCPs), prior work undertaken by the Commission has flagged that the current wording of IED Annex V Part 3 has not been implemented

consistently between Member States with regard to the subtraction of measurement uncertainty in compliance assessment. This means that different methodologies have been deployed by Member States for assessing compliance, with some interpretations/methods being less stringent and others being more stringent. Hence, for those instances which are interpreted less stringently, more could be done to reduce pollution if the more stringent interpretation was applied. In the case where one company has multiple installations operating in different countries, this variation in approaches may lead to a higher level of administrative cost than could be the case if a standardised method was followed.

This problem described for LCPs also applies for the compliance assessment of waste incineration plants. In this case, it is also due to variation in interpretation of the term 'effective operating time'.

For installations governed under chapter II of the IED, there are currently no rules provided in or related to chapter II for assessment of compliance with permit ELVs in the same way that, for example, LCPs have the rules provided in Annex V part 3. This means that there may be variation among Member States in the approaches adopted for assessing compliance, potentially limiting the effectiveness of emission reductions, as well as leading to an unlevel playing field.

Conflicting operating regimes internally within the IED leads to excessive burden

First, in addition to IED Annex II pollutants, relevant pollutants to an IED sector are identified in a systematic manner through the BREF information exchange process. Thus, BAT-AELs can be adopted by BAT Conclusions for additional pollutants to those set out in IED Annex II. This raises the question of whether Annex II is still needed or should be maintained as a comprehensive list of polluting substances. The existence of the Annex II list in addition to the pollutants mentioned in BAT conclusions (where they differ) may lead to excess administrative burden.

Second, the IED includes several requirements on combustion plants: chapter II of the IED and Annex I activity 1.1 comprises combustion installations of at least 50 MWth; the LCP BAT Conclusions set out BAT for LCPs under chapter II; and chapter III of the IED sets special provisions for combustion plants of at least 50 MWth whilst referring to Annex V. Due to this complicated set of rules, excess administrative burden may exist that could be minimised through further clarity and guidance distinguishing between the terminology used in the IED.

Similarly, the IED includes several requirements on waste incineration plants: chapter II of the IED and Annex I activity 5.2; the BAT Conclusions on waste incineration under chapter II; and dedicated special provisions for waste incineration plants in chapter IV and the Annex VI to the IED. Chapter IV applies to all waste incineration plants while Chapter II (BAT Conclusions) applies only above a capacity threshold.

It is further complicated for both LCPs and waste incineration plants because averaging periods set out in Annex V and Annex VI to the IED differ from those under the BAT Conclusions. In addition, some terminology is currently undefined at EU level related to normal operating conditions. This difference leads to additional administrative cost for operators and competent authorities.

Policy incoherence: Accidents Doctrine for the IED

In the event of any incident or accident significantly affecting the environment, IED Article 7 requires that the operator informs the competent authority, takes measures to limit the environmental impact, and prevents further incident or accident.

Under the Environmental Liability Directive, (agro-)industrial plants permitted under the IED are liable for environmental damage. Accordingly, where environmental damage has not yet occurred but there is an imminent threat of such damage occurring, the operator shall, without delay, take the necessary preventive measures. In addition, where environmental damage has occurred, the operator shall, without delay, inform the competent authority of all relevant aspects of the situation and take remedial action.

The Seveso Directive sets out measures to control and prevent major-accident hazards involving dangerous substances which might result from certain industrial activities, and the limitation of their consequences for human health and the environment.

The interface of IED Article 7 provisions with both the Environmental Liability Directive and the Seveso Directive is unclear, including with regard to land planning aspects, to align requirements and streamline where possible.

The definition of some activities is unclear

The definition for some activities is unclear and has led to ambiguity in some cases as to whether or not it is in scope of the IED. There is currently a lack of clarity regarding the inclusion in the IED of certain advanced thermal waste treatment activities. Whilst both gasification and pyrolysis plants are considered within the scope of Chapter IV (IED Article 42), pyrolysis is not explicitly listed under Annex I activities. This results in uncertainty regarding which activities are within the scope of the IED under different parts of the IED (chapter II versus chapter VI).

Clarifying thresholds for some (agro-)industrial activities

Certain sub-activities within activity 4 ‘Chemical industry’, such as e.g., pharmaceuticals, operate as relatively small capacity installations. The Annex I of the IED does not set capacity thresholds for all activities, and this is not included specifically for the chemical industry. Instead, a threshold for inclusion in Annex I is referred to as ‘industrial scale’. There is potential unclarity about what installations would be included as these activities, as well as the possible issue that the administrative costs and compliance costs of inclusion within the IED for small installations may not warrant the benefits that could accrue.

1.1.5.2 What are the problem drivers?

In summary, the drivers for this problem are that: some provisions of EU law applying to large (agro-)industrial plants may be obsolete, complicated or represent an unnecessary burden; and that, in some cases, there is incoherence between IE policy and related environmental policies (that have occurred as the policies have evolved).

In the waste incineration sector, it was found that there has been unnecessary burden for competent authorities and operators caused by overlaps between Chapter II, the LCP BAT Conclusions, and Chapter IV and the associated IED annexes, which require the calculation of ELVs for different regimes, effective operating time and normal operating conditions.

In the LCP sector, it was found that there has been unnecessary administrative burden owing to monitoring and reporting requirements on pollutant emissions for both ELVs and BAT-AELs that have led to a duplication of effort. In addition to this, these limits are based on different averaging periods leading to further increased burden. There are also issues relating to definition of scope of the Directive, namely with regard to combustion plants and incineration plants. Firstly, the definitions of combustion plants and combustion installations should be clarified to provide certainty for stakeholders. Additionally, gasification and pyrolysis plants are included in Chapter IV of the IED but not listed in Annex I activities.

Evidence available suggests that the IED has led to a high burden in the rearing of pigs and poultry (IRPP) sector, which could also potentially be the case for cattle farms being considered for inclusion in the Directive, especially due to the large number of installations that these sectors have.

In the consideration of bringing new sectors within scope of the IED (Section 1.4), assessing the additional burden will be important – particularly as regards interaction with existing legislation. For example, in the case of the mining sector, it will be important to consider interaction with the Extractive Waste Directive and how bringing this sector within the scope of the IED may help to modernise and reduce burden. Similarly, burden will be important when considering the interaction between the IED and the EU-ETS. In addition, the extent to which inconsistency between the definitions of combustion plants in the two Directives is a problem driver needs to be reviewed.

IED Article 7 sets out the need for operators in the event of incidents and accidents with environmental consequences, to limit consequences and prevent further incidents. In addition, under the Seveso Directive (Directive 2012/18/EU), installations carrying out operations involving dangerous substances are required to comply with a range of actions, including the deployment of major accident prevention policy and production of emergency plans for "upper tier" installations of higher risk. Furthermore, IED Article 7 interacts with the Environmental Liability Directive (ELD) (Directive 2004/35). Streamlining these provisions will be important for ensuring coherence and minimising administrative burden of the respective Directives.

An additional driver resulting in unnecessary administrative burden is the presence of obsolete provisions in the IED. An example of this is Transitional National Plans for LCPs. A list of obsolete provisions that have been identified for removal or amendment is outlined in Annex 12. Similarly, legal analysis of the Asbestos Directive has determined that certain aspects are obsolete, and the Commission has determined that the Directive could be repealed without creating regulatory gaps (European Commission, 2015). Consequently, production of asbestos (currently in IED Annex I as Activity 3.2) is now banned under REACH and should be removed as an IED activity.

1.1.5.3 How would the problem evolve?

Without the revision to the IED, it is anticipated that the following would be the case.

- Internally conflicting provisions within the IED: Pollutants listed in Annex II will continue to hold legal relevance despite conflicting with BAT Conclusions. LCP and waste incineration operators will continue to undergo duplication of effort and

administrative burden resulting from duplicated burden. The list in Annex II is creating confusion regarding the integrated nature of the IED. The IED by nature looks at all relevant pollutants. As Annex II is a closed list, readers sometimes think some substances are not covered, leading to suggestions to add substances.

- Policy incoherence: Any potential additional burden caused by the overlap of IED Article 7 and Seveso and ELD provisions will continue in the absence of change. It is, however, expected that the Commission will seek to address these issues in the baseline through the production of guidance.
- The definition of some activities is unclear: Ambiguity of the definition of some activities will continue, leading to continued uncertainty over whether or not some activities are in the scope of the IED. Some novel (emerging) applications of gasification, liquefaction and pyrolysis processes are providing new routes for the extraction of greater amounts of energy from our resources, including the greater utilisation of biomass and waste streams. The extraction of further value from our biomass or waste streams forms an important step to an increasingly circular economy. As such, further development of these processes, which may displace more conventional systems (e.g., the combustion of dedicated planted biomass), is to be expected. The trends towards the greater investigation and reliance on such techniques is driven by the increasing emphasis on decarbonisation and the related goal of achieving a more circular economy.

1.2 The IED is not dynamic enough and doesn't support the rapid deployment of innovative technologies

1.2.1 What is the problem?

Deployment of emerging and breakthrough technologies is needed to address the emission of pollutants and GHGs. It is expected that the same innovative techniques will contribute to reducing emissions of both pollutants and GHGs.

The evaluation of the IED concludes that the IED has not made a significant contribution to the uptake of innovative techniques. This is driven by a number of factors, including: the BREF review cycle is slow, i.e. 10 to 12 years; BAT-AELs are based on 'backward-looking' information and are static; scarce information on innovative techniques is included in BREFs and BAT Conclusions; there are few technology suppliers/developers in the BREF Technical Working Groups; there is no evidence of effective action taken by Member States under Art. 27 of the IED to promote development and application of emerging techniques and no Commission guidance has been published; and Art 15(5) derogation seems to be used in very limited occasions.

These lead to four fundamental sub-problems:

(i) The IED is not dynamic enough to support innovation or deployment of breakthrough techniques

(ii) Decarbonisation breakthrough technologies will often generate environmental co-benefits, e.g. reduced air emissions, and become BAT, and vice versa. If this requires deep transformation, more than the 4 years allowed under the IED may be needed for the entire sector to transform.

(iii) BREF reviews are slow, thus not compatible with quick turnarounds required to adopt innovations

(iv) The IED can prevent innovation, or at least inadvertently promote "lock-in" of existing good, but not best, practice.

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. In this way, the main impact has been 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 copy aspects of the IED or BREFs. However, BAT are inherently 'backward-looking' and their ability to stimulate innovation has been limited. Emerging techniques are identified in the BREF process, and work is ongoing to better identify them through a pilot scale project (innovation observatory) as part of frontloading efforts for the BREF process. This is expected to stimulate innovation further.

It is also acknowledged that the scope of the BREF reviews may limit their impact: the BREFs focus on available techniques (the Sevilla process is backward-looking), leaving aside those which are currently under development and not commercially available (so called breakthroughs or cutting-edge techniques). The BAT-AELs effectively are backward-looking, not forward-looking, as they reflect what has already been achieved in industry to date (at least by some plants/installations).

However, some industrial sectors, such as cement, iron steel or oil and gas refineries, will need to transform and introduce novel primary techniques to decarbonise. Recent studies (Wood, 2021) show that the take-up of decarbonisation options could also deliver pollution reduction benefits. However, this is not always the case. Although some BAT Conclusions under the IED have derived BAT for primary techniques (conversion paths or options) in the past, the focus for TWGs has been mainly on setting BAT for secondary, less transformative techniques. The current IED framework however allows TWGs to address this challenge, as illustrated by the case of the BAT conclusions on chlor-alkali that concluded that the mercury-cell process was not BAT and thereby triggered the conversion of the whole sector to mercury-free processes. However, without a clear and common position across the EU and with diverging views across stakeholders, the implementation of the IED may not contribute as effectively as it could to required transformation of industry whilst pushing towards the EU's zero-pollution and other ambitions. For example, deriving BAT for primary techniques is perceived as not being technology neutral by certain stakeholders that would, therefore, oppose such practice; however, as sectors seek to transform over the coming decades some processes and technologies are likely to be more optimal than others from an environmental and climate perspective. Annex 12 summarises three sectoral case studies that further delve into some of these challenges.

IED Article 15(5) allows derogations from BAT-AELs for the testing and use of emerging techniques for a total period of time not exceeding 9 months. However, there are few cases of derogations being granted according to this provision, suggesting that more could be done to stimulate innovation through encouraging the testing of not-yet commercialised techniques. Some Member States stated that the timescales concerned (e.g., in the Sevilla process) were simply too long to be a driving force for innovation. On the other hand, this resulted in a more universal application of abatement techniques which could be seen as a

form of innovation. Some stakeholders considered that the length of the BAT Conclusions implementation period was often not long enough to test and implement emerging techniques. This typically resulted in resorting to implementing techniques that had previously been in place before instead.

The pilot innovation observatory (tested from 2018 to 2020) has delivered outputs identifying emerging techniques to the kick-off meetings of the BREF reviews for the textiles, and slaughterhouses and animals' by-products industries, as well as identifying potential candidates for BAT. Initial feedback suggests that the pilot observatory has improved the process for identifying emerging techniques. Whether this has also specifically stimulated innovation (i.e., encouraged additional innovative activity in the design and development of techniques that wouldn't have otherwise occurred) is unclear. The pilot observatory also identified synergies between IED with the EU Environmental Technology Verification (EU ETV) and the LIFE budget programme. The EU ETV is a tool to help innovative environmental technologies reach the market (EcoAP, 2021), providing cooperation opportunities to attract and secure funding, and signposting to EU funding opportunities as provided by the LIFE budget programme, which can support pilot projects to test and trial 'close-to-market' innovative demonstrative solutions expected to achieve environmental and/ or climate benefits (EASME , 2021). LIFE funding is available to projects launching solutions that could be implemented in close-to-market conditions (at industrial or commercial scale) during the course of the project or shortly after its completion.

1.2.2 What are the problem drivers?

The summary driver is that the static character (and backwards-looking nature) of the BREF process restricts innovation.

The drivers for this problem area are generally common and cross-cutting to this problem area (i.e. state of the art techniques cannot respond in a satisfactory manner to problems of environmental pollution, the climate crisis and resource depletion). In addition, overlaps with the drivers of other problem areas are identified (relevant to zero pollution ambition, Section 1.5.2; and the depletion of natural resources, Section 1.3.2.2). In sum, key drivers include:

- The BREF cycle is slow, very time-consuming (key driver preventing deep transformation of industrial sectors) (cross-cutting to Problem 2 – the climate crisis; and Problem 3 – the depletion of natural resources)
- BREFs primarily describe existing techniques already being used (key driver inadvertently locking in good but not best practices)
- BREFs do not use life cycle assessment (LCA) to analyse the overall impact (of each process), but focus mainly on abatement capabilities (key driver preventing quick turnaround to adopt innovations, and inadvertently locking in good, but not best practice, techniques) (cross-cutting to Problem 3 – the depletion of natural resources)
- Technical working groups involved in BREF development do not contain technology providers/ developers (cross-cutting to earlier problems).

The fact that the drivers are generally cross cutting means that the scale of the problem will generally be derived from the extent of emerging techniques in BREF documents (qualitative); and, where possible, from the emission reduction potential that could be achieved with the application of emerging techniques (quantitative). In three cases, the scale of the problem is simply based on the fact that there has been no evidence of activity: no Article 15(5) derogations have been granted; no dedicated financial instruments to support substantially emerging techniques (ETV and LIFE scheme are applicable but have low impact to date in ET development) under the IED; and no guidance to support Member States with the development and application of emerging techniques.

1.2.3 How would the problem evolve?

Without policy intervention, it is anticipated that the combined consequences of the drivers will be that:

- Emissions (pollutants to air/ water as well as GHG emissions) from industry will remain ongoing (limited improvement) if BAT conclusions focus mainly on secondary (abatement) techniques.
- Improvements to resource consumption from industry will be limited
- New decarbonisation processes will still need emission abatement devices. End of pipe systems (such as filters, scrubbers, etc) will be required to improve the overall performance of these cleaner (decarbonisation) processes.
- Uneven playing field for operators where industrial plants have adopted emerging techniques.
- The IED's contribution to decarbonisation may be slow and/or limited as the existing regulatory framework may only encourage the deployment of secondary techniques or measures. This may be further exacerbated by uncertainty and lack of clarity or common framework for TWGs to operate in a changing context where deep transformation is required to achieve the EU's decarbonisation objectives. TWGs may consider using a phase-out approach in BREF (e.g., making "it is not BAT" statements in the conclusions chapter) to accelerate the IED's contribution to decarbonisation. However, it is not clear whether, when and the extent to which this will happen across the EU.

1.3 The IED has not been effective at addressing the use of hazardous chemicals, resource efficiency or the circular economy

The IED has not been effective in addressing the use of hazardous chemicals, resource efficiency and the circular economy. These problems are considered below.

1.3.1 IED has not been effective in addressing the use of hazardous chemicals

1.3.1.1 What is the problem?

The advance of technology and society means that European citizens make use of more chemical substances within their daily lives than ever before. The European Chemicals Agency's (ECHA) classification and labelling (C&L) inventory has reported notifications covering some 130,000 unique substances (ECHA, 2021). The European Commission (2020) further commented that in 2018, Europe was the second biggest producer of

chemicals globally (accounting for 17% of all sales), with chemical manufacturing being the fourth largest industry in the EU, directly employing 1.2 million people.

Within the European Union, the safe manufacture and use of chemicals is managed by the chemicals' acquis, which spans approximately 45 pieces of legislation (European Commission, 2019). This includes both horizontal pieces of legislation that span thematic topics such as REACH (European Commission 1907/2006) (ECHA, 2021) and the Water Framework Directive (2000/60/European Commission), and vertical pieces of legislation covering a specific set of applications such as the Plant Protection Products Regulation (European Commission 1107/2009) and the Cosmetics Regulation (European Commission 1223/2009). The Industrial Emissions Directive (2010/75/EU) has a central role within this acquis to help manage and minimise the release of harmful chemicals to the environment. This remit is broader than chemical manufacturing alone, covering additional and unintentionally produced chemicals (such as dioxins and furans) and non-chemical industrial sectors which still produce harmful chemicals that can be emitted (e.g., energy production).

In October 2020, the Commission published its Chemicals Strategy for Sustainability towards a toxic-free environment (European Comission, 2021). This has been followed by the zero-pollution action plan, with the strategy and the action plan both underscoring the importance of sustainability and the circular economy, including the material flow of harmful chemicals. This includes the need for management of chemicals and chemical emissions to the environment from the industrial emissions, which again, underscores the role that the IED can play towards sustainability and the circular economy.

Based on the growing demand for chemicals, the evaluation of the IED identified some areas for improvement.

- The first key example is where the REACH Regulation has proactively identified 'substances of very high concern', which are added into Annex XIV of REACH, but have not necessarily translated into more environmental control and progress to safer alternatives through the implementation of the IED. For example, the recent IED ex-post evaluation highlights evidence to this effect, including that "some stakeholders (Member States and industry)…stated that the [BREF] review cycle is too long and the process is not dynamic enough to address emerging issues, particularly around the use of specific chemicals". In addition, an earlier report by Ricardo into the *IED's contribution to the circular economy* (also considered as part of the ex-post evaluation) found that BATs on the use of hazardous chemicals could be more systematically included across the BAT conclusions; and that greater reference to hazardous chemicals identified under REACH and other related chemicals legislation could be described within KEIs in the BREFs.
- The second example is the relationship between the implementation of the IED and the Water Framework Directive. The EEA's State of the Environment report (2018) comments that 45% of EU surface water bodies were in poor chemical status, primarily linked to a small handful of chemicals, particularly mercury and polyaromatic hydrocarbons (PAHs). The primary source of these emissions comes from deposition of atmospheric emissions linked to combustion of fossil fuels both from industrial facilities (covered by IED), but also from diffuse emissions from

transport. The EEA's 2020 signals report (2020) goes further highlighting the importance of releases to water from urban wastewater treatment works. This reflects the complex picture for material flows of a range of substances released to sewers that cannot effectively be treated at urban wastewater treatment works (i.e., Poly- and perfluoroalkyl substances (PFAS)). While these are issues managed by related legislation (environmental quality standards directive, and urban wastewater treatment directive), there is an important role for the IED to play and greater opportunity for the systematic inclusion of data from water policy into IED processes. The integrated assessment of river basin management plans (2019) commented that, while the IED and Water Framework Directive were well-aligned 'on paper', in practice the very different philosophical approaches and terminologies between industrial and water representatives created a gap, and more needs to be done to understand the downstream consequences for surface water.

- The final key example relates more widely towards the aims of the zero-pollution action plan. The EU's chemicals strategy for sustainability towards a toxic-free environment, published in October 2020 (European Commissin, 2020), highlighted the aims of the European Union to move away from use of hazardous chemicals through substitution to safer alternatives, or innovation leading to new processes that were less reliant upon hazardous chemicals. However, it is important to recognise that as the scientific and industrial processes evolve, the way that chemical substances are used becomes more complex, including supply chains that extend beyond the borders of the European Union. As an illustration, ECHA have provided direct support to the update of the BREF on ceramics (which commenced in Spring 2021), by identifying a list of potential substances of high concern for further review and possible substitution. Based on data submitted under REACH and a screening process, this identified a subset of 70 substances, with a further stakeholder engagement ongoing with industry parties to help refine things further. The high number of chemical substances in use and complex supply chains represents a challenge for identification of how substances are used and what the potential is for substitution. This is an element where the IED (through the BREF process) could add value to related legislation. A good example of this is the recent update of the textiles BREF (December 2019) which posed the idea of a chemical management system to help industry operators and national regulators better understand how and where chemicals are used in specific processes.

Alongside the identified challenges with the implementation of the IED in a way that is aligned with other closely related legislation, there are issues with reporting and monitoring of key emission and environmental data to track and minimise emissions to the environment. Given the goals of the chemical strategy published in October 2020, particularly on sustainability and circular economy, greater understanding of how chemicals are used within a wider circular economy and reporting of emissions data will be key to meet the objectives set out. Data produced under the European Pollutant Release and Transfer Register (E-PRTR) Regulation (European Commission 166/2006) illustrates a downward trend for emissions to air and water from a wide array of the 91 pollutants covered by E-PRTR. However, it should also be recognised that many emerging chemical concerns and substances of very high concern (SVHCs) are not covered by the E-PRTR,

and the fitness check of the E-PRTR (European Commission., 2018) identified (much like the IED evaluation) potentially missing key economic activities. It is worth noting that an impact assessment for options to amend the E-PRTR (following the E-PRTR evaluation) is also now in process.

1.3.1.2 What are the problem drivers?

The main drivers of this problem are:

- Market signals do not result in the use of safest chemicals by IED operators because the cost of chemicals does reflect the environmental impacts of chemicals' use.
- Coverage of chemicals of concern (such as substances of very high concern (SVHC), POPs, and priority substances) in a less systematic way within BREFs and BAT conclusions. The results of the Targeted Stakeholder Survey highlight that, in part, this issue is exacerbated by the lack of a common definition for 'hazardous chemicals', with different legislation using different terminology.
- Practical obstacles that impede the flow of data between different legislations. For example, REACH takes a substance-by-substance approach, while the IED is industry sector focussed. REACH does include consideration of uses and possible emissions and exposure from the use of chemicals; however, the industry sector indexing for REACH does not align or match the sectors defined by the IED. This means that identifying data related to the relevant sector is challenging and not transparent.
- The implementation of the IED could play a greater role in contributing to meeting the Water Framework Directive objectives for priority hazardous substances.
- The development of BREF documents provides valuable information on best practice for industry sectors covered by the IED, including detailed information on processes. However, use of this information to support the circular economy and transition to safer chemicals is limited due to the complexity of the topic. This could represent a missed opportunity where IED could play a greater role in supporting the EU's chemicals strategy for sustainability.

In particular, as highlighted above, the IED sits centrally within a wider chemical acquis of policy, which evolves around it and creates a pressure for the IED's implementation to keep up with policy developments in other areas.

The IED sets out the approach for prevention and control of pollution from industrial activities. This includes (under Article 4) the need for environmental permitting and identification of key chemical species that should be controlled. However, there are challenges in implementing this. For example, the selection of key chemical species is dictated, in part, by the understanding of the main chemical pressures under related legislation and Conventions, and this is complex and dynamic. The lists of substances of concern are long and complex, and new requirements emerge over time. For example,

- REACH (which contains 211 substances of very high concern)
- The priority substance list under the Water Framework Directive (45 substances)

- The POPs Regulation, which includes 30 regulated substances
- Other emerging issues that appear across these legislations and may be related with the implementation of the IED. For example, the increased need for destruction of brominated POPs leads to emissions of brominated dioxins and furans from IED plants, the increasing concerns for pharmaceutical emissions from wastewater treatment plants (leading to the proposed addition of pharmaceuticals in the list of priority substances by 2024). The regrettable substitution of perfluoro-octane sulfonate (PFOS) by ADONA[36] and GenX[37] chemicals with potential emissions from IED plants in the textile sector amongst others.

The publication of the zero-pollution action plan sets a clear and loud precedent and set of aims, with the IED having a clear role in supporting the transition to safer chemical alternatives. The implementation of the IED has not so far contributed as effectively as it potentially could. The challenge, therefore, is to maintain continuity and maximise the effectiveness of the IED to help support the sustainability goals of the EU Chemical Strategy.

Moreover, the Water Framework Directive (and its Daughter Directive on environmental quality standards (EQSD, 2008/105/European Commission)) requires widespread monitoring of surface water. This programme of monitoring within a receiving environment provides the key evidence base for how policy instruments are impacting the minimisation of emissions to the environment (or otherwise). This dataset, therefore, represents a key resource, particularly for the IED, to help adjust and improve the role of environmental permitting to limit emissions where needed. This is particularly true of emerging chemicals of concern covered by instruments such as the Watch List (European Commission, 2020) . However, it is far less clear how well these data sets are used, and what the general awareness levels are of these datasets by representatives working in different policy fields.

1.3.1.3 How would the problem evolve?

Both the IED and REACH set in place obligations for the safe management of chemicals and minimisation of emissions. However, there is potential for activities to become siloed and gaps to emerge between IED and REACH, particularly for SVHCs (211 substances, with additional substances being targeted).

ECHA has increased its participation and support of the most recent two BREF updates (textiles and ceramics). Based on discussions with ECHA, this engagement is still at a stage where collaboration is developing and the support is being provided on a case-by-case approach. This support provides an important step in sharing expertise and moving towards a more systematic inclusion of data into IED processes. However, this could still be strengthened further, especially as REACH continues to evolve at a rapid rate, with further addition of SVHCs. Without further intervention, policy and implementation gaps between REACH and the IED are likely to grow.

[36] ADONA is the trade name for ammonium 4,8-dioxa-3H-perfluorononanoate

[37] GenX chemicals are processing aids used in the production of fluoropolymers. Hexafluoro-propylene oxide dimer acid (HFPO-DA) and its ammonium salt are the major GenX chemicals.

The Water Framework Directive, and in particular the EQSD for priority chemicals to water, covers the aquatic environment as a receiving body. Failure to address these pollutants through the implementation of the IED is likely to continue to add pressure to EU water bodies.

Achieving the aims set out within the EU's 'Chemicals strategy for sustainability towards a toxic-free environment' are ambitious and will require significant efforts and input from all relevant parties. Without seeding the themes of the strategy into the relevant legislation, such as the IED, these aims may be more difficult to achieve.

1.3.2 The IED has not been effective in addressing resource efficiency and circular economy

1.3.2.1 What is the problem?

The existing production and consumption systems are, to a large extent, linear. Natural resources are used in industrial installations to manufacture products of which, at the end of their use phase, only a fraction is reused, repaired, remanufactured, refurbished or recycled. During production, a part of the natural resources is lost as waste or emissions to the environment. On the other hand, in a circular economy, the materials contained in a discarded product should be kept within the economy wherever possible, in order to be productively used again and again, thereby creating further value.

The problem with this linear use of natural resources is two-fold:

1. Waste and industrial emissions pollute the environment or cause climate change (covered by earlier problems)
2. Natural resources are being depleted

In order to address this, the Commission adopted, as part of the European Green Deal, a new EU Circular Economy (CE) Action Plan (COM/2020/98 final). On the topic of circularity in production processes, the CE Action Plan refers to (the review of) the IED and the BREFs:

"Circularity is an essential part of a wider transformation of industry towards climate-neutrality and long-term competitiveness. It can deliver substantial material savings throughout value chains and production processes, generate extra value, and unlock economic opportunities. In synergy with the objectives laid out in the Industrial Strategy, the Commission will enable greater circularity in industry by…assessing options for further promoting circularity in industrial processes in the context of the review of the Industrial Emissions Directive, including the integration of circular economy practices in upcoming Best Available Techniques reference documents;"

There are three aspects to this problem:

- The binding nature of resource efficiency BAT-AEPLs. In some BAT Conclusions, resource efficiency BATs (aiming for efficient use of energy, water, and materials, including the minimisation of waste generation) are expressed as quantitative BATs (i.e. BAT-AEPLs), or are merely contained in narrative BATs. There are indications of heterogeneous approaches between and within Member States when implementing BAT-AEPLs in permits. Some Member States consider that the

resource efficiency BAT-AEPLs do not have a binding value. A general challenge for the setting of environmental performance benchmarks and especially for deriving quantitative resource efficiency BATs is that certain information (e.g. production levels, process or product specifications, or the resource use per unit produced) is considered by industry to be confidential business information ('CBI').

- Obligations relating to resource efficiency and circular economy. According to the IED evaluation, the IED has not been very effective in addressing resource efficiency and circular economy aspects. Furthermore, BREFs & BAT Conclusions do not systematically take into account (upstream or downstream) value chain issues that could be addressed by the IED operator. Furthermore, BREFs currently contain little information that supports the setting of End-of-Waste criteria by European, national or regional bodies.
- Relation to industrial symbiosis. Industrial symbiosis (IS) refers to sharing resources between firms to achieve a mutually beneficial competitive advantage, involving physical exchange of materials, energy, water, and by-products. The exchange of production residues is, however, considered recycling (waste treatment) and not industrial symbiosis if a production residue that is categorised as waste is reprocessed into products, materials, or substances. Industrial symbiosis has clear advantages for resource efficiency and in promoting a more circular economy, but there are few measures at present that support a wider overall uptake. BREFs currently do not contain sufficient information to unlock the potential for generating mutual benefits from cross-sectoral and cross-value chain collaboration (thus fostering industrial symbiosis), which would create more resource efficient value chains.

1.3.2.2 What are the problem drivers?

The summary driver is that whilst market signals do not result in optimised use of resources by IED operators because the cost of chemicals does reflect the environmental impacts of resource use, IED design and implementation have not prioritised resource efficiency.

The contribution of the IED to the CE has been previously researched (Ricardo et al, 2019) on the topic areas of energy use, materials use, waste generation, use of hazardous chemicals and industrial symbiosis. The report looked at the contribution of IED sectors to each topic and their trends over time, and at the untapped potential for the IED to contribute further to the circular economy. A series of options to strengthen the IED's contribution to the circular economy was identified. An OECD report (OECD, 2019) addressed the effectiveness of BAT policies to reduce industrial emissions. Another report (European Commission., 2018) analysed the contribution of the IED to water policy.

Inversely, an unpublished report commissioned by the European Environment Agency (ETC/WMGE, n.d.) tried to associate the effects of policies, actions and measures that are proposed in CE strategies, with selected industrial sectors' emissions levels and resource use intensities. It was however found that most of the identified public initiatives are very generic in scope − with mostly economy-wide quantitative pollution reduction goals − and

rarely with targets for a specific industrial sector or pollutant. In contrast, industry practices on pollution control and reduction, as considered in the BREFs, refer to very specific processes of which the prevalence and scale of application are difficult to judge or quantify. Effective and successful circular economy strategies must identify the linkages between single process, installation and sectoral emissions and global emission reduction targets. In this context, it can be evidenced that macro-economic effects of CE initiatives might be strengthened, weakened, or cancelled out due to other changes elsewhere in the economy. For instance, the well-intended use in industrial activities of refurbished, remanufactured, repaired or upgraded parts or products, or of recycled material feedstocks, might negatively affect the sectoral emissions and waste generation figures, as a consequence of the processing or usage of less homogeneous, more impure or less reliable resources.

The above indicated reports and analyses allow the identification of particular problems regarding the potential for improvement of the environmental performance of industrial activities in the context of the IED and its current scope and objectives. The problems relate to the role of the IED in promoting: (i) installation-level resource efficiency; (ii) sector-specific strategies, and (iii) cross-sectoral cooperation.

- At the individual installation level, circular economy strategies primarily aim to lower the use of natural resources in absolute terms, to avoid their depletion. From an industry's perspective, however, this means that, assuming constant production capacity and added value generation, industrial activities must increase their resource efficiency by lowering the energy, water and raw material consumption per unit of industrial output, referring to either the total number of units produced, or to their economic value or weight. A common challenge in setting targets for industrial resource efficiency, is the difficulty of gathering and exchanging data and contextual information, which is in some cases considered to be confidential business information. The competitiveness concern is most often expressed about data related to production processes and products, more than about emissions data. It has been suggested that the requirement of throughput data could place an unfair burden on facilities in terms of resources and their ability to remain competitive (UNITAR, 2020). Furthermore, there are specific challenges for different types of natural resources:
    - Energy efficiency (specific energy consumption). The IED allows Member States to choose not to impose requirements relating to energy efficiency in respect of combustion units or other units emitting carbon dioxide on the site (IED Article 9(2) of the IED).
    - Material efficiency (specific materials consumption and specific waste generation). BAT Conclusions focus primarily and highly on end-of-pipe emissions and, to a lesser extent, waste generation, and not on resource consumption per unit of output. Furthermore, heterogenous approaches between and within Member States are observed on the implementation of precisely those BAT-AEPL and indicative levels that refer to resource consumption and waste generation levels. Some Member States consider

that such BAT-AEPLs are not binding, similar to the 'indicative' levels sometimes included in the BAT conclusions.

- Water efficiency (specific water consumption and specific waste water generation). Here, the considerations are analogous to those mentioned for material efficiency.

- At the sector level, successful implementation of circular economy practices will need '*more than traditional R&D or a piecemeal approach to technologies: it needs changes in entire systems and joint efforts by researchers, technology centres, industry and SMEs, the primary sector, entrepreneurs, users, governments and civil society*' (European Commission, 2017). However, according to responses by some stakeholders in the IED evaluation, the IED has not been very effective in addressing resource efficiency and circular economy aspects. BREFs & BAT Conclusions do not systematically take into account value chain issues that could be addressed by the IED operator. One of the possible reasons for this might be a lack of monitoring and reporting of the results of in-house measures that contribute to improved resource efficiency (see bullet above). On the other hand, knowledge of and insights about the environmental effects that occur beyond the installation boundaries as a consequence of the choices made by a plant's operator might be very limited. Choices in this context can refer to: (i) operator's procurement requirements, aiming at renewable, recycled or low-carbon feedstocks, (ii) specific measures that avoid or limit the content of hazardous substances in the plant's waste or by-products to be treated or used by third parties, or (iii) measures such as waste sorting or by-product pre-treatment. This lack of monitoring or knowledge then leads to limited available information from and to operators on the range of choices that might improve resource efficiency in-house or elsewhere in the plant's value chain.

- Finally, the realisation of net environmental benefits as a result of cross-sectoral cooperation beyond installation boundaries, through collaboration with upstream (secondary) material resource suppliers and downstream stakeholders, is not in the scope of the IED. Although currently, there is a poor and fragmented evidence base regarding the environmental and economic gains that can be realised by industrial symbiosis (Technopolis Group, UCL et al., 2018), it is likely that there is an untapped resource efficiency & CE potential that could originate from industrial symbiosis initiatives.

1.3.2.3 How would the problem evolve?

Without policy intervention, the current variation in interpretation by Member States of whether BAT-AEPL values are binding and thus included in permits will continue. On exchange of information, limited change is expected by other policy frameworks. More information could be made available through E-PRTR (e.g., on solid waste generation), but this is often not at the necessary level of detail to be useful for BREFs. Currently, art 13.2 of the IED requires exchange of information on consumption and nature of natural resources and generation of waste to be addressed.

On resource efficiency and circular economy, along with economic risks of short- or medium-term scarcity (e.g., critical raw materials), policy instruments other than IED will be main driver for improved resource efficiency and circular economy. At the EU level, these include EU ETS legislation; waste and product legislation; European Green Deal policy instruments; Chemical Strategy for Sustainability; REACH; E-PRTR; and UWWTD.

On industrial symbiosis, sectoral, national or other initiatives could still function, but would be less supported by a large-scale information exchange at EU level. The current abundance and diversity of national End-of-Waste criteria would continue to hinder the exchange of waste-based feedstocks between installations in different countries.

1.4 The contribution of the IED to reducing greenhouse gas emissions has been limited

1.4.1 What is the problem?

(Agro-)industrial plants under the scope of the IED include energy-intensive plants that are responsible for a significant share of EU greenhouse gas (GHG) emissions and will therefore be important in view of the European Green Deal and the Zero Pollution ambition. In 2017, the industry and energy sectors (EU-28) accounted for a total of 2,195 Mt CO_2e (EEA, 2020a), the majority of which will need to be cut by 2050 to meet the targets of the Paris Agreement. The European Environment Agency (EEA) annual GHG inventory report (EEA, 2020b), indicates that GHG emissions in the EU decreased in the majority of sectors between 1990 and 2018.

Emission reductions for manufacturing industries, electricity, and heat production (as well as for construction and residential combustion) are amongst the largest at aggregate level. However, the current reduction rate will not be sufficient to deliver the savings needed to achieve the EU's 2030 reduction target (40% compared with 1990 levels) (European Commission, 2021b). Achieving the 2030 targets will require a focused effort across the EU; and achieving the long-term goals of even greater levels of decarbonisation will require faster rates of reduction than those currently projected.

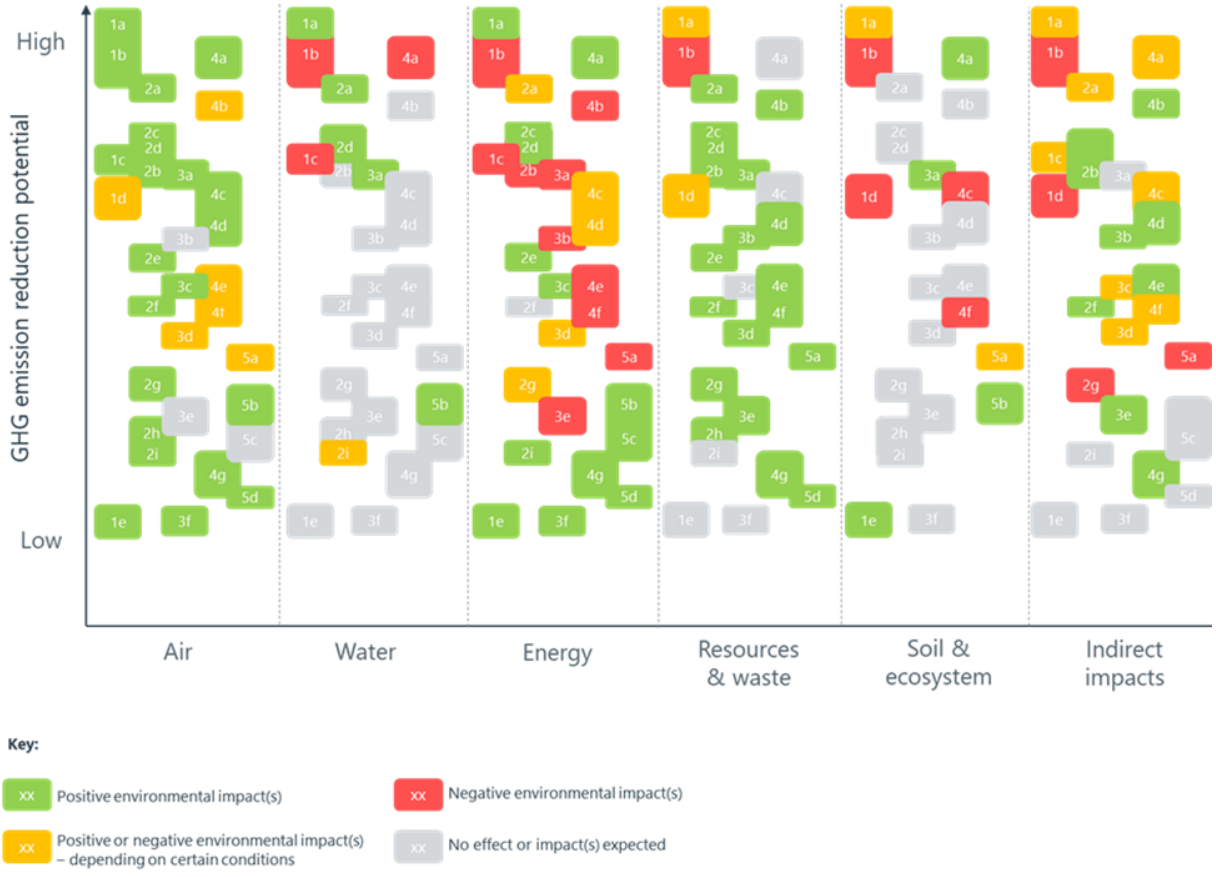
Although industry is expected to continue the current trend of emissions reduction and energy savings exhibited in the past few decades, to reduce its emissions further, especially in line with Europe’s ambition for 2050 (European Commission, 2021c), major changes need to be made in the way industry consumes energy and produces its products.

According to data from the European Pollutant Release and Transfer Register (E-PRTR) (EIEP, 2021) IED installations account for approximately 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 sectors that do not fall within the scope of the ETS and, furthermore, there are other GHG not addressed by the ETS that are emitted by IED installations. 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.

The Commission’s in-depth analysis (2018) in support of the long-term vision for a prosperous, modern, competitive and climate neutral economy indicates that there is a

plethora of deep decarbonisation options for industry, but no single silver bullet for all subsectors. In a recently completed report for the Commission (DG Environment) (European Commission, 2021e), the main decarbonisation options for sectors covered by the IED were identified. In particular, this report provides an overview of the wider environmental impacts of these identified decarbonisation options. This is important as one of the problems identified relates to potential knock-on impacts of decarbonisation options on the environment (and vice versa, i.e. impacts of pollution abatement on energy efficiency and GHG emissions), including resource use - both material and energy - emissions to air, emissions to water and soil pollution. A key takeaway from this report is shown in Figure A6-1below.

Figure A6-1: Assessment of the wider environmental impacts for the main decarbonisation options and their potential for GHG emissions reductions across all sectors



1a	Energy – Renewables	2g	Metals – Low carbon fuels	4a	Chemicals - Green H_2 (ammonia production)
1b	Energy – Carbon Capture	2h	Metals – Smelting reduction	4b	Chemicals – CO_2 valorisation
1c	Energy – Power-to-liquids	2i	Metals – Energy and process efficiency	4c	Chemicals - Electrification of heat and processes
1d	Energy – Biomass as feedstock			4d	Chemicals – Power-to-X
1e	Energy – Process efficiency	3a	Minerals – CCU	4e	Chemicals – Chemicals and plastics recycling
		3b	Minerals – Material recovery and recycling	4f	Chemicals – Low carbon fuels
2a	Metals - H-DRI (I&S)	3c	Minerals – Electric melting	4g	Chemicals – System optimisation
2b	Metals – Secondary production	3d	Minerals – Raw material and clinker substitution		
2c	Metals – Anode replacement	3e	Minerals - Low carbon fuels / waste material as fuel	5a	Waste & Other - Biomass / low carbon fuels
2d	Metals – Iron ore electrolysis	3f	Minerals – System optimisation	5b	Waste & Other – Electrification of heat
2e	Metals – CCU – top gas recycling			5c	Waste & Other – Process innovations
2f	Metals – Recycling of by-products			5d	Waste & Other – Process efficiency

Source: Service Request 21 under Framework Contract ENV.C4/FRA/2015/0042: https://circabc.europa.eu/w/browse/39928fd6-dcea-4fbc-b798-70e816bdecb0

The significant proportion of the green items in this figure reflects the fact that, frequently, the techniques applied drive improvements in respect to GHG and other pollutants.

The IED aims to achieve a high level of protection of human health and the environment taken as a whole by reducing harmful industrial emissions across the EU, in particular through better application of BAT. The IED also applies to major GHG emitting installations, thus making it relevant to energy and climate policy. The IED governs installations that contribute to energy production or use energy for production purposes, and information on the energy used in, or generated by, the installation must be included in applications for permits (Article 12(1)(b)). Energy efficiency is also one of the general principles governing the basic obligations of the operator (Article 11) and one of the criteria for determining BAT (Annex III). Whilst ELVs are very rarely set for IED installations for GHGs, due to the ETS, (non-binding), BAT-AEPLs are often set for energy efficiency.

The problem defined here mainly relates to the coherence of the IED with energy and climate policy (including EU ETS) as well as to the Directive's role in contributing to the GHG emissions reduction of the activities under its scope. The EU ETS is expected to remain a key policy instrument for the reduction of industry's GHG emissions through its cap-and-trade system. Limitations to the existing cap and trade scheme are highlighted in the "Masterplan for a Competitive Transformation of EU Energy-intensive Industries Enabling a Climate-neutral, Circular Economy by 2050", a report published by the High-Level Group on Energy-intensive Industries (European Commission, 2019). This report furthermore states that, in order to accelerate the uptake of disruptive solutions, there is a need to consider complementary and/or alternative policy options to carbon pricing (including potential alternative and complementary regulatory mechanisms).

By 2050, the EU will achieve net zero GHG emissions, with any remaining GHG emissions compensated by an equivalent amount of removals (European Commission, 2020b). The IED could have the potential to complement the already existing policy efforts and measures to reduce GHG emissions and increase energy efficiency through its integrated permit and BAT approach. As part of the IED evaluation (Ricardo et al, 2020), the issue of coherence between the IED and the EU ETS was analysed. A number of important observations from the IED evaluation, illustrating the IED vs EU ETS coherence issue as well as their (potential) contribution to GHG emission reductions, are as follows:

- Although some industry stakeholders viewed the IED and the EU ETS as coherent, they emphasised the importance of avoiding "double regulation" and considered the EU ETS to remain the most appropriate tool to control GHG emissions (until 2030). The contribution to a zero-carbon economy as such is not the primary objective of the IED. Concerns were also raised regarding additional administrative burdens for reporting on GHGs.
- A number of stakeholders indicated that climate and energy actions need to be dealt with in an integrated way with other environmental issues which emphasises the relevance of the IED in view of the need for industry to rapidly adapt to a zero-carbon economy by 2050 (in combination with a range of other policies such as EU ETS, circular economy policy, eco-design policy, energy policy etc.).

- Regarding the potential knock-on impacts of decarbonisation options on other environmental media and vice versa, there is evidence that the IED requires certain abatement measures and/or process changes, which can increase energy consumption, countering the objectives of EU climate and energy efficiency policies. In some circumstances, compliance with BAT-AELs may conflict with techniques, which are more climate or energy efficiency friendly, such e.g. perpetuating the use of coke together with pollutant emission abatement, rather than move to using hydrogen, as a reducing agent to make steel. A better understanding of such potential impacts of decarbonisation options and of pollution abatement options can inform an assessment of the role of the IED in contributing to a zero-carbon economy.

In summary, therefore, there are two main elements that need to be considered in this assessment:

- For GHG emissions resulting from the operation of IED installations that are addressed under the EU ETS, ways in which the present provisions of the IED may be preventing the implementation of the Directive from contributing to the climate objectives of the EU; and
- For GHG emissions resulting from the operation of IED installations that are not addressed by the EU ETS, ways in which the present provisions of the IED as not as effective as they could be in spurring further reductions of these emissions.

There is a fundamental need, therefore, to consider the integrated nature of the IED and the wider impacts of decarbonisation whilst defining possible future policy measures. Furthermore, the energy efficiency of IED installations plays a key role in addressing GHG emissions and policy measures should not only concentrate on direct emissions of GHG to the atmosphere.

To achieve the EU's climate ambitions, IED installations will need to take action to decarbonise, which will require a change in the way that BREF TWGs consider those changes alongside the other key environmental issues addressed in BREF documents. For example, the iron and steel sector has developed a roadmap that envisages a transformation that require wholescale installation changes to their feedstocks and energy sources, including replacement of coke with hydrogen and electrification of metal production processes. In addition, the use of hydrogen direct reduction of iron has the potential to reduce sectoral GHG emissions by over 70% and the electrification for the sector has the potential to significantly reduce and, in some cases, eliminate emissions to air. However, the costs involved in the application of such techniques is potentially very high (€900-€1 210/t for hydrogen reduction and a seven-fold increase in electricity use in the sector for electrification).

Existing TWGs under the IED have limited experience of dealing with transformation plans of the type that are now required. Alongside the urgent timescales for developing and implementing these transformation plans, maintaining the BREF process in its current form runs the risk of producing BREFs that quickly become outdated or even a barrier to the transformations that are required.

Furthermore, there remains uncertainty with regard to the techniques that will be available and thus employed to achieve the EU's climate targets. In fact, generally, existing transformation plans rely on techniques that currently have low Technology Readiness Levels (TRL) and may reach TRL level 9 in the 2030s. A key challenge to address is, therefore, to ensure that the BREF process can reflect on these uncertainties, can be updated when the uncertainties are resolved and can be a positive tool to assist IED operators and public authorities in enabling the transformation of industries whilst ensuring the protection of the environment.

1.4.2 What are the problem drivers?

The summary driver is that the interactions between GHG emission reduction possibilities and overall pollution emissions minimisation in the IED have, to date, not been sufficiently taken into account. This is partly because Article 9(1) of the IED prevents the setting of ELVs in IED permits for those GHG emissions that are covered by the EU ETS[38].

Article 9(1) of the IED states the following in relation to GHG: "*Where emissions of a greenhouse gas from an installation are specified in Annex I to Directive 2003/87/European Commission in relation to an activity carried out in that installation, the permit shall not include an emission limit value for direct emissions of that gas, unless necessary to ensure that no significant local pollution is caused*."

This means that in practice (i) almost no BAT-AELs are defined for GHG emissions in BAT conclusions and (ii) the majority of IED installations do not have emission limits for GHGs covered under the EU ETS due to the overlap in scope between the two instruments. Emission limit values for GHGs within the scope of the EU ETS shall not be set in permits under the IED unless to ensure that no significant local pollution is caused or where an installation is excluded from the ETS. Nevertheless, IED implementation has, to some extent, addressed GHG emissions, for example, through the setting of BAT and associated performance levels (BAT-AEPLs) on energy efficiency or through BAT on the substitution of fluorinated GHGs. In a few cases, BAT-AELs have been set for GHGs not covered by Annex I of the ETS Directive.

The stated purpose of the provision is "to avoid duplication of regulation" (recital 9). Though, in recital 10, it is stated that the IED does not prevent Member States from maintaining or introducing more stringent protective measures, for example greenhouse gas emission requirements (in accordance with Article 193 of the Treaty on the Functioning of the European Union (TFEU)).

Furthermore, Article 9(2) of the IED states "*For activities listed in Annex I to Directive 2003/87/European Commission, Member States may choose not to impose requirements relating to energy efficiency in respect of combustion units or other units emitting carbon dioxide on the site.*"

Added to this, some (agro-)industrial activities generating GHG emissions fall outside the current scope of the IED or fall below the IED's current production capacity thresholds. Examples include farming (e.g. cattle farms), mining / quarrying industries and landfills. These activities may also not be covered by the ETS.

The rationale behind this separation of tasks has, to date, mainly been the avoidance of double regulation and a risk that 'command and control' under the IED may interfere with, and damage, the working of the ETS carbon trading mechanism. However, these frameworks operating in parallel, on many of the same activities and sectors, but by definition almost completely separately, has the disadvantageous effect that any

[38] Carbon dioxide (CO2), nitrous oxide (N2O) and perfluorocarbons (PFCs)

decarbonisation and depollution interactions are not coherently taken into account, and, as a result, synergistic optimising possibilities and investments are to date not being identified.

However, it is increasingly clear that, in the EGD context and the wider, EU and indeed global efforts towards tackling the climate and environmental degradation, deployment of emerging techniques by energy-intensive industry sectors, e.g. using hydrogen rather than coal to produce steel, will create an unprecedented interaction between decarbonisation and depollution[39], which may result in new policy coherence challenges in the near to mid-term future. Whilst climate-related interventions will remain the main driver of transforming industrial techniques, principally via the ETS mechanism, the IED has to accompany and optimise this process by taking fully into account the co-benefits and trade-offs of decarbonisation and depollution. This has two aspects:

1. Where decarbonisation techniques have strong co-benefits in terms in reducing emission of pollutants, it may become impossible to avoid the IED impacting more the carbon market in the future. When such techniques will become economically viable and practicable, they will qualify as BAT within the meaning of the IED and become the reference for establishing mandatory environmental performance levels for all relevant IED plants. Consequently, command and control under IED would drive investment in the techniques and affect the carbon market, whilst also contributing to the decarbonisation efforts. This is likely to increasingly occur in the run-up to the 2030 decarbonisation milestone, as emerging cleaner techniques become available in a number of sectors;
2. There is a need to avoid that investment cycles triggered separately by the IED and the ETS may increase costs for society in respect of pollution and climate objectives:
    a. Obligations to implement existing (backward-looking) BAT may hinder deployment of emerging decarbonisation techniques;
    b. The deployment of decarbonisation techniques may entail a need for a later and costly retrofitting to abate pollutant emissions if maximum synergies between decarbonisation and depollution are not stimulated at innovation technologies level, and through BREFs.

The IED and ETS frameworks operating in parallel, on many of the same activities and sectors, but by definition almost completely separately, has the disadvantageous effect that any decarbonisation and depollution interactions are not coherently taken into account, and, as a result, synergistic optimising possibilities and investments are to date not being identified.

Two specific examples of this dissonance between the two instruments, rather than mutual reinforcement, are the current optional nature of energy efficiency performance benchmarks in the IED, and the current IED provision not to set emission limit values for GHGs covered by the ETS. Both of these provisions are elements that currently limit the IED's contribution to decarbonisation objectives.

1.4.3 How would the problem evolve?

Without any policy intervention, IED installations will continue to be confronted with potential trade-offs and impacts of investment (and timing thereof) in decarbonisation vs pollution abatement options. In addition, the IED will continue to have a limited, direct contribution to the reduction of GHG emissions from IED installations and, therefore, the decarbonisation objectives underpinning the European Green Deal.

[39] Wood, Deloitte, IEEP (2021). Wider environmental impacts of industry decarbonisation. https://circabc.europa.eu/w/browse/39928fd6-dcea-4fbc-b798-70e816bdecb0

Furthermore, in the longer term between 2030 and 2050, and as a result of both legislative and policy action at EU and national level, it is likely that a large proportion of EU-based industrial operators will have already converted to low-carbon or carbon-neutral techniques. This will require increasing attention on the question of whether and how a level playing field should be established through the IED, so that the use of such cleaner techniques is generalised across the EU. The interaction between depollution and decarbonisation may have mutually-supporting or dissonant effects.

1.5 The IED does not regulate some highly polluting (agro-) industrial sectors

1.5.1 What is the problem?

The IED evaluation found that the IED has been effective at reducing emissions from industrial installations covered within its scope, and their related impacts on human health and the environment. This contribution is most notable for emissions to air, with reductions in several key pollutants since implementation. Implementation progress is ongoing with the continuous adoption of BAT Conclusions and updating of permit conditions to account for this.

Nevertheless, an earlier report by Amec (2014) concluded that agro-industrial activities not regulated under the IED can have a considerable share of the total EU emissions to air and water, although the exact shares vary depending on the pollutant. While emissions from installations that have been regulated under the IED to date have reduced over time, there is no information to suggest a similar trend for installations outside the scope of the IED. Any reductions in emissions from these installations depend on the national and/or regional level measures and legislative framework in each Member State.

The impact of emissions to water from agro-industrial activities not regulated by the IED is also apparent in the 2nd round of Member State reporting on the River Basin Management Plans (EEA, 2018). The Water Framework Directive (2000/60/European Commission) requires Member States to identify significant pressures on surface water bodies from point and diffuse sources of pollution. Out of all surface water bodies under pressure from point source pollution, 15% were reported to be under pressure due to pollution from IED plants and 14% due to pollution from non-IED plants. The largest source of pressure on water bodies from point sources continues to be urban waste water treatment plants (UWWTP) (67% of surface water bodies have been reported under pressure from UWWTPs). On the basis of that evidence, a report by the EEA (EEA, 2018b) found that industrial point sources not regulated by the IED may exert greater pressure on the quality of water than the IED installations themselves (e.g. in Belgium, Bulgaria, Croatia, Czechia, Portugal, Slovenia and Spain). Although this may suggest that the IED regulatory process has been effective in controlling industrial pollution, it also suggests that measures to control pollution from smaller industry (often introduced at national level) may have been less effective.

Emissions to air from agro-industrial activities not regulated by the IED can also be significant as illustrated by data on key environmental issues assembled for the baseline. Examples of emissions to air from sectors not regulated by the IED include for cattle farming and for upstream oil and gas. Enteric fermentation of feed in the stomachs of livestock (particularly cattle) is the largest single source of CH_4 in the EU and two thirds of

EU27 total NH_3 emissions are from livestock. Upstream oil and gas activities are a source of CH_4 and CO_2. The OSPAR inventory provided details of 12.7kt CH_4 in 2017, equivalent to ~1.6% of total CH4 reported to E-PRTR from IED sites. Further emissions from upstream oil and gas are of $PM_{2.5}$, NO_x, SO_x and NMVOC.

1.5.2 What are the problem drivers?

The problem driver is that the scope of the IED excludes polluting (agro-)industrial activities.

There are two aspects to this driver:

1.5.2.1 Potentially highly polluting sectors not within the scope of the IED

While the IED evaluation found that the IED addresses the most polluting sectors, there remain several potentially highly polluting activities not within the scope of the IED, including:

- Farming (cattle farms and mixed livestock farms, aquaculture)
- Mining / quarrying industries (currently regulated by the Directive 2006/21/European Commission of the European Parliament and of the Council on the management of waste from the extractive industries and within the scope of the E-PRTR Regulation (European Commission) No 166/2006 (activity 3a))
- Upstream oil and gas industries (extraction) (currently subject of BAT Guidance Document on upstream hydrocarbon exploration and production, voluntary).

In addition, there are other (agro-)industrial activities (not identified by the IED evaluation or set out in the inception impact assessment) that are polluting and that could be considered for inclusion under the IED:

- Battery production (including manufacturing of industrial, automotive, electric vehicle and portable batteries regardless of their shape, volume, weight, design, material composition, use or purpose), while also recognising battery compound production (i.e. chemicals) is already covered within the IED's present scope, and battery disposal and recovery (to the extent not already covered by activity 5.1). The rapidly changing scale of battery production, disposal and recovery is a key driver in determining whether this sector should be regulated under the IED or not
- Ship building (other than coating) and ship dismantling – shipyards are partly covered under IED Activity 6.7 (for the coating activity) but ship building processes (other than coating) and dismantling activities are not covered
- Certain downstream ferrous metal processing activities: to consider inclusion under IED (e.g. under activity 2.3) of forging presses, cold rolling and wire drawing (above certain thresholds).

1.5.2.2 Some activities polluting the environment fall below current production capacity thresholds set in the IED

There remain several industrial activities polluting the environment which are currently outside the scope of the IED owing to production capacity thresholds defined in Annex I of the IED. These include:

- Recovery of non-hazardous waste from biological treatment (IED activity 5.3 (b)(i)) (to include certain activities with a capacity of less than 75 tonnes per day with increased risk for emissions to soils, such as biogas production or manure processing plants). The ongoing Commission report 'Impact of the biogas plants and of gasification, liquefaction and pyrolysis of wastes on the environment' has estimated that between 35% and 98% of biogas plants fall under the threshold, varying between Member States, and that plants falling under the threshold contribute approximately 27% of emissions to air of the sector, with ammonia and NOx, and greenhouse gas methane being the most important impacts.
- Textiles: Pre-treatment or dyeing of textile fibres or textiles (IED activity 6.2), to include textile finishing as well as activities below the current limit of treatment capacity (10 tonnes per day) to encompass a larger proportion of the sector's emissions and impacts, particularly from waste water impacts. Limited data is currently available regarding the environmental performance of functional finishing processes. However, these processes account for 8% of the total EU textile manufacturing and are considered to be the most polluting aspect of textiles. The amount of polluted water discharged, and the hazardous properties of the chemicals released, as well as the high rates of energy, water and chemical consumption are the main environmental concerns for this sector[40].
- Smitheries: Reduction of IED capacity threshold for smitheries (IED activity 2.3b) from the current limit of 50 kilojoule per hammer and where the calorific power used exceeds 20 MW. This will encompass a larger proportion of the sector's emissions and impacts, particularly for releases to air. Limited data is currently available with regard to the environmental performance of smitheries and particularly hammers with capacities of lower than those stated in the IED. However, given the proportion of the production of forged materials that are produced by hammering (estimated to be 1.2 million tonnes across the EU for 2019[41]), it is estimated that only 25 out of 400-500 plants are currently being regulated under the IED.
- Medium Combustion Plants: Examine the scope of Chapter III - Large Combustion Plants (LCP), detailed under IED Article 28 and consider moving the 20-50 MWth capacity band from the Medium Combustion Plant Directive (MCPD) (Directive (EU) 2015/2193) to LCP. The main driver for this revision is to align with the EU ETS scope threshold. There are more than 140 000 MCPs operating in the EU compared with around 3 500 LCPs. Emission factors (concentration at flue gas streams) for MCPs and LCPs are similar. MCPs are important sources of emissions of SO_2, NOx and PM. Latest estimates[42] suggest circa 550 kt/y of NOx, 300 kt/y SOx and 100 kt/y PM.
- Landfills - to allow adoption of BAT conclusions for landfills covered by the IED (IED Annex I activity 5.4) - BAT conclusions would cover the key environmental

[40] From ongoing study 'Gathering of complementary evidence for assessing the impacts of extending the scope of the IED to additional sectors' draft report for the Commission.
[41] ibid.
[42] http://ec.europa.eu/environment/air/pdf/Revised%20Final%20Report.pdf

issues for which BAT has evolved since the 1990s, including with regard to methane capture – and to reduce the threshold for inclusion of landfills within the IED scope. Landfill remains an important source of environmental pressures in the EU, not least as a key source of methane emissions: in 2019, the waste sector comprised 20%-26% of all EU anthropogenic methane emissions (104 $MtCO_2e$)[43], with landfill sites covered by the E-PRTR registering around 11.9 $MtCO_2e$ of emissions in 2019 (down from 16.1 $MtCO_2e$ in 2017).

1.5.3 How would the problem evolve[44]?

Development without policy intervention is in Table A6-4.

Table A6-4: Development without policy intervention for sub problems of the problem "There are agro-industrial activities that are polluting and yet are not covered by IED"

(Sub) Problem	Development without policy intervention
Not all agro-industrial activities that are polluting the environment are covered by the IED	Continued potential for pollution from (agro-) industrial installations not covered by the IED to reduce more slowly than for those covered by the IED

2 THE PROBLEMS – E-PRTR

Evaluation of the E-PRTR Regulation

In 2016-2017 the E-PRTR Regulation was evaluated as part of the Regulatory Fitness and Performance (REFIT) programme[45, 46, 47]. The E-PRTR was determined to be an effective instrument for providing a comprehensive and detailed dataset on industrial releases and transfers. Information beyond the requirements of the Kyiv Protocol was determined to be efficiently collected. Concerns were raised about coherence of the E-PRTR with data reported under related environmental legislation, such as the IED and waste legislation. The E-PRTR has particular relevance by providing a publicly available dataset that aids transparency and public participation in setting environmental policy. Finally, the evaluation determined that the E-PRTR provides added value for the public, operators and policymakers as it ensures consistent implementation of the Kyiv Protocol, enabling comparative assessments between Member States.

The E-PRTR evaluation identified the following areas for refinement:

- Updating the existing EU-level guidance to aid consistent interpretation of reporting requirements.

[43] https://www.eea.europa.eu/data-and-maps/data/data-viewers/greenhouse-gases-viewer
[44] See details in Annex 3, Chapter 3
45 https://circabc.europa.eu/ui/group/f80de80b-a5bc-4c2b-b0fc-9c597dde0e42/library/f2f2de66-2d30-453a-adaf-0a0c51a67ffe?p=1&n=10&sort=modified_DESC
46 https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1513176768325&uri=SWD:2017:710:FIN and https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1513176822493&uri=SWD:2017:711:FIN
47 https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1513173747248&uri=COM:2017:810:FIN

- Further harmonisation with closely related environmental reporting.
- Addressing areas of weakness in reporting such as waste transfers, diffuse emissions and releases in products
- Simplifying the triennial obligation for Member States to report on E-PRTR implementation.
- Providing more contextual data to improve the E-PRTR's effectiveness as a comprehensive source of environmental information, including on environmental performance.
- Raising awareness of the E-PRTR and increasing user numbers.

Review of E-PRTR implementation and related guidance

A subsequent Commission study '*Review of E-PRTR implementation and related guidance*'[48] reviewed the completeness of the E-PRTR activities, pollutants and thresholds compared with the IED, with the needs of other European environmental legislation, with recent work by the OECD to harmonise international PRTR definitions of sectors and pollutant lists, and with emerging evidence on new activities and pollutants of concern. The work identified and suggested the inclusion of additional activities and pollutants to improve the E-PRTR's alignment with the IED, other European Union medium-specific legislation and emerging environmental concerns.

Suggested revisions to the list of E-PRTR activities included adding magnesium oxide production, carbon capture and storage and a new metal-working activity; revising E-PRTR sub-activity definitions to align with the IED for cement and lime production and hazardous waste management; lowering the capacity threshold for combustion plants to 20 MW to include larger facilities covered by the Medium Combustion Plant Directive (MCPD); and lowering the capacity threshold from 100,000 population equivalents (p.e.) to 15,000 p.e. to capture 90% of releases from plants covered by the Urban Waste Water Treatment Directive (UWWTD). A top-down approach to estimating releases to air and water from cattle rearing was also elaborated.

Relevant pollutants not currently in the E-PRTR but which are covered by a number of initiatives focussed on environmental protection were identified by reviewing:

- Annex II of the IED;
- Pollutants with associated emission levels in BAT conclusions;
- The Water Framework Directive (WFD) priority substances and watch lists;
- The Stockholm Convention and Gothenburg Protocol;
- The OECD short list of PRTR pollutants; and
- Substances of concern in other scientific literature.

A total of 38 pollutants were suggested for addition to the E-PRTR pollutant list to enable more comprehensive tracking of environmental initiatives. Twenty-four of the pollutants listed in the E-PRTR Regulation Annex II have been banned or severely restricted and have been reported in low quantities in recent years. However, their retention was advised

48 https://circabc.europa.eu/ui/group/f80de80b-a5bc-4c2b-b0fc-9c597dde0e42/library/b4eacd6d-4425-479a-a225-77306de6b060?p=1&n=10&sort=modified_DESC

since their removal would impact historical time series as well as international comparisons of environmental pressures.

The degree of capture of industrial releases by the current E-PRTR lists of activities and pollutant reporting thresholds was also evaluated to assess whether the target 90% capture of all industrial releases was being achieved by the E-PRTR. The work concluded that for some pollutants less than 90% of releases were being captured. Lowering the reporting threshold for 11 pollutants to air and 14 pollutants to water would enable 90% capture of all industrial releases of these pollutants. The work also concluded that reducing activity capacity thresholds to capture smaller facilities would not necessarily increase the amount of release reported. Numerous smaller facilities individually release smaller amounts of substances and may therefore be below the pollutant reporting thresholds. The current E-PRTR annexes (I and II) do not set activity-pollutant reporting thresholds that would enable the E-PRTR reporting to be more targeted and complete.

The project also proposed possible revisions to the E-PRTR Guidance document that aim at improving the consistency, coherence and quality of data reported to the E-PRTR by Member States. This work was based on reviews of national facility reporting guidance and consultation with industry trade associations. The recommendations were designed to help operators and competent authorities to allocate resources to quantifying and reviewing releases more effectively and included a sector-specific approach to E-PRTR reporting requirements (e.g. prescribing or permitting different quantification methods such as use of continuous monitoring or top-down versus bottom-up approach, defining pollutants that should be present in significant quantities and different release thresholds).

Problems to be tackled

Based on this evaluation and wider implementation feedback, six overarching problem areas, and an additional seven sub-problem areas, have been identified, namely:

1) Activities and activity thresholds:
    a) Updating activity thresholds to capture 90% of releases and transfers for existing activities,
    b) Adding additional activities and or sub activities (and thresholds to be defined) to be consistent with IED and other media-specific issue monitoring
2) Pollutants and their thresholds
    a) Updating pollutant thresholds to capture 90% of releases and transfers for existing and newly identified activities
    b) Adding additional pollutants (and thresholds to be defined) to be consistent with IED and other media specific issue monitoring
3) Adding detail to reports to support the tracking progress of industry towards circular economy
4) Reporting modalities and data flow:
    a) Efficiency and interoperability of reporting
    b) Reporting timeframes and the time lag of reported data
    c) Quality of reporting
5) Quality of reports and the accessibility of the E-PRTR data for the public

6) Releases from diffuse sources and products.

These problems are outlined in more detail below, with a focus on description of the problem, the relevant drivers, how the problem may evolve without any further policy intervention and who is impacted.

2.1 Problem 1a: Current activity thresholds and definitions

Summary

There is a lack of completeness in the reporting under identified activities in the E-PRTR. The E-PRTR is not capturing the targeted percentage (90%) of releases from industrial activities currently defined in the reporting requirements (Section 2.1.2). The original aim of the E-PRTR was to capture 90% of industrial releases for each pollutant. In addition, the definitions and thresholds of some activities are inconsistent with the IED and other legislation such as the MCPD and UWWTD. Industrial activities operating in Europe have evolved since the E-PRTR came into force and therefore the thresholds for the activity list in Annex I needs to be reviewed and updated to ensure 90% data capture today. The reporting thresholds do not guarantee capture of 90% of releases and transfers from industrial facilities.

Is there a problem?

Some activity thresholds do not guarantee capture of 90% of releases and transfers from industrial activities within Europe (Section 2.1.2). There are also inconsistencies in thresholds and activity descriptions between the IED and E-PRTR activity lists. Additionally, medium combustion plants, and the majority of urban waste water treatment plants within scope of the UWWTD legislation, are not within the scope of the E-PRTR activity list. There is currently limited data collection under the UWWTD and MCPD. This will create under reporting and an incomplete picture of industrial impacts for existing activities across Europe.

Why is it a problem and what are the main drivers?

Under-reporting, resulting from thresholds for reporting being too high, will result in poor understanding of the releases from industrial activities. Under-reporting along with misalignment with related EU legislation, e.g. IED, MCPD, UWWTD, results in an inability to monitor progress for these policies, or inform decision making effectively. The current E-PRTR does not provide flexibility for ensuring thresholds capture sufficient reported transfers and releases.

What is the scale and trend of the problem?

Six activities, 5(a), 5(b), 5(c), 3(c), 1(b) and 5(g), are misaligned with the IED activity list, either in capacity threshold or activity description. The IED Impact Assessment is additionally proposing the lowering of thresholds for further activities that could potentially increase the misalignment between the E-PRTR and IED activity lists. Additionally, activities 1(c) and 5(f) have capacity thresholds that could be lowered to

capture releases and transfers from sites under the MCPD or a higher proportion of those under the UWWTD legislation. For example, lowering the capacity threshold for combustion plants to 20 MW to include larger facilities covered by the MCPD. This would add approximately 9% of additional NO_x releases to air through adding around 6,300 facilities but would also require lowering of the pollutant reporting threshold (see Section 2.2.3).

Who is impacted by the problem and how?

All stakeholders are impacted by an incomplete capture of releases and transfers from industrial sectors due to outdated activity thresholds and descriptions. The incomplete dataset could lead to a lack of visibility of new and emerging environmental problems resulting from industrialised activity and inability to plan for or head off future problems, e.g. policies and or private sector investment that do not effectively address the problem.

2.2 Problem 1b: Missing activities and sub activities

Summary

As previously stated the original aim of the E-PRTR was to capture 90% of industrial releases for each pollutant. Industry in Europe has changed since the E-PRTR came into force in 2006 with new activities becoming more widespread. Therefore, the activity list in Annex I needs to be updated. Missing activities mean that the E-PRTR does not provide a complete picture of releases and transfers and cannot be used as a tool to fully understand impacts and ensure coherent environmental policy.

Is there a problem?

The E-PRTR provides an incomplete picture of the important European industrial activities. There are a range of emerging sectors with significant releases of pollutants, which are not yet included in the E-PRTR Annex I activity list. Importantly, there are inconsistencies between the IED and E-PRTR activity lists meaning that some IED activities that are not reported in the E-PRTR. This will be providing an incomplete picture of industrial impacts across Europe.

Why is it a problem and what are the main drivers?

New and emerging sources with increasingly significant impacts are not in the list of reporting activities and therefore not reporting to E-PRTR. Several new industrial sources, that were not producing a significant amount of pollution when the legislation was originally introduced, could be important now because of changes in processes (e.g. CO_2 storage), increased activity (e.g. battery production) and/or identification of new pollutants of interest. Additionally, there are some activities not included in the E-PRTR that are included in the IED, and therefore an inability to monitor progress for this policy completely. Another driver is changes in industrial process, development and importation of new products and/or increasing intensity of production.

What is the scale and trend of the problem?

Fourteen new activities and sub activities have been so far identified for inclusion (Section 3.2.2). Some examples are:

1) Adding magnesium oxide production to the E-PRTR activity list would enhance coherence with the IED and add some 14 facilities. Likewise, adding carbon capture and storage to the E-PRTR would also increase IED coherence although the additional number of facilities is uncertain as only pilot-scale plants currently operate in the EU.
2) Adding a new metal-working activity would ensure a more complete E-PRTR coverage of the manufacture of motor vehicles, computer, electrical, transport and other equipment. Comparison with international PRTRs shows high releases of metals to air and water from these sectors, for which further investigation of source processes is needed.

- ***Who is impacted by the problem and how?***

All stakeholders are impacted through an incomplete and skewed perspective of the important releases and transfers from industrial activities due to missing activities of importance. The incomplete dataset could lead to a lack of visibility of new and emerging environmental problems resulting from industrialised activity and inability to plan for or head off future problems, e.g. policies and or private sector investment that do not effectively address the problem.

2.3 Problem 2a: Existing pollutants and thresholds

Summary

The Annex II pollutant list is out of date. Reporting thresholds require adjusting for existing pollutants or groups of pollutants to improve the capture of industrial releases, as some reporting thresholds do not guarantee capture of 90% of releases from industrial facilities.

Is there a problem?

The E-PRTR dataset is incomplete as some pollutant reporting thresholds do not guarantee capture of 90% of releases from industrial activities (Section 2.1.2). There are also no provisions for updating the thresholds when new evidence emerges. .

Why is it a problem and what are the main drivers?

The incomplete capture for some important pollutant releases in the E-PRTR (through inadequate thresholds) leads to a partial and skewed perspective of the most important pollutants and industrial activities. This results in poorly focused policies to reduce releases and undermines the credibility of the E-PRTR dataset for decision making. There is currently no provision for dynamic adaptation or updating of annexes to respond to recent scientific findings on new or existing pollutant impacts. The current E-PRTR

Regulation also does not provide flexibility for ensuring thresholds capture sufficient reported transfers and releases.

What is the scale and trend of the problem?

Previous analysis identified that lowering the reporting threshold for 11 pollutants to air and 14 pollutants to water would enable 90% capture of all industrial releases of these pollutants. Analysis indicated that there is already 90% capture of all industrial releases for 30 pollutants to air and 35 pollutants to water.

Who is impacted by the problem and how?

All stakeholders are impacted through an incomplete and skewed perspective of the important releases and transfers from industrial activities due to inappropriate pollutant thresholds. The incomplete dataset could result in a lack of visibility of new and emerging environmental problems resulting from industrialised activity and inability to plan for or head off future problems, e.g. policy options and or private sector investment that do not effectively address the problem.

2.4 Problem 2b: Additional pollutants

Summary

Resent analysis of science and emerging environmental and health issues (including media specific policies and legislation) have identified new pollutants of concern emitted by industrial activities that are not in the E-PRTR Annex II list. It is important that industry reports on these pollutants and the pollutants are assigned appropriate thresholds.

Is there a problem?

Yes, the E-PRTR does not include some emerging pollutants considered important and does not include some pollutants of concern that are covered by other EU legislation.

Why is it a problem and what are the main drivers?

The current E-PRTR reflects 2006 understanding of the main environmental issues associated with Annex I activities and related processes and pollutants. New pollutants and environmental issues have risen in prominence since then. Additionally, there is currently no provision for dynamic adaptation or updating of annexes to respond to recent scientific findings on new pollutant impacts.

What is the scale and trend of the problem?

Adding the 38 pollutants identified in previous analysis to the E-PRTR pollutant list would improve alignment with the IED, European media-specific legislation, and other PRTRs, enabling more comprehensive tracking of environmental initiatives.

Who is impacted by the problem and how?

All stakeholders are impacted by lack of visibility of new and emerging environmental problems resulting from industrialised activity and inability to plan for or head off future problems, e.g. policies and or private sector investment that do not effectively address the problem.

2.5 Problem 3: Information to track progress towards the circular economy and decarbonisation of industry

Summary

The European Green Deal commits the Commission to revise EU measures to address industrial pollution to make them more consistent with climate, energy and circular economy policies. This will contribute towards the zero-pollution agenda. The Green Deal commits, inter alia:

- Adopting an action plan towards a zero pollution ambition.
- Revising EU measures to address pollution from large industrial plants, including both the IED and the E-PRTR.

The E-PRTR, in combination with related legislation such as the IED, has untapped potential for contributing to the EU's circular economy objectives by providing transparency on industrial performance:

- There is a benefit in the reporting of additional data on resource consumption, e.g. use of energy, water, raw materials. This also has linkages with options under consideration in the IED revision, e.g. mandatory application of BAT-AEPLs related to resource consumption.
- There is also no transparency around the transfer of pollutants in the data reported to the E-PRTR. The E-PRTR needs proper tracking of pollutants in transfers and their storage, export or final release (particularly waste and waste water).

Additionally, the European Union has committed to reach net GHG emissions of 55% of 1990 levels by 2030. The E-PRTR offers a mechanism to efficiently track progress with the reduction of GHG emissions from a range of GHG intensive activities. Transparent integration between E-PRTR and EU-ETS reporting is needed to provide stakeholders with sufficiently transparent information for decision making. Although the verified emissions under EU ETS are publicly available, any underlying background information on activity levels is not. Such information forms part of the confidential verification reports and is not available for public scrutiny. With suitable provisions the E-PRTR could provide relevant background data for benchmarking and assessing industrial environmental performance within and across sectors.

Is there a problem?

The E-PRTR does not currently provide information that would help stakeholders (citizens, NGOs, competent authorities, Member States, the Commission) track the performance of

industry in contributing to the Green Deal, energy or circular economy commitments. Data on the composition of waste transfers and data on resource consumption (e.g. energy, raw materials and water) are currently not included or only partly included. It is important to note however, production volume will be a mandatory field under the integrated E-PRTR/LCP reporting from the 2021 reporting year (to be reported in 2022), although individual data points won't be made publicly available. This additional information could be an important contribution to realising the circular economy objectives, although this will be limited for the public and external data users. Additionally, evaluation of this information and releases reported under the E-PRTR and EU-ETS, can inform the IED's BAT information exchange process and the identification of installations with good environmental performance and energy efficiency. There are however gaps and difficulties in linking the datasets.

The current E-PRTR reporting requirements also do not facilitate transparency around releases of GHGs and other pollutants from EU-ETS facilities by linking EU ETS installations to E-PRTR facilities. The EU Registry collects installation EU-ETS IDs, thus potentially allowing correlation with IED installations and their parent E-PRTR facilities. This will allow comparison with emissions reported under the EU-ETS with those reported to the E-PRTR.

Why is it a problem and what are the main drivers?

Industry plays a critical role in delivering commitments to the Green Deal, climate, energy and circular economy policies. However, the E-PRTR does not provide sufficiently transparent information (resource use and production data and activity (e.g. technologies/practices used/waste compositions etc.). Neither does it provide pollutant breakdown (e.g. hydrofluorocarbons (HFCs) and perfluorocarbons (PFCs) which have different global warming potentials (GWPs)) for decision making around priorities, potential synergies and conflicts for GHG emission reductions and other environmental issues and impacts (e.g. circular economy; air, water and soil pollution). It also does not provide transparency on the role played by EU-ETS as a targeted policy on large industrial activities responsible for significant greenhouse gases that can also have an impact on air pollutant emissions as well as other pressures on health and the environment (e.g. water and resource use and soil and water contamination). . Reporting already exists for the EU-ETS but it is not consistent with E-PRTR reporting. There are differences in scope (e.g. reporting on biomass burning is excluded from EU ETS and EU ETS is focussed on a much narrower range of industries) and detail (e.g. EU ETS reports at a more granular installation level rather than E-PRTR facility level) of reporting, reporting frequencies (where updates on EU ETS and E-PRTR are not in sync) and modalities (where datasets are difficult to align with missing linking IDs) which increase burden and reduce transparency.

What is the scale and trend of the problem?

There is poor transparency in the E-PRTR data with the majority of reports lacking in relevant voluntary activity data reporting. In addition, the composition of waste transfers and data on resource consumption (e.g. energy, raw materials and water) are currently not

included or only partly included in the E-PRTR. There is no noticeable trend in improvement to the voluntary reporting. The lack of completeness and poor detail (in activity and pollutant breakdown) means that environmental performance benchmarking cannot be done for any groups of activity or for the E-PRTR dataset as a whole. The E-PRTR is therefore not able to contribute to driving the circular economy objectives or assessing the carbon or resource efficiency of different industrial activities.

Who is impacted by the problem and how?

Industry, competent authorities and government policy makers are impacted by a lack of ability to benchmark performance of facilities for individual and groups of activities in the E-PRTR. If industry and policy makers do not have access to information that can highlight good and bad performers there is more limited scope to understand and drive environmental performance in support of Green Deal, climate, energy and circular economy objectives. Ultimately, the public are impacted through ineffective action to improve the quality of the air, water and soil. Industry also risk poorly formed investment strategies and government policies risk unforeseen negative impacts, poor public engagement and levels of trust.

2.6 Problem 4a: Reporting modalities

Summary

For some categories of activity, in particular farming, reporting releases can be a significant burden on reporters due to the number of facilities and difficulties in quantifying releases accurately. Estimates using a top-down approach for some diffuse industrial sectors (where there is a large number of smaller operators such as in farming or in gas distribution) may reduce the reporting burden and improve data quality.

Is there a problem?

Yes. A large number of small diffuse facilities (e.g. farming) face a disproportionally higher burden of reporting (effort per unit of release reported) and consequently there is a risk to data quality.

Why is it a problem and what are the main drivers?

Activities with a large number of diffuse facilities with relatively low releases per facility and little or no trained expertise in estimating releases face a disproportionate burden on their reporting. These industries consist of relatively few personnel with the time or training to engage in accurate reporting. Facilities are often unable to dedicate the time needed to develop and generate accurate estimates for the relatively complex activities.

What is the scale and trend of the problem?

For accurate reporting across a large number of small facilities the burden (person days) of reporting is considerable per data point provided in reports. As an example, in 2017, 8,157 (20%) of the E-PRTR facilities reported were farms. For each of these facilities to be able

to collect data and manage reporting is a burden on the sector. The possibility of including cattle farms in the E-PRTR activity list would increase the number of diffuse small facilities further, increasing the burden on operators of reporting per data point reported. If the E-PRTR is to capture more diffuse facilities with a large number of operators, then the burden of reporting will continue to increase disproportionately.

Who is impacted by the problem and how?

Small operators e.g. livestock farms through time needed to compile reports. Awareness raising, data gathering, verification and processing along with basic training for reporting of this number of small and transient entities is also an added challenge for competent authorities.

2.7 Problem 4b: Time lag and data flows in reporting

Summary

The time lag (reporting every in reporting means decision making is based on data that are over two years old once it has been compiled, reported verified by competent authorities and submitted to the EEA. The current data flow could be modernised, making use of advances in CEMs, tele-monitoring technology and automated verification and machine learning approaches to improve the speed and quality of reporting and availability of data for decision making.

Is there a problem?

Yes: The time lag in reporting inhibits timely flows of information to citizens and decision makers.

Why is it a problem and what are the main drivers?

Current data reporting and collection approaches and tools create significant time lags in data becoming available to inform the public and do not optimise opportunities for the capture of good quality data. Drivers for this problem include out-dated non-automated reporting systems in some Member States and a significant manual burden and therefore time-lag in submitting reports by facility operators, processing, aggregating, checking and submitting data by competent authorities to EEA and verification of data by the EEA.

What is the scale and trend of the problem?

The scale relates to the whole E-PRTR dataset and creates a lack of transparency on releases and transfers that have occurred in the most recent year. The E-PRTR dataset is less useful for modelling pollution releases due to this time lag. The problem could get worse if more data from many more facilities are included in the E-PRTR and conventional data collection and verification methods continue to be used. If the data flow can be more standardised and automated with automatic verification and rejection procedures, then the time-lag could be reduced to just over a year (because facilities reports for the years operation previous will be processes quickly).

Who is impacted by the problem and how?

All users of the E-PRTR data are impacted by slow visibility of new and emerging environmental problems resulting from industrialised activity and inability to plan for or head off future problems, e.g. policies and or private sector investment that do not effectively address the problem.

2.8 Problem 4c: Inconsistent and incorrect reporting

Summary

There are inconsistencies and potential issues with the reported E-PRTR data resulting in poor accuracy, incomplete and in-transparent data, including:

Inconsistent pollutant reporting and quantification methods used by facilities in the same sector.

A lack of clarity on whether data is absent due to incomplete reporting or non-applicability or below threshold for a particular facility.

Poor administrative information on location, methodology used and tagging of release or transfer.

Is there a problem?

Yes. Problems include:

- Reporting in incorrect units or with typos in the numerical information creating.
- Incorrect co-ordinates (located outside of Europe).
- Incorrect methodology reporting applied.
- Potential missing releases and transfers.
- Pollutant releases to water being reported as pollutant transfers and vice versa.
- Inconsistencies in measurement or calculation methodologies between reporters.

Why is it a problem and what are the main drivers?

This problem affects the accuracy, completeness and transparency of the E-PRTR and undermines its credibility and usefulness to decision makers and the public. It is hard for competent authorities and users to distinguish if data are missing or just below threshold. Drivers include a lack of clarity in the E-PRTR guidance and poorly trained and under resourced operator reporting functions at facilities.
These issues also restrict the use of the data, often when using the data in analyses then erroneous data must be removed or corrected[49].

49 https://www.eea.europa.eu/publications/costs-of-air-pollution-2008-2012

What is the scale and trend of the problem?

A range of studies and reports about the E-PRTR points to discrepancies between countries and sectors for many data fields. The new EU Registry and Integrated E-PRTR/LCP reporting flows, with more vigorous online QA, has to some extent improved the data quality. However, a number of issues such as potential missing releases and transfers and incorrect methodology reporting have not been improved by the new reporting flows. The problem will continue with added facilities and pollutants.

Who is impacted by the problem and how?

All stakeholders are impacted by the quality of the data. Poor quality data being used by decision makers could lead to policies and or private sector investment that do not effectively address environmental problems from industrial activities.

2.9 Problem 5: Access to E-PRTR information

Summary

Public awareness and usage of the E-PRTR could be improved to increase participation in decision making and understanding of the environmental impacts of large industrial installations. The E-PRTR is currently a complicated dataset that requires explanation of its structure to most data users, such as members of the public, academics and NGOs, and is only available in English. There is a lack of contextual information for comparing environmental performance and relationship to regulatory requirements for researchers. It does not allow engagement with interested groups in seeking options for improving the environment.

Is there a problem?

While the evaluation concluded that many different stakeholders use the E-PRTR, there is always a possibility to increase its use. In particular, the E-PRTR website is only available in English. This may be reducing engagement and/or interest in the E-PRTR data.

Why is it a problem and what are the main drivers?

If the E-PRTR is not accessible and relevant to the public, it is not serving its core purpose. Lack of contextual information has been suggested as one factor limiting the usefulness for the public, e.g. data on production volumes to enable some degree of benchmarking of facilities.

What is the scale and trend of the problem?

The scale of the problem is partially defined by the number of times the E-PRTR is accessed and then information is used by the public and other stakeholders to engage with environmental decision-making processes. The scale of the problem is additionally defined by how, and how often, E-PRTR data are used in analysis and studies on environmental concerns within Europe by academia and NGOs.

Who is impacted by the problem and how?

Citizens and NGOs by lack of visibility of current, new and emerging environmental problems resulting from industrialised activity and inability to plan for and/or address future problems.

2.10 Problem 6: Releases from diffuse sources and releases from products

Summary

Citizens, NGOs, competent authorities and the Commission need information on releases from smaller installations within (agro-)industrial activities that are collectively significant (small farms, diffuse energy extraction) but individually below current capacity thresholds. Additionally, many new and emerging products contain pollutants that are released once these products have left the factory and are then used or disposed of. The Aarhus Convention also includes that releases from diffuse sources such as transport and residential combustion should be incorporated.

Is there a problem?

Yes: As there are activity thresholds, small installations do not report to the E-PRTR. While releases from these smaller installations are low, collectively these could be significant for some sectors. Excluding these will give an incomplete picture of releases from industrial activities within Europe. Additionally, releases from products can affect the environment after they have left the factory. In addition, to note, the Aarhus Convention also requires releases from diffuse sources such as transport and domestic combustion to be calculated.

Why is it a problem and what are the main drivers?

As well as a pollutant and release transfer register the E-PRTR is seen as an inventory of releases and transfers from industrial sectors within Europe. Omitting smaller installations below the activity thresholds and products that release pollutants would provide an underestimate of releases from the industrial sector within Europe. Additionally, a significant driver is the Aarhus Convention, which includes a requirement to calculate releases from diffuse sources such as transport and domestic combustion.

What is the scale and trend of the problem?

The scale of the problem is currently unknown.

Who is impacted by the problem and how?

All stakeholders are impacted by lack of visibility of new and emerging environmental problems resulting from industrialised activity and inability to plan for or head off future problems, e.g. policies and or private sector investment that do not effectively address the problem.

Annex 7: Definition of options

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1. POLICY OPTION 1 – MORE EFFECTIVE LEGISLATION

Twenty-four measures have been retained after screening as relevant for addressing the general effectiveness of the current legal acts.

PO1 groups the **24 individual measures** (IED#1-16 and E-PRTR#1-6 and #8-#9), into the following **4 policy sub-options** addressing the action needed to resolve a variety of issues across the two pieces of legislation.

PO1- More effective legislation
PO1-a-achieving BAT-AELs (IED#1-#5): Alternative 1 **clarify flexibilities: (IED#1#-#4).** Clarify the rules on derogations, indirect releases of pollutants to water and on taking environmental quality standards into account, and ensure transparent monitoring of related impacts on air and water quality Alternative 2 **full BAT potential: (IED#1-#4 AND IED#5).** Clarify the rules on derogations, indirect releases of pollutants to water and on taking environmental quality standards into account, and ensure transparent monitoring of related impacts on air and water quality **AND** require consideration of the full BAT-AEL range when setting ELVs in permits**.** **PO1-b-implementation and enforcement (IED#6-#9):** Empower competent authorities to suspend the operation of non-compliant plants, harmonise the rules to assess plants' compliance with their permits, make the provisions on penalties more stringent and improve transboundary cooperation in permitting. **PO1-c-rights of the public (IED#10-#13 and E-PRTR#1-#4):** Alternative 1 **public rights: (IED#10-#13 and E-PRTR#1, 3 & 4).** Improve and expand the public's access to information, participation and access to justice (including effective redress) by making clear permit summaries publicly and digitally available and requiring systematic public participation in permit reviews. Alternative 2 **enhanced public rights: (IED#10-#13, E-PRTR#1, 3 & 4 AND E-PRTR#2)** improve and expand the public's access to information, participation and access to justice (including effective redress) by making clear permit summaries publicly and digitally available, requiring systematic public participation in permit reviews **AND** more granular reporting of emissions to E-PRTR in an INSPIRE-compliant manner**.** **PO1-d- simplification (IED #14-#16 and E-PRTR #5-#6 and #8-#9):** clarify certain definitions and activity descriptions, delete the indicative list of pollutants in Annex II, compliance assessment rules under Chapter II of IED to take precedence over rules in other chapters and top-down reporting for livestock farms and aquaculture.

Measures included in Option PO1 sub-options are outlined in the table below.

Ensuring that BAT-AELs are achieved
IED #1 Introduce a time limit for derogations granted under Article 15(4). *Article 15(4) of the IED allows derogations from paragraph 3 of Article 15 of the IED, allowing competent authorities to issue less stringent permit limit values than BAT-AELs for operators meeting certain criteria. The IED does not indicate whether derogations can be provided indefinitely nor does it indicate if there is an upper limit on a derogation period. Evidence has been identified suggesting that some derogations have been granted without specifying an end date of the derogation, and thus the date from which BAT-AELs would apply. This measure would seek to address this.*
IED#2 Mandate the application of a standardised methodology for assessing the (dis)proportionality between costs of implementation of BAT conclusions and the potential environmental benefits for assessing applications for derogations under Article 15(4). *Article 15(4) of the IED permits a derogation from where achievement of emission levels associated with BAT would lead to disproportionately higher costs compared to the environmental benefits due to (a) the geographical location or the local environmental conditions of the installation, or (b) the technical characteristics of the installation. The measure will aim to standardise the approach to assessing disproportionality between costs and benefits for derogations under the IED, raising standards in the Member States where this is currently underdeveloped.*
IED#3 Amend Article 15(1) to introduce an explicit requirement that indirect releases of polluting substances to water shall be assessed and evidence must be provided to demonstrate that such releases would not lead to

an increased load of pollutants in receiving waters when compared to a scenario where the IED installation applies BAT and meets AELs for direct releases. *Article 15(1) states that emission limit values apply at the point when the pollution leaves the installation and clarifies that the effect of any processes which dilute the final emission should be disregarded. There is an exception for indirect releases to water. This measure would adjust the exception for indirect water pollution to ensure that it is clear that, at a minimum, any indirect release to water (i.e. from a waste water treatment plant) would be no more polluting than if treated at the installation employing BAT.*
IED#4 Amend Article 18 to require that stricter ELVs are set in permit conditions in the case that environmental quality standards cannot be met by implementing existing BAT conclusions. *As part of the IED evaluation, some stakeholders suggested that the current wording of Article 18 is not specific enough with regard to concrete actions that must be carried out (the Article 18 currently refers to 'additional measures').*
IED#5 Clarify Article 15(3)(a) by specifying that when setting emission limit values that do not exceed the BAT-AELs, the starting point is the lower limit of the BAT-AEL range, unless the operator demonstrates to the satisfaction of the competent authority that applying BAT techniques as described in BAT conclusions only allows meeting a higher ELV within the BAT-AEL range. *The measure would seek to encourage a tightening of the emission limit values in permit conditions for installations across the EU employing a relatively harmonised approach. It is not foreseen as a means to make lower BAT-AELs mandatory. Competent Authorities will be able to make decisions on a case-by-case basis, continuing to account for local environmental conditions and the technical characteristics of the installation, i.e. allowing for the possibility to set ELVs higher in the BAT-AEL range. The emphasis however is to begin the considerations at the lower end of the BAT-AEL range.*
Homogenizing and enhancing enforcement
IED#6 Allow Member State Competent Authorities to suspend non-compliant installations in cases where non-compliance (Article 8) causes significant environmental degradation until compliance is restored.
IED#7 Introduce common rules for assessing compliance with emission limit values under Chapter II of the IED. *The measure intends to improve legal certainty and eliminate varied interpretation of compliance. Some areas where a common approach to the assessment rules would be beneficial have been identified in previous studies* (Ricardo, 2020). *These include the clarification on the role of measurement uncertainties in determining compliance with ELVs and a more structured approach towards compliance with ELVs for combined waste water streams from different processes or installations.*
IED#8 Require Member States, in determining the penalties under Article 79, to give due regard to the nature, gravity, extent and duration of the infringement as well as the impact of the infringement on achieving a high level of protection of the environment. *There is currently no monitoring or register of penalties imposed on non-compliant installations. Therefore, a system for monitoring the penalties/new requirements would need to be set up by the EC as part of implementing this measure. The monitoring and enforcement responsibilities would also be on the EC.*
Tackling transboundary pollution
IED#9 Add a new provision in, or linked to, Article 26 for requiring effective multidisciplinary cooperation among competent national administrative, law enforcement and judicial authorities in cases of transboundary pollution, and for Member States receiving a request for cooperation to respond within three months of receipt. *The measure aims to increase the cooperation between the relevant competent authorities in order to limit the impact of transboundary emissions.*
Improving and expanding the public's access to information
IED#10 Require that information from Member States' monitoring of the impact of Article 15(4) derogations is made publicly available. *Currently, the IED does not require public authorities to publish the environmental impact of granted derogations. Therefore, this measure would address this to ensure that the public has access to information related to the impact that these derogations have on the environment.*
IED#11 Widen scope of public participation under the permitting procedures based on the recommendations by the Aarhus Convention Compliance Committee. *This measure would align public participation in permitting procedures with the recommendations by the Aarhus Convention Compliance Committee (ACCC), made under case ACCC/C/2014/121.*

IED#12 Introduce a requirement for a uniform permit summary to be made public. The 'uniform permit summary' shall include an overview of the ELVs regulated and monitoring frequency and the timings for permit reconsideration or reviews. Add a template of the 'uniform permit summary' to the IED provision covering at least the format and content requirements. *This measure would improve the accessibility of information for the purposes of public engagement activities under Article 24(2) of the IED.*
IED#13 Amend the legislation to state that 'the competent authority shall make available to the public by publishing open-access on the internet' the information requirements listed in Article 24 (2) free of charge and without restricting access to registered users. *The existing legislation requires competent authorities to publish information when a decision on granting, reconsideration or updating of a permit has been taken, but does not specify how the public should be able to access the information. Public access to information across Member States is, therefore, inconsistent at present. This measure would clarify that information should be open access, for example, removing the possibility that competent authorities require some form of payment to access the data.*
E-PRTR#1 Reduce reporting thresholds for some existing pollutants to better meet the aim of 90% capture. *As a result of better environmental controls, mainly under the IED, the releases of some pollutants have reduced to such an extent that the Annex II reporting thresholds no longer fulfil the original aim of capturing 90% of releases from industrial facilities. For these pollutants, there is an incomplete picture of where the main releases occur. This measure would re-calibrate reporting thresholds to, once again, ensure 90% capture of industrial releases.*
E-PRTR#2 Introduce sub-facility reporting. *Whilst E-PRTR reporting is at the level of 'facility', the IED sets regulatory controls at sub-facility level i.e. for 'installations'. Since there may be several IED installations in an E-PRTR facility, this restricts the extent to which E-PRTR data can support the IED. This measure would entail reporting releases/transfers on an installation basis rather than aggregating to the facility level. The benefits of reporting at this level would be greater data granularity thus enabling better matching to individual activities.*
E-PRTR#3 Add active operator confirmation that releases are below the reporting threshold. *Currently, operators submit release data when the release of a pollutant exceeds a reporting threshold. In the absence of an operator return, it is presumed that releases are below the threshold but this is not always the case. This measure would require positive operator confirmation that releases are below reporting thresholds and therefore avoid the ambiguity of missing values. This would improve the overall clarity and quality of E-PRTR data.*
E-PRTR#4 Mandate the monitoring/calculation/estimation (M/C/E) hierarchy. *E-PRTR currently allows for releases/transfers to be quantified by either measurement, calculation or estimation (M/C/E). Measurement is preferable as it usually provides the most accurate data but it also costs more. Data comparisons are difficult where different facilities have used different approaches. This measure would mandate the M/C/E hierarchy for reporting i.e. releases/transfers should be measured where possible and calculation should take precedent over estimation. This will improve overall data quality and comparability.*
Clarifying and simplifying existing legal requirements
IED#14 Amend the legislation to clarify the scope of coverage of the IED pertaining to gasification, liquefaction, and pyrolysis plants as well as to biogas plants.
IED#15 Delete Annex II of the IED "List of polluting substances". *The list of polluting substances in Annex II of the IED can be limiting and become outdated in the consideration of key environmental issues (KEI) addressed in the BREF review process. This measure would delete Annex II because it is already the requirement for the BREF process to consider all KEIs, including any new and emerging, environmental issues and pollutants.*
IED#16 Introduce a provision in Chapter II of the IED setting out that the compliance assessment rules for Chapter II installations take precedent over other compliance assessment provisions for those installations. *There are currently issues caused by discrepancies in emission limit values set out for combustion plants and waste incineration plants in the IED under Annex V and VI, and requirements set out in the LCP BATC. This includes differences in averaging periods, leading to operators and competent authorities needing to assess compliance for the same pollutants and processes multiple times, which causes unnecessary administrative burden. However, Annex V ELVs can be an important environmental backstop for combustion plants that*

have received an Article 15(4) derogation and as would not be required to comply with BAT-AELs. The measure would, therefore, introduce a new provision in Chapter II for compliance assessment that takes precedence over other provisions for those installations and is linked directly to the BAT conclusions, whilst Annex V ELVs are retained as a safety net.
E-PRTR#5 Establish a 'sunset list' to remove pollutants that are no longer of concern. *The E-PRTR's list of pollutants was established in 2006 and includes substances that are banned and are therefore not released from EU facilities. This measure would create a more dynamic mechanism to identify a list of pollutants for future removal due to them being no longer relevant (a 'sunset list').*
E-PRTR#6 Clarify that activity 3(a) covers upstream oil and gas facilities. *Whilst activity 3(a) ('underground mining and related operations') was always intended to cover the extraction of crude oil and natural gas, there has been inconsistent MS reporting despite Commission guidance. This measure would explicitly mention upstream oil and gas industries in the Annex I activity list. This will reflect current interpretation.*
E-PRTR#8 Reword 5(d) landfills activity description to include flaring of vent gas. *This measure would clarify the current interpretation that activity 5(d) includes pollutant releases arising from the flaring of landfill vent gases.*
E-PRTR#9 Add an option for top-down reporting for activity 7 (livestock production and aquaculture). *For some categories of activity, in particular farming, reporting releases can be a significant burden on operators due to the number of facilities and difficulties in quantifying releases accurately. This measure would introduce the option for using a top-down approach to estimating releases for sectors where there is a large number of smaller operators. This would reduce the reporting burden and improve data quality.*

2. POLICY OPTION 2: ACCELERATING INNOVATION

2- Accelerating innovation
Measures IED #17-#22 are structured into **three policy sub-options** that would seek to improve the IED's dynamism and support the uptake of innovative technologies and techniques. **PO2-a-frontrunners:** Facilitate the development and testing of emerging techniques *AND* allow more time for implementing these more innovative technologies and techniques **PO2-b-stimulate innovation:** Establish shorter BREF revision cycles ***(shorter BREFs cycle***) *OR* an INnovation Centre for Industrial Transformation & Emissions documenting innovation and recommending BREF revisions (***INCITE)*** **PO2-c-supporting transformation:** Allow more time to implement BATC if deep industrial transformation is required (***time***) *OR* establish a permit review obligation and require transformation plans (***plans***)

2.1. PO2-a: frontrunners

Policy option PO2-a focuses on facilitating the development and testing of more innovative and emerging technologies and techniques. PO2-a comprises two policy measures as outlined in the table below.

IED#17 Introduce legislative amendments to facilitate the development and testing of emerging techniques over a longer period. *In particular, this measure would seek to introduce a longer period, e.g. 24-36 months, during which operators are exempt from meeting BAT-AELs for pertinent sources of emissions whilst testing and/or developing emerging techniques. This would be an amendment of the 9 months currently referred to in Article 15(5).*
IED#18 Amend requirements to allow more time (6 to 8 years) for operators to implement emerging techniques with Technology Readiness Level (TRL) 8-9 or to enable the setting of stricter long-term Emerging Techniques Associated Emission Levels (ET-AELs), reflecting the expected environmental performance of emerging techniques, instead of just complying with BAT-AELs. Applicable to Key Environmental Issues only. *The measure will aim to promote [operationally] disruptive or significant achievements on environmental protection (rather than marginal improvements). This measure will, therefore, contribute to the general objective of stimulating a deep industrial and agro-industrial transformation through deployment of emerging techniques and, more specifically, ensure that the IED is fit for permitting and reviewing of permits of large industrial and agro-industrial installations for the upcoming transformation.*

2.2. PO2-b: stimulate innovation

Policy option PO2-b focusses on improving the flexibility of the BREF process to keep up with the latest technological advances, whilst maintaining the robustness and standards of the existing processes. PO2-b comprises two policy measure alternatives as outlined below.

IED#19 Establish shorter, up to 5-year, BREF cycles focused on defining stricter BAT-AELs based on recent innovations. *The measure would target innovations that could apply to new installations and major refurbishments but would not trigger a mandatory permit review for existing installations.*
IED#20 Establish the INnovation Centre for Industrial Transformation & Emissions (INCITE) to monitor the Technology Readiness Level (TRL) and environmental performance) of emerging and breakthrough techniques. Recognition by INCITE of advanced techniques with TRL 8-9 (or improved environmental protection) would suggest to trigger an update of BAT conclusions. *This means that INCITE would consider advanced techniques with TRL 8-9 (or improved environmental protection) and suggest to trigger, where pertinent, an update (e.g. for specific sections) of BAT conclusions. The measure would also provide INCITE with some powers to recommend a BREF review or update of BAT conclusions as pertinent.*

2.3. PO2-c: Supporting transformation

Policy option PO2-c focusses on facilitating sectoral transformation that is aligned with longer-term EU objectives. PO2-c comprises three policy measure alternatives as outlined below, the aims of which is that operators should retain their focus on contributing to the EU's long-term objectives, even if this may mean that they cannot keep up with short-term BAT conclusions.

IED#21 Amend requirements to allow operators to have more time to implement BAT conclusions where deep transformation of industrial sectors is required. 'Deep transformation' would refer to the adoption of completely different process routes and/or primary process techniques that facilitate a significant reduction in pollutant emissions and/or the use of energy, raw materials (i.e. secondary, or 'end-of-pipe' techniques would not qualify as 'deep transformation').
IED#22A Establish a permit review obligation by 2030 that focusses on the capacity of the installations to operate in accordance with the EU's general zero-pollution, circular economy and climate objectives. This measure comprises a requirement for installations to produce 'Transformation Plans' for review as part of this process and write results into the permit. Contents of Transformation Plans would be clarified in a Commission Decision at a future date.
IED#22B Requirement for installations to produce 'Transformation Plans' and integrate them in the environmental Management System. Contents of Transformation Plans would be clarified in a Commission Decision at a future date.

3. POLICY OPTION 3: CONTRIBUTING TO A NON-TOXIC AND RESOURCE EFFICIENT CIRCULAR ECONOMY

3- Contributing to a non-toxic and resource efficient circular economy
Measures IED #23-#26 (PO3-a, b and c below) and E-PRTR #10-#17 (PO3-d to g below) are structured into **seven policy sub-options** that would seek to contribute towards the use of safer chemicals, improved resource efficiency and the circular economy. **PO3-a-performance levels (IED #23, 24):** Introduce option for BREF Technical Working Groups (TWGs) to set binding environmental performance levels (so-called BAT-AEPLs) including for resource efficiency, water use efficiency and reuse, and waste generation) (***binding***), *OR* introduce both binding BAT-AEPLs AND performance benchmarks to be used in the Environmental Management System (EMS) (***binding and benchmarks***) **PO3-b-EMS (IED #25):** Require operators to address Resource Efficiency, Circular Economy and Chemicals Management in their EMS **PO3-c-symbiosis plans (IED #26):** Require Member States to produce national plans to promote industrial symbiosis **PO3-d-pollutants list (E-PRTR #10):** Dynamically updating the list of pollutants to be reported **PO3-e-report resource use (E-PRTR #11, 12, 13):** Require information to track progress in resource efficiency (including energy, materials and water) **PO3-f-tracking waste transfers (E-PRTR #14, 15, 16):** Require information to better track the nature and destination of waste transfers between installations (mainly concerns transfers between installations located within a Member State) **PO3-g-report on products (E-PRTR #17):** Require reporting releases from products

The following sub-sections provide a more detailed outline of the measures.

3.1. PO3-a-performance levels

This policy option (PO3-a) focuses on updating the status of BAT-AEPLs, to improve their effectiveness in encouraging energy, water and materials efficiency and the substitution of primary or fossil materials or fuels by secondary materials and renewables. PO3-a comprises two, alternative policy measures as outlined in the table below.

IED#23 Introduce the possibility to set binding resource efficiency and circular economy BAT-AEPLs. *This measure would intend to bring the status of BAT-AEPLs in line with that of BAT-AELs. Existing BAT-AEPLs would not become binding. Only a new, or review of a, BREF and its BAT conclusions would render the BAT-AEPL binding, where applicable.*
IED#24 Introduce an option to set either: • Resource efficiency and circular economy BAT-AEPLs, which would be binding through permit conditions or general binding rules; • Benchmark levels (associated with BAT), for which the inclusion in the EMS is obligatory. These can be chosen e.g. when there is large variability in the data due to important differences in products manufactured, or when one KEI is much more important than another. *The introduction of benchmark levels creates an opportunity to improve implementation of past BAT-AEPLs derived under the IED, or possibly even under the IPPCD. They can, retroactively, be assigned the status of benchmark levels, meaning it would become obligatory to address them in the EMS. Any review of a BREF and its BAT conclusions could then either review and update the benchmark levels or convert them into*

binding BAT-AEPLs if this is deemed preferable by the TWG.

3.2. PO3-b: EMS

IED#25 Require operators to incorporate a 'Resource Efficiency and Circular Economy Plan' and a 'Chemical Management System' at the installation level as separate sections of their Environmental Management System (EMS). Expand the scope of monitoring and reporting to cover resource efficiency techniques, indicators and performance levels, as well as the use of hazardous chemicals and the level of substitution for safer alternatives.

3.3. PO3-c: Symbiosis plans

IED#26 Require Member States' national authorities (or delegated competent authorities) to establish a national plan to promote industrial symbiosis. *This option acknowledges that industrial symbiosis is a cross-cutting, cross-sectoral activity and may require interactions and collaboration between actors beyond those regulated by the IED.*

3.4. PO3-d: Pollutant list

E-PRTR#10 Dynamically updating the list of pollutants to be reported. *Some pollutants of concern emitted by industrial activities are not in the E-PRTR Annex II pollutant list. It is important that industry reports on these pollutants. This measure would include a more dynamic mechanism to identify and include emerging pollutants of concern ("sunrise list") within the E-PRTR Regulation e.g. enabling the Commission to identify and include new pollutants in the future via delegated acts. This could include pollutants which have the potential to become important for environmental issues in Europe.*

3.5. PO3-e: Report on resource use

E-PRTR#11 Require the reporting of energy use. *This measure would require operators to report energy use in their facilities. This would allow the assessment of energy efficiency and benchmarking of facilities across the EU (within a sector), particularly when combined with production volume data which will soon be required under E-PRTR.*
E-PRTR#12 Require the reporting of water use. *This measure would require the reporting of water use to allow for better assessment of the impacts of industry on the environment beyond pollution. This would allow the assessment of water use efficiency and benchmarking of facilities across the EU (within a sector), particularly when combined with production volume data which will soon be required under E-PRTR.*
E-PRTR#13 Require the reporting of raw material use. *This measure would require the reporting of raw material use to better assess energy and carbon efficiencies. This would allow the assessment of resource efficiency and benchmarking of facilities across the EU (within a sector), particularly when combined with production volume data which will soon be required under E-PRTR.*

3.6. PO3-f: Tracking waste transfers

E-PRTR#14 Reporting waste composition of waste transfers. *This measure would require reporting of the composition of waste transfers using the Waste Framework Directive waste codes (EWC waste code). This would improve transparency on waste transfers and facilitate the reuse of waste streams.*
E-PRTR#15 Improve tracking of waste transfers. *This measure would require the reporting of waste receivers for all waste transfers (as currently done for transboundary hazardous waste transfers). This would improve transparency on waste transfers and facilitate the reuse of waste streams.*
E-PRTR#16 Improve tracking of waste water transfers. *This measure would require the reporting of the*

receivers of waste water transfers (as currently done for transboundary hazardous waste transfers). This would improve transparency on waste water transfers and facilitate the reuse of waste streams.

3.7. PO3-g: Report on products

E-PRTR#17 Require the reporting of releases from products. *Many new and emerging products contain pollutants that are released once these products have left the factory and are then used or disposed of. Article 5(9) of the Aarhus Convention suggests that such releases should be incorporated in a PRTR. This measure is to provide data on product releases by making use of other reporting streams and/or carry out a specific Commission study for the calculation of releases from products during consumer use.*

4. POLICY OPTION 4: ADDRESSING DECARBONISATION OF INDUSTRY

4- Addressing decarbonisation of industry
Measures IED #27-#30 (PO4-a and b below) and E-PRTR #18 and#19 (PO4-c and d below) are structured into **four policy sub-options**, which could contribute towards the decarbonisation of the agro-industrial activities. **PO4-a-energy efficiency (IED #27):** Delete Article 9(2) with exemptions from setting energy efficiency requirements in IED permits **PO4-b-IED/ETS interface (IED #28, 29, 30):** Plan a future review by 2028 to maximise coherence and synergies between the IED and the ETS in light of the dynamics of innovation (***review***), *OR* introduce a sunset date on Article 9(1) (***sunset***), *OR* immediately delete Article 9(1) (***delete***) **PO4-c-disaggregated reporting (E-PRTR #18):** Require more granular reporting for some GHG, in particular refrigerants **PO4-d- CO_2 eq. reporting (E-PRTR #19):** Require GHG releases to be also reported as CO_2 equivalent

4.1. PO4-a: Energy efficiency

IED#27 Delete Article 9(2) that exempts agro-industrial installations from setting requirements relating to energy efficiency in respect of combustion units or other units emitting carbon dioxide on the site. *This measure widen to all IED operators the requirements of BAT conclusions containing energy efficiency requirements.*

4.2. PO4-b: IED/ETS interface

IED#28 Plan a future review by 2028 to maximise coherence and synergies between the IED and the ETS in light of the dynamics of innovation. *This measure would ensure that the functioning of the IED, including the exemption from setting GHG emission or concentration limits within the IED, would be reviewed, in light of the dynamics of innovation, with a view to maximise coherence and synergies between the concerned instruments. Such review should take place prior by 2028, which is both prior to a the major FF55 milestone and the approximate time by which breakthrough decarbonisation techniques are expected to start becoming available.*
IED#29 Introduce a limit of 2035 ('sunset date') beyond which the exemption for agro-industrial plants from setting GHG ELVs requirements in permit conditions if they are regulated by the EU ETS will not apply. *This measure would allow the introduction of ELVs for GHG into permit conditions for IED installations from 2035. Consequently, BREFs and BATC would set BAT-AELs for GHG emissions from this date. 2035 was chosen as a milestone between the 2030 target of 55% emissions reduction and 2050 carbon neutrality goal. This would provide industry with time to review and adjust their course of action so they can contribute to the EU's journey towards climate neutrality.*
IED#30 Delete Article 9(1) that exempts agro-industrial plants from setting GHG ELVs requirements in permit conditions if they are regulated by the EU ETS. *This measure would allow IED permits to contain GHG ELVs. Consequently, BREFs and BATC would set BAT-AELs for GHG emissions covered by the ETS.*

4.3. PO4-c: Disaggregated reporting

E-PRTR#18 Disaggregation of some currently reported GHGs. *This measure would require the reporting of hydrofluorocarbons (HFCs) and perfluorocarbons (PFCs) as individual pollutants instead of the current*

aggregated groups. This would provide a better understanding of the GHG contributions since HFC and PFC species have different GWPs.

4.4. PO4-d: CO_2 equivalent reporting

E-PRTR#19 Require GHG releases to be also reported as CO_2 equivalent. *This measure would require the reporting of HFCs and PFCs in mass of CO_2 thus giving a more accurate picture of their GHG contribution.*

5. POLICY OPTION 5: SECTORAL SCOPE

5- Industrial scope
Measures IED #31-#44 (PO5-a to f, and i below) and E-PRTR #20-#31 (PO5-g and h below) are structured into nine policy sub-options, which would contribute towards addressing, as efficiently as possible, the environmental impacts of agro-industry installations currently not regulated. **PO5-a-cattle and tailored permitting (IED #31, 32, 33; E-PRTR #20, 21)** : Broaden current sectoral coverage of the IED and E-PRTR Regulation in rearing of animals (include cattle farming, expand coverage of rearing of pigs and poultry *AND* a tailored permitting process for the rearing of animals) **PO5-b-expand existing IED activities (IED #34, 36, 37, 38; E-PRTR # 22, 24, 25, 26)**: Extension of IED and E-PRTR current sectoral scope by closing loopholes for smaller smitheries, regulating the associated activities of textiles finishing, forging presses, cold rolling and wiredrawing; and better coverage of the battery value chain by including the rapidly growing batteries gigafactories **PO5-c-landfills (IED #39, 40; E-PRTR # 27)**: Landfills: Adoption of BAT conclusions for landfills *OR* adoption of BAT conclusions for activity 5.4 landfills *AND* revise the capacity threshold **PO5-d-mining (IED #41)**: Include non-energy minerals extraction industry in the IED scope **PO5-e-aquaculture (IED #42)**: Include acquaculture in the IED scope **PO5-f-oil and gas (IED #43)**: Include upstream oil and gas extraction in the IED scope **PO5-g-align E-PRTR to IED (E-PRTR #28)**: Align E-PRTR activity descriptions to IED activity descriptions **PO5-h- align E-PRTR to other EU laws (E-PRTR #29,#30)**: Revise E-PRTR activity descriptions by aligning to the Medium Combustion Plants Directive (MCPD) *AND* the Urban Waste Water Treatment Directive (UWWTD) (***fully***) *OR* expand the E-PRTR scope to cover (MCPs between 20 and 50 MW *AND* UWWTPs between 20 000 and 100 000 person equivalents (***partially***) **PO5-i-watch mechanism (IED #44; E-PRTR #31)**: Establish a dynamic system to identify and include emerging activities/sectors of concern, according to significance of production and attendant (already occurring, or risk of) pollutant emissions, and the IED's potential to address these issues

5.1. PO5-a: Cattle and tailored permitting

This policy option (PO5-a) focusses on further addressing pollution associated with the rearing of certain animals by expanding the scope whilst limiting additional administrative burden. PO5-a comprises five complementary policy measures as outlined in the table below.

IED#31 and E-PRTR#20 - Include cattle farming within the scope of the IED and the E-PRTR. *This measure identifies the need to address the environmental significance of cattle farming. The measure defines a capacity threshold, of 100 livestock units (LSUs) for cattle, a reference unit that facilitates the aggregation of livestock from various species and age.*
IED#32 and E-PRTR#21 - Amend the capacity thresholds for the rearing of pigs and poultry (IRPP). *This measure seeks to consider lowering the current capacity thresholds to include the environmental impacts of*

slightly smaller farms. The thresholds could be set at 125 LSUs.
IED#33 Introduce a tailored regulatory framework for installations carrying out rearing of animals. *Around 40% of all existing IED installations are related to rearing of animals. The IED's scope expansion would include cattle farming and more poultry and pig farms, leading to more than tripling of the number of installations that would be regulated by the IED. This would translate into significant additional administrative and operational burden for businesses and public authorities and, therefore, a lighter administrative process is proposed for all installations rearing animals with this tailored regulatory framework.*

5.2. PO5-b: Expand existing IED activities

This policy option (PO5-b) focusses on extending coverage for specific sectors already partly regulated by the IED and E-PRTR. As a general principle, activities will be added to the E-PRTR's scope if added to the IED. PO5-b comprises five complementary policy measures as outlined in the table below.

IED#34 and E-PRTR#22 - Extend the current IED and E-PRTR sectoral coverage to also include battery production. *The legislation currently regulates a number of activities related to battery production. Battery production (specifically of lithium-ion batteries) is expected to grow in the EU.*
IED#36 and E-PRTR#24 - Extend the current sectoral coverage to also include forging presses, cold rolling, with capacity exceeding 10 t/h, and wire drawing, with capacity exceeding 2 t/h.
IED#37 and E-PRTR#25 - Extend the current sectoral coverage to also include textile finishing activities with the existing capacity thresholds in activity 6.2 (pre-treatment or dyeing of textile fibres or textiles)..
IED#38 and E-PRTR#26 - Extend the current sectoral coverage to also include smitheries of 20 kilojoule per hammer with no threshold for the calorific power or reduce the capacity threshold for the calorific value to > 5 MW (from the current limit of 50 kilojoule per hammer and where the calorific power used exceeds 20 MW).

5.3. PO5-c: Landfills

IED#39 Facilitate the adoption of BAT conclusions for activity 5.4 landfills. *No BAT conclusions exist for landfills owing to the coverage of this activity under the Landfill Directive. An updated BREF and BAT conclusions would lead to the implementation of more up to date techniques for protecting the environment.*
IED#40 and E-PRTR#27 - Revise the capacity threshold for landfills. *Landfills with smaller capacity would be brought under the scope although the number is uncertain.*

5.4. PO5-d: Minerals extraction activities

IED#41 Include non-energy minerals extraction activities, i.e., extraction and treatment of metallic and industrial minerals (E-PRTR Annex I activities 3a and 3b) within the scope of the IED. *Revised scope: following the assessment of impacts, the scope of the measure was revised to 'include minerals extraction activities within the scope of the IED'. The revised measure covers the extraction and treatment of metallic and industrial minerals (but excludes the extraction of construction materials and aggregates). The environmental issues linked to the extractive activities within scope are significant, with higher pollution potentials. Furthermore, the revised scope of the measure ensures that IED/BAT requirements and their implementation in permits focus on the most significant sources of emission of pollutants.*

5.5. PO5-e: Aquaculture

IED#42 Include aquaculture within the scope of the IED (E-PRTR Annex I activity 7b).

5.6. PO5-f: Oil & gas

IED#43 Include upstream oil and gas extraction within the scope of the IED.

5.7. PO5-g: Align E-PRTR to IED

E-PRTR#28 Align E-PRTR activity descriptions to IED activity descriptions. *This concerns the following E-PRTR activities: 1(b) installations for gasification and liquefaction; 1(c) thermal power stations; 5(a) & 5(b) waste treatments; 5(g) independently operated industrial waste water treatment plants; 8(b) production of food and beverage products; AND including an additional activity capture of CO_2 streams for geological storage with no threshold (IED activity 6.9).*

5.8. PO5-h: Align E-PRTR to other law

E-PRTR#29 Revise E-PRTR activity descriptions by fully aligning to the scopes of the MCPD ***AND*** the UWWTPD.
E-PRTR#30 expand the E-PRTR scope to cover MCPs between 20 and 50 MW ***AND*** UWWTP between 20 000 and 100 000 p.e.

5.9. PO5-i: Watch mechanism

IED#44 and E-PRTR#31 - Establish a dynamic system to identify and include emerging activities of concern. *This option seeks to recognise that over time other existing activities or new activities may become relevant for regulating by the IED and reporting under the E-PRTR. This would be when such activities become a significant source of emissions of pollutants of concern, there is a significant potential for improvement of environmental performance, the IED's BAT approach is suitable for regulating those activities in a proportionate manner, and there is a range of environmental performance within the activity or between Member States.*