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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}

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TABLE OF ACRONYMS

Acronym	Meaning
AEL	Associated Emission Level
BAT	Best Available Technique
BAT-AEL	BAT-Associated Emission Level
BAT-AEPL	BAT-Associated Environmental Performance Level
BATC	Best Available Techniques conclusions
BAU	Business As Usual
BREF	Best Available Techniques Reference document
CAPEX	Capital expenditure
CCS	Carbon Capture and Storage
CCU	Carbon Capture and Utilisation
Cd	Cadmium
CE	Circular economy
CEMS	Continuos emissions monitoring systems
CMS	Chemical Management System
CMR	Carcinogenic, mutagenic and reprotoxic
EIA	Environmental Impact Assessment
EEA	European Environment Agency
EGD	European Green Deal
EIPPCB	European Integrated Pollution Prevention and Control (IPPC) Bureau
ELV	Emission Limit Value
EMS	Environmental Management System
EMAS	Eco-Management and Audit Scheme
E-PRTR	European Pollutant Release and Transfer Register
EPER	European Pollutant Emission Register
ETS	Emissions Trading System
FF55	Fit for 55
GHG	Greenhouse gas
HFC	Hydrofluorocarbons
Hg	Mercury
IA	Impact assessment
INCITE	INnovation Centre for Industrial Transformation & Emissions
IED	Directive 2010/75/EU of the European Parliament and of the Council of 24 November 2010 on industrial emissions
INSPIRE	Infrastructure for Spatial Information in Europe
JRC	EU Joint Research Centre
LCP	Large Combustion Plant
LSU	Livestock Unit
MCA	Multi-criteria analysis
MCP(D)	Medium Combustion Plant (Directive)
MS	Member State
MWEI	Management of Waste from Extractive Industries (directive)
NGO	Non-Governmental Organisation
NMVOC	Non-methane volatile organic compounds
NO_x	Generic term for the nitrogen oxides that are most relevant for air pollution
ODS	Ozone depleting substances

Acronym	Meaning
OECD	Organisation for Economic Co-operation and Development
OPC	Open Public Consultation
OPEX	Operational expenditure
PBT	Persistent, bioaccumulative and toxic
PFAS	Perfluoroalkyl chemicals
PM ($_{2.5}$ and $_{10}$)	Particulate Matter of size < 2.5 µm or < 10 µm
PO	Policy option
PRTR	Pollutant Release and Transfer Register
RE	Resource Efficiency
REACH	Regulation (EC)1907/2006 on the Registration, Evaluation, Authorisation and Restriction of Chemicals
SO_2	Sulphur dioxide
REFIT	Regulatory Fitness and Performance Programme
SVHC	Substance of very high concern
TRL	Technology Readiness Level
TWG	Technical Working Group
UNECE	United Nations Economic Commission for Europe
UWWTP(D)	Urban Waste Water Treatment Plant (Directive)
vPvB	Very persistent and very bioaccumulative
WFD	Water Framework Directive
WHO	World Health Organisation
ZPAP	Zero Pollution Action Plan

1. INTRODUCTION: POLICY AND LEGAL CONTEXT

1.1. Context of the initiative

The European Green Deal (EGD)[1] is Europe's growth strategy to ensure by 2050 a climate-neutral, clean and circular economy, optimising resource management, minimising pollution while recognising the need for deeply transformative policies. The EU Chemicals Strategy for Sustainability[2] of October 2020 and the Zero Pollution Action Plan[3] adopted in May 2021 specifically address pollution aspects of the EGD. In parallel, the New Industrial Strategy for Europe[4] highlights the need for new technologies, innovation and investment to strengthen Europe's industrial competitiveness and facilitate industry's shift to a truly sustainable, greener and more digital economy. The updated May 2021 version of this strategy[5] further emphasises the potential role of transformative technologies.

Other particularly relevant policies comprise the "Fit for 55" package[6], the Methane Strategy[7] and the Glasgow methane pledge, the Climate Adaptation Strategy[8], the Biodiversity Strategy[9], the Soil Strategy[10], the Farm to Fork initiative[11] and the upcoming Sustainable Products Initiative[12].

In the EGD, the Commission commits to revise EU measures to address pollution from large industrial installations, notably by looking at the scope of the legislation and at how to make it fully consistent with the European Green Deal, the zero pollution ambition, and climate, energy and circular economy policies, bearing in mind the benefits for both public health and biodiversity. The **Industrial Emissions Directive 2010/75/EU (IED)**[13] and the **Regulation (EC) No 166/2006 on the European Pollutant Release and Transfer Register (E-PRTR)**[14] are complementary instruments controlling the environmental impact of industry. The IED establishes a system of 'command and control' to secure a progressive reduction of pollution from the EU's largest industrial and rearing of livestock installations (hereafter agro-industrial installations)[15], whilst preserving a competitive level playing field. The E-PRTR facilitates monitoring of pollution-reduction efforts by enhancing publicly available information on the actual performance of installations.

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[1] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52019DC0640
[2] https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52020DC0667&from=EN
[3] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52021DC0400&qid=1623311742827
[4] https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1593086905382&uri=CELEX%3A52020DC0102
[5] https://ec.europa.eu/info/sites/default/files/communication-industrial-strategy-update-2020_en.pdf
[6] https://ec.europa.eu/clima/eu-action/european-green-deal/delivering-european-green-deal_en
[7] https://ec.europa.eu/energy/sites/ener/files/eu_methane_strategy.pdf
[8] https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52021DC0082&from=EN
[9] https://ec.europa.eu/environment/strategy/biodiversity-strategy-2030_en
[10] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52021DC0699
[11] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52020DC0381
[12] https://ec.europa.eu/info/law/better-regulation/have-your-say/initiatives/12567-Sustainable-products-initiative_en
[13] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32010L0075&qid=1624007748130
[14] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32006R0166&qid=1624007792921
[15] The expression agro-industrial installations is used to capture all types of activities that may be regulated by the IED mechanisms, including in particular energy-intensive industries and rearing of livestock

This legislation has links with many other policies since it seeks to address the environmental pressures of agro-industrial installations in a holistic manner. However, the effectiveness of its contribution varies by policy area. This is discussed in the section on problem definition and drivers.

Table 1: Mapping of IED and E-PRTR links to EGD policies

Policy area	IED and E-PRTR contribution and relevance
Zero pollution	• IED prevents and reduces emission of pollutants to air, water and soil • IED seeks to ensure that emissions do not lead to exceedances of environmental quality standards defined in air and water legislation • IED regulates transfers of industrial pollutants to urban waste water plants • E-PRTR provides public access to data on the amount of pollutants emitted and transferred, thereby empowering civil society
Sustainable Chemicals	• IED reduces the presence of harmful chemicals in the environment • IED encourages the use of safer chemicals in production processes • E-PRTR data is used when assessing risks of harmful chemicals
Circular economy	• IED promotes efficient use of materials, water and energy • IED encourages the use of secondary raw materials
Waste	• IED reduces emission of pollutants from polluting waste treatment installations • IED promotes waste prevention and recycling • E-PRTR provides data on industrial waste transfers to treatment facilities
Sustainable Products	• IED levels the playing field for the production of intermediate products (e.g. metals, paper, cement, and polymers), addressing part of products' lifecycle
Nature and biodiversity	• Pollution is one of the drivers of biodiversity loss. By curbing pollutant emissions, the IED contributes to protecting biodiversity
Climate	• IED takes GHG emissions of pollutant reduction techniques into account • IED regulates emission of GHG not covered by the ETS, e.g. methane • E-PRTR provides data on a range of GHG emissions
Energy	• IED identifies energy efficiency techniques and establishes energy performance levels for specific processes
Innovation	• IED seeks to promote emerging techniques
Sustainable finance	• IED information is used in defining criteria for the Taxonomy • E-PRTR provides data to gauge the environmental performance of installations
Digitalisation	• E-PRTR promotes the use of advanced IT instruments to make environmental information publicly available
Industrial strategy	• IED contributes to levelling the EU playing field for production processes • IED is increasingly recognised internationally as a model for developing industrial emission policies[16] • E-PRTR data can be compared internationally with other countries

The Council[17] and the European Parliament[18,19,20] welcomed the revision of the IED and expressed their expectations that this revision will address pollutant emissions to air from

[16] https://www.oecd.org/chemicalsafety/risk-management/best-available-techniques.htm?utm_source=Adestra&utm_medium=email&utm_content=More%20on%20the%20BAT%20project&utm_campaign=November%202017%20Chemical%20Safety%20News&utm_term=demo
[17] https://data.consilium.europa.eu/doc/document/ST-6650-2020-INIT/en/pdf
[18] https://www.europarl.europa.eu/doceo/document/TA-9-2021-0107_EN.html
[19] https://www.europarl.europa.eu/doceo/document/TA-9-2020-0005_EN.pdf
[20] https://www.europarl.europa.eu/doceo/document/TA-9-2020-0321_EN.pdf

industrial and agricultural activities and contribute to the circular economy, including by promoting water reuse in industry[21,22].

The multi-stakeholder High Level Group on Energy-Intensive Industries, advising the Commission on policies relevant to energy-intensive industries since 2015, developed a masterplan[23] with recommendations to build the policy framework needed to manage this transition while keeping industry competitive. It recommends that '*The Industrial Emissions Directive permitting process should be adapted to support GHG* [greenhouse gas] *abatement measures in energy-intensive installations throughout the transition.*'

This impact assessment focuses on the processes set out in the IED and the E-PRTR to minimise pollution from agro-industrial installations in the context of the recently adopted Climate Law and the Fit for 55 package[24] of climate, energy and transport proposals. It does not discuss the wider problems of environmental pollution, biodiversity loss, climate change and resource depletion, which are subject to other specific policies.

The key aims of this impact assessment are to:

1. Identify and assess the impacts of policy measures to address the shortcomings identified in evaluations of the IED and the E-PRTR thereby contributing to the zero pollution ambition of the European Green Deal in general, and the objectives of the Zero Pollution Action Plan in particular.

2. Assess how this legislation may contribute to wider EGD policy goals and respond to relevant stakeholder concerns and Council conclusions and resolutions from the European Parliament. This requires exploring a range of options of varying ambition, covering the promotion of innovation, resource efficiency, circularity and decarbonisation, thus enhancing the EU's resilience whilst reducing harmful impacts on both public health and biodiversity.

3. Address the current and future interactions between reducing emissions of pollutants (depollution) and GHGs (decarbonisation) including policy coherence to maximise industrial installations' contribution to the EU's twin targets of Zero Pollution and Net Zero Carbon emissions.

1.2. The IED (Industrial Emissions Directive)

Processes established by the IED

The IED controls the environmental impacts of around 52 000 of Europe's large-scale, high pollution risk agro-industrial installations in an integrated manner, on a sector-by-sector basis. It covers all relevant pollutants potentially emitted by industrial installations that affect human health and the environment[25]. IED installations account for about 20% of the EU's overall pollutant emissions by mass to air, around 20% of pollutant emissions to water and

[21] https://data.consilium.europa.eu/doc/document/ST-9419-2021-INIT/en/pdf
[22] https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1583933814386&uri=COM:2020:98:FIN
[23] https://op.europa.eu/en/publication-detail/-/publication/be308ba7-14da-11ea-8c1f-01aa75ed71a1/language-en
[24] https://ec.europa.eu/info/sites/default/files/chapeau_communication.pdf
[25] Annex II to the IED provides a non-exhaustive list of relevant pollutants

approximately 40% of GHG emissions[26]. Activities regulated by the IED include e.g. power plants, refineries, waste treatment and incineration, production of metals, cement, glass, chemicals, pulp and paper, food, and drink, as well as the rearing of pigs and poultry. An IED installation may undertake several IED activities, e.g. cement production and waste co-incineration.

National authorities are obliged to issue permits covering each installation's activities based on the use of Best Available Techniques (BAT)[27]. To ensure a consistent approach across the EU, BAT reference documents (BREFs), addressing specific agricultural or industrial activities, are produced via a EU-wide assessment, the 'Sevilla process', by Technical Working Groups (TWGs) whose members include non-governmental organisations (NGOs) promoting environmental protection, industry associations, EU Member States and the European Commission. BREFs are large documents (up to more than 1 000 pages) describing the concerned sector(s), the techniques used and evidence gathered for establishing BAT and, where possible, quantifying their environmental performance.

The conclusive chapters of BREFs are adopted as Commission Implementing Decisions (the 'BAT conclusions') and are legally binding. Member States' permitting authorities must use BAT conclusions as the reference when setting, in the relevant permit, the conditions which regulate the modalities of operating specific installations. Each site-specific permit must include Emission Limit Values (ELVs) for relevant pollutants from within the range of the BAT-Associated Emission Levels (BAT-AELs) set in the sectoral BAT conclusions.

Experience has shown that by defining in some degree of detail the tasks of the competent authorities, Member States have ensured that the appropriate level of resources were made available to fulfil the related obligations and comply with the Directive. However, the revision of the large number of permits of pigs and poultry farms has been a challenge for these competent authorities.

Interaction between the IED and other EU environmental law

The IED permits must respect limits placed on releases of pollutants and other resource, waste, and environmental controls, including ensuring a high level of protection of media (air, water etc) and ecological habitats. These levels of controls may refer to the prevention or high degree of control of pollution entering river basins, groundwater or air, which by their nature may span the territories of more than one Member State. Alternatively, a nature protection site may be close to the IED installation in question, and thus require a high level of localised protection.

By regulating certain activities at source, the IED:

[26] SWD(2020) 181

[27] Defined in Article 3 (10) of Directive 2010/75/EU as a combination of "best", "techniques" and "available techniques". Using this trio of conditions, the emphasis of the end result is (*sensu lato*) on achieving the most effective way of protecting the environment as a whole, under economically and technically viable conditions, and referring to the way in which the installation is designed, built, maintained, operated and decommissioned.

- In parallel with other EU law regulating emissions at source[28]:
    - Supports Member States in meeting their obligations under EU legislation setting environmental quality standards, e.g. the Ambient Air Quality Directive[29], and the Surface Water Directive[30].
    - Also supports the Member States in meeting the objectives they have under EU legislation setting national targets, such as the National Emission reduction Commitments (NEC) Directive[31] (e.g. by reducing emissions of SO_2), the Effort Sharing Regulation[32] (e.g. by reducing emissions of methane) and the Energy Efficiency Directive[33].
- The IED does not regulate emissions of greenhouse gasses that fall within the scope of the EU Emissions Trading System (ETS)[34]. It however complements the EU ETS by regulating emissions of greenhouse gases from industrial activities that do not fall under the EU ETS (e.g. methane or fluorinated gases).
- Secures general environmental performance improvement contributing to other EU sectoral legislation including REACH[35], waste[36], and nature protection[37].
- Urban Waste Water Treatment[38]- The current UWWTD regulates pollutants typical for such wastewater (e.g. organic matter), whereas it only includes general principles for pollutants that may be released to the sewer by IED installations (e.g. heavy metals). The current IED contains an ambiguous provision allowing higher emissions from IED installations if there is a downstream wastewater treatment plant.
- In line with the Aarhus Convention, horizontal and vertical EU law ensures access to environmental information. Directive 2003/4/EC on public access to environmental information defines the principles on access, disclosure and withholding of such information. The IED requires access to information on permitting processes and permits.

Progress achieved under the IED

The 2020 evaluation[39] provides a detailed overview of the functioning of the processes set up by the IED. Annex 14 reproduces relevant excerpts thereof.

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[28] For example, for cars, Euro 5 and 6 Regulation 715/2007/EC sets the emission limits for NO_X and Regulation (EU) 2019/631 sets emission performance standards for CO_2

[29] Directive 2008/50/EC, *OJ L 152, 11.6.2008, p. 1–44* http://data.europa.eu/eli/dir/2008/50/oj

[30] Directive 2008/105/EC, OJ L 348, 24.12.2008, p. 8 . https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32008L0105

[31] Directive (EU) 2016/2284, *OJ L 344, 17.12.2016, p. 1–31* https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=uriserv:OJ.L_.2016.344.01.0001.01.ENG&toc=OJ:L:2016:344:TOC

[32] Regulation (EU) 2018/842 , *OJ L 156, 19.6.2018, p. 26–42* http://data.europa.eu/eli/reg/2018/842/oj

[33] Directive (EU) 2018/2002 as amended, *OJ L 328, 21.12.2018, p. 210-230* http://data.europa.eu/eli/dir/2018/2002/oj

[34] Directive 2003/87/EC establishing a scheme for greenhouse gas emission allowance trading

[35] Regulation (EC) No 1907/2006 , as amended (current consolidated version: http://data.europa.eu/eli/reg/2006/1907/2021-10-01)

[36] E.g. Waste Framework Directive 2008/98/EC, as amended (current consolidated version: http://data.europa.eu/eli/dir/2008/98/2018-07-05

[37] Inter alia, the Habitats Directive 92/43/EEC, as amended (current consolidated version: http://data.europa.eu/eli/dir/1992/43/2013-07-01)

[38] Council Directive 91/271/EEC concerning urban waste water treatment

[39] See section 2 of SWD(2020)181 https://europa.eu/!HP74fW, pages 7 to 13

The IED evaluation concluded that the directive is generally effective in preventing and controlling pollution to air, water and soil from industrial activities, as well as in pushing forward the incorporation of BAT. The process for producing BREFs and identifying BAT has worked well, and is recognised as a model of collaborative governance and co-creation of legislation.

The IED has substantially reduced emissions of pollutants to air and, to a lesser degree, water emissions. It has also contributed to minimising emissions to soil from IED installations. Although its impacts on resource efficiency, the circular economy and innovation are harder to assess, it appears to have made a positive contribution, even though this to date may be of limited magnitude. It has also made a limited contribution to decarbonisation, within the constraints currently placed on the IED (see Section 2.4). Other aspects, such as public access to information and access to justice, have improved compared to the earlier legislation that the IED replaced.

The IED design ensures proportionality of outcomes by (i) defining BAT as the most environmentally effective as well as economically viable range of proven techniques used in a sector, and (ii) allowing derogations in individual cases if application of the EU-wide BAT requirements would lead to costs disproportionately higher than the expected environmental/health benefits. The evaluation concluded that the IED has mixed impacts on EU competitiveness: on one hand driving the export of EU sustainability expertise, on the other imposing additional compliance costs in the EU compared to elsewhere. Nevertheless, Eurostat data shows that, overall, the industry environment compliance costs remain relatively constant and are generally a small factor in global competitiveness, with other costs, such as labour, raw materials and energy, being much more influential. The IED design also allows for evidence-based input to the taxonomy process. Furthermore, the IED's provisions on access to information and public participation help operators to diffuse societal disagreements and tensions when establishing or expanding industrial activities. The co-creation of BAT requirements by Member States, industry and environmental NGOs ensures a high, albeit not necessarily absolute, level of support by Member States, industry and environmental NGOs.

The evaluation, however, also identified areas for improvement that are discussed in the problem definition section.

1.3. The E-PRTR Regulation

Processes established by the E-PRTR Regulation

Since 2007, the E-PRTR has provided accessible environmental data from the largest EU agro- industrial facilities[40]. It implements the EU's international obligations from the UNECE Kyiv Protocol[41], under the umbrella of the Aarhus Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters[42].

[40] There is also data for Switzerland, Iceland, Liechtenstein, Norway and Serbia. The UK has exited from the E-PRTR as a consequence of Brexit

[41] https://unece.org/DAM/env/pp/prtr/Protocol%20texts/PRTR_Protocol_e.pdf

[42] https://unece.org/DAM/env/pp/documents/cep43e.pdf

Data on key pollutants are provided by operators of some 30 000 agro-industrial facilities. This data is held in the E-PRTR database hosted and maintained by the European Environment Agency, as part of a revamped Industrial Emissions Portal[43], where annual emission[44] data are combined with data reported under the IED. This covers 65 economic activities that are closely (but not exactly) aligned to the list of activities regulated under the IED.

For each facility, operators provide annual information on the quantity of pollutants emitted to air, water and soil (land), together with off-site transfers of hazardous and non-hazardous waste and pollutants in waste water. The reported data may come from measurements, calculations or estimations, and they cover all emission routes i.e. deliberate, accidental, routine or non-routine. The E-PRTR covers 91 key pollutants, including heavy metals, pesticides, GHGs and dioxins. To concentrate efforts on reporting solely the largest emission sources, the E-PRTR's scope is restricted to facilities that emit more than defined thresholds, set for each pollution type.

In addition to these core datasets, which cover the main point sources of pollution, the E-PRTR contains spatially disaggregated data on emissions from diffuse (i.e. non-point) sources such as transport or domestic heating, resulting from modelling.

Interaction between the E-PRTR Regulation and other EU environmental law

Compared to the IED, the E-PRTR covers additional activities that are derived from the UNECE Kyiv Protocol (e.g. waste water treatment plants, mining, aquaculture) but omits certain activities introduced by the IED in 2010 (e.g. waste recovery, carbon capture and storage).

An E-PRTR facility may comprise several IED installations e.g. a complex petrochemical facility may operate installations for oil refining, chemical production and power generation. As such, the E-PRTR Regulation covers the overwhelming majority of IED installations.

Annex 16 maps the scope of the IED, the E-PRTR Regulation and other relevant EU law. The main E-PRTR interfaces with other EU law are with the directives for:

- Aarhus Convention - horizontal and vertical EU law ensures access to environmental information. The E-PRTR ensures disclosure to the public of comprehensive information on emission of pollutants.
- EU ETS – compared to the ETS, E-PRTR provides a wider scope of GHG data (adding CFCs, HCFCs etc.), provides more nuance on carbon dioxide emissions (as it distinguishes biomass derived CO_2) and, through the Industrial Emissions Portal, provides enhanced data accessibility. In addition, ETS emissions are subject to Monitoring, Reporting and Verification (MRV)[45] requirements but, in view of the associated financial implications, these are typically more formal and onerous than quality assurance processes under the E-PRTR. ETS data are publicly available as a simple list via the EU

[43] https://industry.eea.europa.eu/

[44] The E-PRTR term 'releases' is equivalent to 'emissions'. Therefore, for clarity, the term 'emissions' is used instead of the term 'releases', wherever possible in this staff working document.

[45] https://ec.europa.eu/clima/sites-0/emission-trading-system-mrv-reporting_en

Registry[46]. In practice, the same emission data may be used by operators for both ETS and E-PRTR purposes although this can be complicated by different installation boundaries for the two regimes.

- Whilst the UWWTD sets regulatory controls on the operation of plants as small as 2 000 population equivalent (p.e.), the E-PRTR requires the very large plants (over 100 000 p.e.) to report their emissions. The E-PRTR also requires operators of industrial activities to report their transfers of waste water to UWWT plants. The Water Information System for Europe (WISE)[47] contains country-level overviews of UWWTD implementation but no data on emissions from individual plants.
- National Emission reduction Commitments (NECD)[48] – sets national (top-down) totals for the atmospheric emission of five key pollutants[49] and therefore complements the individual (bottom-up) source controls under IED permits and E-PRTR reporting obligations.

Progress achieved under the E-PRTR Regulation

The 2017 evaluation[50] provides a detailed overview of the functioning of the processes set up by the E-PRTR Regulation. Annex 15 reproduces the relevant excerpts of that evaluation.

The evaluation concluded that the Regulation is a pivotal component in the knowledge base on emissions from industrial activities in Europe. It was considered to be an important instrument in the EU environmental acquis and to be generally fit for purpose.

The readily-accessible data available on the new 'Industrial Emissions Portal' (previously the E-PRTR website) provide the public with information that greatly enhances their ability to engage with wider environmental decision-making. Moreover, for a variety of other users, including policy analysts, the E-PRTR remains the primary reference point for key environmental facts on large industrial activities.

The E-PRTR website and its associated search tools have been designed to make access as easy as possible. The E-PRTR evaluation showed an average of 242 consultations per day of the old E-PRTR website, by varied visitors (including public services, private enterprises, NGOs and the general public). In 2021, a different analytical method showed 160 website visits per day to the Industrial Emissions Portal.

The evaluation, however, also identified areas for improvement that are discussed below in the problem definition section.

2. PROBLEM DEFINITION

Annex 6 provides a detailed discussion of the problems and drivers, taking into account the outcome of the evaluations, stakeholders input and further analysis.

Based on this analysis there are five high-level problems to be addressed.

[46] https://ec.europa.eu/clima/eu-action/eu-emissions-trading-system-eu-ets/union-registry_en
[47] https://water.europa.eu/
[48] Directive (EU) 2016/2284 of the European Parliament and of the Council on the reduction of national emissions of certain atmospheric pollutants
[49] Sulphur dioxide, nitrogen oxides, volatile organic compounds, ammonia and fine particulate matter
[50] See section 2 of SWD(2017)710 available at https://europa.eu/!bC98wG, pages 3 to 9

2.1. Problem area 1: Insufficiently effective legislation

A major objective of the IED is to prevent or reduce emissions of pollutants to the environment, thereby helping to meet environmental and public health standards and objectives set in EU air quality[51] and water quality[52,53,54] laws.

Between 2010 and 2019, based on data reported to the E-PRTR, industrial emissions of sulphur oxides (SO_x) and particulate matter (PM_{10}) decreased by 50% in the EU. Other emissions decreased to a lesser extent: carbon dioxide (CO_2) by 8%, nitrogen oxides (NO_x) by 25% and heavy metals: cadmium (Cd), mercury (Hg) and lead (Pb) by 40%, whereas non-methane volatile organic compounds (NMVOC) increased by 1%[55]. From 2014 to 2017, ammonia emissions increased every year, and by about 2.5 % over the whole period[56].

At the same time, however, scientific evidence related to the negative impacts of air pollution has consolidated further, and the updated Air Quality Guidelines[57] as recently published by the World Health Organization (WHO) recommend lower guideline exposure levels than the previous 2005 edition for several air pollutants – including particulate matter, nitrogen dioxide and ozone. Accordingly, and in line with the European Green Deal, the European Commission will "propose to align EU air quality standards more closely with WHO recommendations"[58], which in turn may require further reductions of industrial emissions. Similarly, the gradual reduction of pollution is unlikely to allow the full cessation of priority hazardous substance[59] emissions to water bodies as stipulated in EU water legislation.

Large agro-industrial installations still significantly contribute to pollution across the EU, through both emissions (to air, water and soil) and the continued use of harmful substances in agro-industrial processes (including pesticides, insecticides and biocides). In 2017, these installations were responsible for over half of anthropogenic emissions to air of CO_2, SO_X, NMVOCs and the heavy metals (Cd, Hg and Pb), and were key sources of NO_X (32%) and PM_{10} (28%)[60]. This causes significant harm as evidenced by the damage costs (externalities) to public health and natural ecosystems due to emissions to air[61] reported to the E-PRTR, estimated for 2017 at 277 - 433 € billion. This represents only part of the health and environmental damages of polluting emissions by agro-industrial installations, as recognised monetisation methodologies only exist for some air pollutants and not for emissions to water or soil.

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[51] Directive 2004/107/EC relating to arsenic, cadmium, mercury, nickel, and polycyclic aromatic hydrocarbons in air, and Directive 2008/50/EC on ambient air quality and cleaner air for Europe

[52] Directive 2000/60/EC establishing a framework for Community action in the field of water policy

[53] Directive 2008/105/EC on environmental quality standards in the field of water policy

[54] Directive 2006/118/EC on the protection of groundwater against pollution and deterioration

[55] https://www.eea.europa.eu/data-and-maps/indicators/industrial-pollution-in-europe-4/assessment

[56] https://www.eea.europa.eu/publications/nec-directive-reporting-status-2019/nec-directive-reporting-status-2019

[57] WHO guidelines available at 9789240034228-eng.pdf (who.int)

[58] https://ec.europa.eu/info/law/better-regulation/have-your-say/initiatives/12677-Revision-of-EU-Ambient-Air-Quality-legislation

[59] The Water Framework Directive (2000/60/EC) and its daughter Directive 2013/39/EU

[60] Concerns EEA-33, i.e. the 33 member countries of the European Environment Agency including the EU-27 Member States, Iceland, Liechtenstein, Norway Switzerland, Turkey and UK - https://www.eea.europa.eu/data-and-maps/indicators/industrial-pollution-in-europe-3/assessment

[61] Based on value of a life year (VOLY) and value of statistical life (VSL); Schucht, et al., 2021 https://www.eionet.europa.eu/etcs/etc-atni/products/etc-atni-reports/etc-atni-report-04-2020-costs-of-air-pollution-from-european-industrial-facilities-200820132017

Member States mainly set Emission Limit Values (ELVs) in permits for individual agro-industrial installations towards the least stringent end (i.e. upper end) of the BAT-AEL ranges. Despite difficult access to permits and their complex and inhomogeneous drafting, the analysis of permits for several sectors shows[62] that between 75-85% of all emission limit values are either based on the upper end of the range or are above it. Furthermore, the IED offers flexibilities that are not always properly applied, e.g. allowing industrial waste waters to be discharged into the public collection systems even when the urban treatment water plants cannot, and do not, treat adequately such industrial pollutants. Many of these pollutants are priority hazardous substances under EU water legislation.

Member States implement IED requirements in a heterogeneous manner, including measures related to BAT conclusions. This leads to differences in granting derogations, compliance assessment and enforcement. In particular, when assessing permit compliance, Member States use diverging methods to account for measurement uncertainty thus creating discrepancies in EU-wide compliance. Even where permit ELVs are the same, diverging Member State approaches to measurement uncertainty lead to major differences in the actual emission levels. These discrepancies may reach 25% or more of the emissions of a given plant[63].

All of the above elements mean that the operation, permitting and monitoring of IED installations may be inconsistent with the objectives of the IED framework, and exhibit a lack of ambition with regard to the spirit of the law as outlined in, for example, Articles 11, 14, 15 and 18 of the existing IED. However, even where inconsistencies exist, both Member States' and operators' implementation methods can still be compliant with the present IED letter of specific articles within the law. It is for this reason that greater convergence between IED aims and the flexibilities given to all parties is required, whilst maintaining genuine reasons for taking into account technological and contextual specificities of individual installations.

The level of public access to information, participation in decision-making and access to justice with regard to permitting decisions and revisions remains an issue. Environmental NGOs complain that permit information is very difficult to access on the Internet and, even when available, it is so complex that the public cannot understand and use it. Information on emissions does not cover all relevant substances, which also makes it difficult to identify which sectors may be significant sources, e.g., of emissions of priority hazardous substances under EU water legislation, and thereby limits the capacity of the IED processes to define BATs for preventing their emission. Furthermore, the Meeting of the Parties to the Convention (Aarhus Convention MoP7) in October 2021[64] endorsed the conclusions of the Aarhus Convention Compliance Committee ha that the fact that the IED does not entitle the public to participate in reviews of permits triggered by the publication of new BAT conclusions is in breach of the EU obligations under the Convention[65]. As found out in the evaluation of the IED and recently underlined again in the 2020 Communication on improving access to justice[66], limitations also remain in access to justice including in the

[62] Assessment of BAT Conclusion Implementation in IED permits, Eunomia (2021) Draft Final Report

[63] https://circabc.europa.eu/sd/a/589a486c-1732-4e9d-abbc-a515ddf0aca0/IED-evaluation-support-study-published.pdf

[64] https://unece.org/environmental-policy/events/Aarhus_Convention_MoP7

[65] https://unece.org/fileadmin/DAM/env/pp/compliance/CC-68/ece.mp.pp.c.1.2020.8.e.pdf

[66] COM(2020) 643 final

ability of the public or environmental NGOs to challenge revisions of existing permits or to seek legal redress in case of damages.

With regard to the E-PRTR Regulation, information collected and made public is outdated and does not fully support the IED and its coherence with other policy areas, e.g. by not taking sufficiently into account priority substances under EU water legislation. The list of substances, and the reporting thresholds, for which reporting is required date from before 2006 and ignores development of emerging pollutants, e.g. PFAS[67].

These combined problems undermine the capacity of the IED and the E-PRTR Regulation to reduce environmental pressures exerted by agro-industrial installations, as well as the IED's ability to establish a level playing field at a high level of protection of health and the environment. These problems also relate to the failure to correctly apply the polluter pays principle, as identified by the European Court of Auditors[68].

Conclusions on problem and drivers

The IED and E-PRTR are less effective than they could be in terms of: ensuring prevention and reduction of pollution from agro-industrial installations, providing public access to information and participation in the permit procedure and coherence in implementation and enforcement.

Driver 1: Regulatory failure at the EU level: in particular, excessive flexibilities allowed by the IED for national authorities to set ELVs, grant derogations from BAT-AELs, and set other permit conditions, result in polluters not being required to sufficiently reduce or prevent harmful effects stemming from their operations and not paying the true costs (externalities) of their pollution, thus insufficiently implementing the "Polluter Pays Principle".

Driver 2: Imperfect information on emissions from large industrial installations, including on their environmental and health impacts, and insufficient public involvement in the permit setting process.

Driver 3: Regulatory failure at the Member State level (coherence, clarity) mean that rules on permitting conditions are not uniformly applied and enforced.

2.2. Problem area 2: Ineffective promotion of innovation

There are deficiencies in how the IED promotes new production processes, technologies and innovation. The reason for this is that BAT are inherently 'backwards looking', i.e. based on current, already established practices that are proven 'on the ground'. Emerging techniques are not taken into account when defining BAT and their performance levels. This results in BREFs that may hamper innovation deployment and slow technological progress or even "lock in" existing technologies and techniques as the norm for a decade or so, until the BREF is revised e.g. perpetuating the use of coke, rather than hydrogen, as a reducing agent to make steel.

Conclusions on problem area and drivers

The IED is not dynamic enough and does not sufficiently support the deployment of innovative processes and technologies.

[67] Perfluoroalkyl substances; see https://echa.europa.eu/hot-topics/perfluoroalkyl-chemicals-pfas

[68] https://www.eca.europa.eu/en/Pages/DocItem.aspx?did=58811#:~:text=Special%20Report%2012%2F2021%3A%20The%20Polluter%20Pays%20Principle%3A%20Inconsistent,and%20is%20a%20key%20concern%20for%20EU%20citizens.

Driver 4: Regulatory failure at the EU level in terms of backwards looking, rigid and slow processes to establish BAT[69], hindering the development and deployment of more effective innovative techniques.

2.3. Problem area 3: Insufficient contribution to resource efficiency and less toxic production

The IED has not been effective in addressing resource efficiency, circular economy and non-toxic production[70]. This is mainly because the IED only gives a clear legal status to the parts of BAT conclusions that contain ranges for setting emission limit values in permits for pollutant emissions to air and water. Other parts, such as techniques to reduce resource use and prevent waste generation, to reuse water within installations (or the use of reclaimed water for inflows)[71] or to use safer chemicals, are solely characterised as a 'reference' for setting permit conditions. Furthermore, Article 9(2) of the IED allows Member States to opt out from requirements on energy efficiency. This results in diverging interpretation by Member States of the legal status of those parts, leading to further discrepancy in implementation.

Furthermore, E-PRTR reporting is limited to emissions and does not cover, e.g., resource efficiency aspects, which are essential in contemporary EU policies.

Conclusions on problem area drivers

The IED and E-PRTR do not sufficiently promote the following: use of safer chemicals or chemical alternatives[72]; resource efficiency and Circular Economy solutions (with reference to materials, energy, waste prevention and reduction, and water use, and re-use).

Driver 5: Market/regulatory failure: the combination of (i) market prices not reflecting the environmental and health impacts of resources and hazardous substances, and (ii) the lack of clarity of the relevant IED provisions, in particular the weak status (mere reference) of the relevant parts of BAT conclusions, result in ongoing overuse of resources and hazardous substances by IED installations.

2.4. Problem area 4: Limited contribution to decarbonisation

Whilst IED installations are responsible for about 40% of total EU GHG emissions (36% out of these 40% are covered by the EU Emissions Trading System (ETS) Directive[73]), 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[74].

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[69] BAT conclusions are published after 5-6 years of data gathering and are implement in permits within 4 years. The revision of BAT conclusions may occur up to 10 years later.

[70] IED evaluation and Ricardo (2019) "IED Contribution to the circular economy"

[71] The Regulation on minimum requirements for water reuse ((EU) 2020/741) foresees the use of reclaimed water for agricultural irrigation; an evaluation of its scope is to take place in 2028 and assess in particular also reuse for industrial purposes. https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32020R0741

[72] Building on the work under the Chemicals Strategy for Sustainability (COM(2020) 667) on chemicals that are safe and sustainable by design

[73] Directive 2003/87/EC establishing a scheme for greenhouse gas emission allowance trading

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

It is important to note, however, that there is no absolute exclusion of GHGs from the IED, except the limitation on setting ELVs in permits for GHG emissions and installations falling under the scope of the ETS. Information gathering to define BAT has generally not covered GHG emissions and only a few BAT-AELs have been set for GHG emissions that are not covered by the ETS (e.g., refrigerants, methane). For example, the IED currently regulates about 5% of the total methane emissions in the EU-27.

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, since these frameworks are de facto operating in parallel, on many of the same activities and sectors, but by definition almost completely separately, it 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.

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[75], 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. The interaction between depollution and decarbonisation may have mutually-supporting or dissonant effects. 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.

[75] 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.

With regard to the E-PRTR, reporting on GHG emissions is incomplete and lacks detail. In addition, whilst the E-PRTR provides data on GHGs outside the scope of the ETS (e.g. CFCs), these emissions data are aggregated and do not distinguish the constituent compounds – each of which has a very different Global Warming Potential.

Conclusions on problem area and drivers

Currently, the IED's contribution to EU climate policy lacks coherence and is limited.

Driver 6: Sub-optimal regulation and implementation: IED design and implementation have not prioritised GHG emissions, resulting in lack of coherence and GHG emissions not being taken into account in IED and its implementation.

2.5. Problem area 5: Sectoral scope coverage is too limited

Commitments to reduce pollution in the Green Deal, as enshrined in particular in the Zero Pollution Action Plan, new Circular Economy Action Plan and in the Farm to Fork Strategy will increase the need to reduce pollutant emissions at source including those sectors not currently captured by the IED and/or the E-PRTR Regulation. Certain polluting agro-industrial activities may merit future inclusion, in the following instances: (1) where they have controlled their pollution emissions relatively less than comparable IED sectors (e.g. rearing of livestock); (2) where significant growth is expected in the sector, leading to commensurate risks of increased pollutant emissions (e.g. extraction of metals and production of batteries); or (3) where they are only regulated when associated to other activities (e.g. textile finishing and downstream ferrous metal processing activities).

These problems limit the capacity of the IED and the E-PRTR Regulation to reduce environmental pressures exerted by agro-industrial installations and establish a level playing field.

Conclusions on problem area and drivers

The IED and E-PRTR do not regulate some medium to highly polluting agro-industrial sectors, especially when taking into account future growth projections for some sectors.

Driver 7: Regulatory failure: current provisions fail to capture a significant stream of emissions leading to a market failure: polluters do not pay the true costs of the pollution they cause.

2.6. Stakeholder views

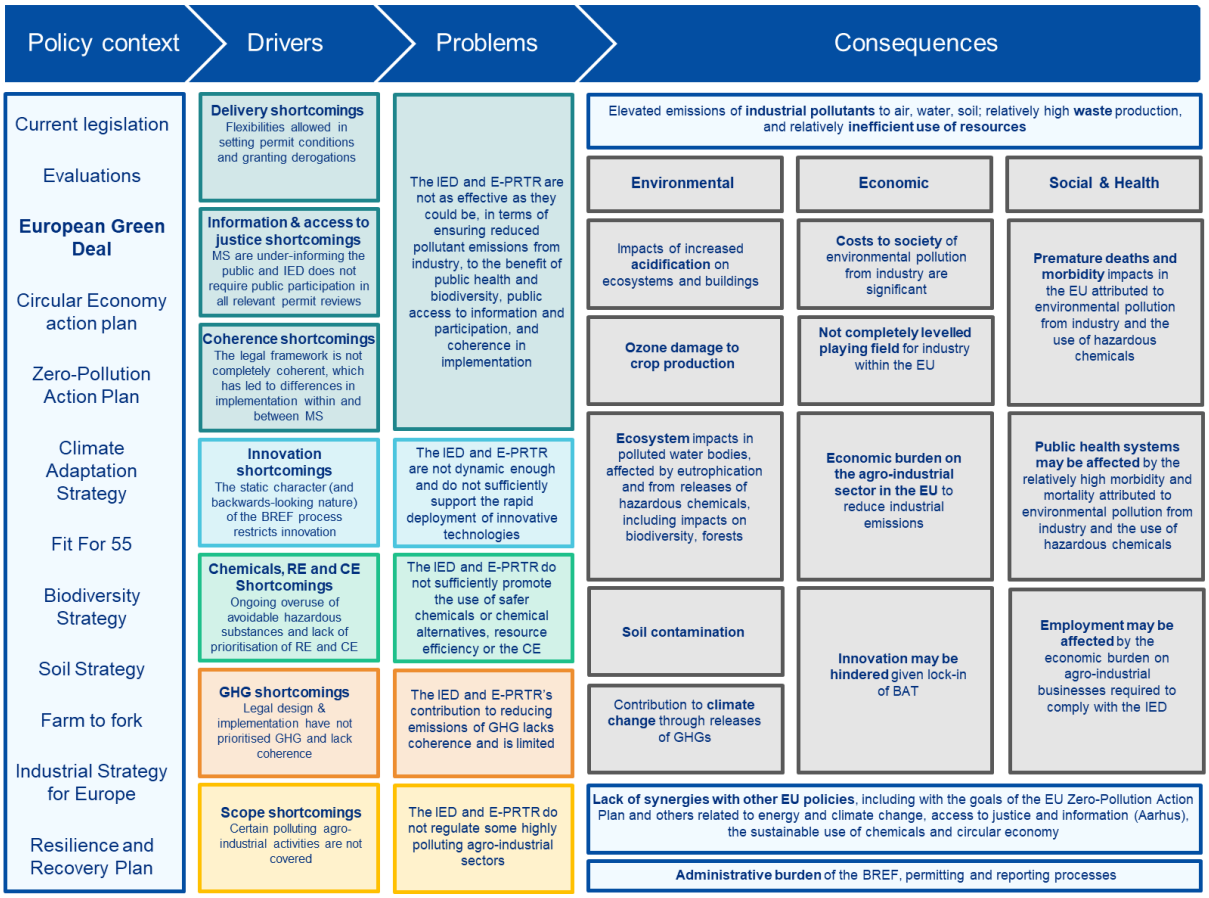
There is a similar pattern of responses from stakeholders to consultations regarding the evaluation of the current contribution of IED installations to three main policy concerns: achieving a climate-neutral economy, promoting green growth, and achieving a circular economy in the EU. Responses from environmental and civil society NGOs, backed up by EU citizens and public authorities, mostly ranked the contributions of IED installations to date as being limited whilst business associations and individual companies considered IED facilities were currently playing an important role.

Civil society and environmental NGOs consider all above-listed 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[76] and limited access to information on installations' performance levels. Interestingly, the latter is perceived by all groups as an important element to promote. Industry and business associations were rather neutral (but not negative) in recognising problem areas 3 (resource efficient and less toxic production), 4 (decarbonisation) and 5 (scope), pointing to potential additional reporting costs and risks of overlaps with the ETS. All stakeholders agree that the IED is limited in promoting innovation.

2.7. Overview of problems and drivers

Figure 1 presents the problem tree for the revision of the IED and the E-PRTR

Figure 1: The problem tree



3. WHY SHOULD THE EU ACT?

3.1. Legal basis

Articles 191, 192 and 193 of the Treaty on the Functioning of the European Union (TFEU)[77] empower the EU to act to: preserve, protect, and improve the quality of the environment;

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

[77] Treaty on the Functioning of the European Union, OJ C 326, 26/10/2012, https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A12012E%2FTXT

protect human health; contribute to the prudent and rational utilisation of natural resources; and promote measures at the international level to deal with regional or worldwide environmental problems, in particular combating climate change.

3.2. Subsidiarity: Necessity of EU action

Pollution from agro-industrial installations travels across national borders, both between Member States and across the frontiers of the Union, and pollution control cannot be sufficiently achieved by the Member States alone. Furthermore, the operation of industrial plants is intrinsically linked to the functioning of the internal market. In the absence of a common EU approach for setting environmental performance standards, the same industries would face different pollution control regulation in each Member State with the resultant risk of creating an uneven playing field, fragmenting the single market and impeding the Union's efforts in pursuing the Treaty objective of achieving a high level of environmental and health protection.

The IED's and E-PRTR's combination of centralised elements (definition of standards, publication of EU-wide data) with decentralised components (permitting of activities and validation of operators' data by national competent authorities) is consistent with carrying out at EU level only what is necessary.

3.3. Subsidiarity: Added value of EU action

The IED BAT-based system and the E-PRTR provide information used by all Member States, through a single EU level information exchange process, replacing the need for each Member State to establish national processes. Operators of plants in all Member States achieve economic efficiencies by only having to adhere to one EU-wide uniform regulatory approach. The EU system is increasingly being used by third countries, thereby promoting an international level playing field.

4. OBJECTIVES: WHAT IS TO BE ACHIEVED?

4.1. General objectives

The general objective of this initiative is to contribute in the most effective and efficient way to protect natural ecosystems and public health from the adverse effects of pollution from large agro-industrial installations; this will also enhance EU industry's resilience against the impacts of climate change. It aims to stimulate a deep agro-industrial transformation towards zero pollution through the deployment of breakthrough technologies, and thereby contribute to the achievement of the EGD objectives of reaching carbon neutrality, a non-toxic environment and a circular economy. It aims to further contribute to establishing a competitive level playing field at a high level of protection of health and the environment, including by ensuring consistency of implementation by the Member States.

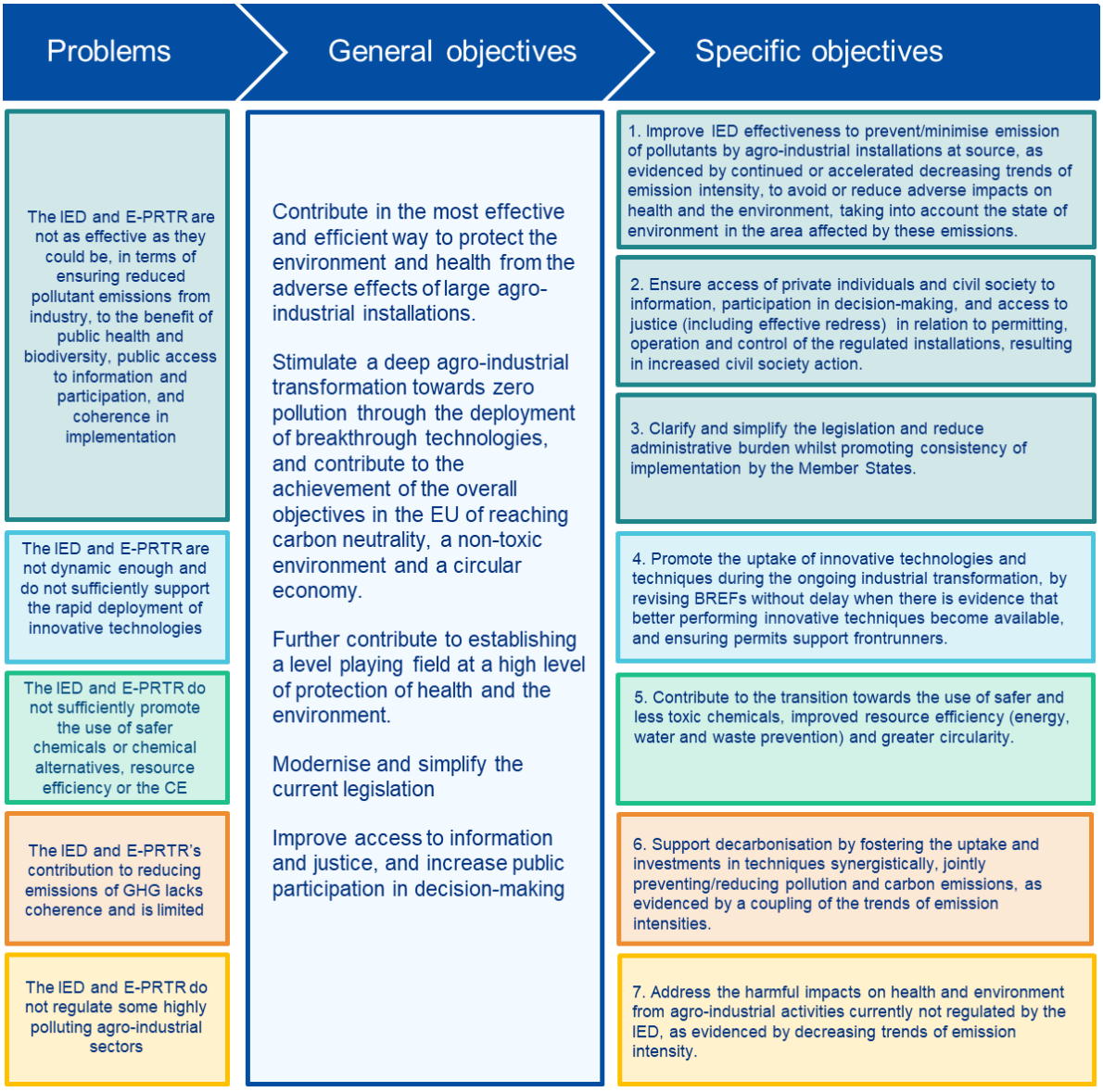
The aim is also to modernise and simplify the current legislation - where this is feasible, e.g. through digitalisation and without impairing the overall objectives whilst improving knowledge on sources of pollution. Moreover, the initiative will aim to improve access to information and justice, including effective redress, and increase public participation in decision-making.

4.2. Specific objectives

As shown in Figure 2, there are 7 specific objectives logically linked to the 5 problems and their respective drivers:

1. Improve IED effectiveness to prevent or, when impractical, minimise the emission of pollutants by agro-industrial installations at source, as evidenced by continued or accelerated decreasing trends of emission intensity, to avoid or reduce adverse impacts on health and the environment, taking into account the state of environment in the area affected by these emissions.
2. Ensure access of private individuals and civil society to information, participation in decision-making, and access to justice (including effective redress) in relation to permitting, operation and control of the regulated installations, resulting in increased civil society action.
3. Clarify and simplify the legislation and reduce administrative burden whilst promoting consistency of implementation by the Member States.
4. Promote the uptake of innovative technologies and techniques during the ongoing industrial transformation, by revising BREFs without delay when there is evidence that better performing innovative techniques become available, and ensuring permits support frontrunners.
5. Contribute to the transition towards the use of safer and less toxic chemicals, improved resource efficiency (energy, water and waste prevention) and greater circularity.
6. Support decarbonisation by fostering the uptake and investments in techniques synergistically preventing/reducing pollution and carbon emissions, as evidenced by a coupling of the trends of emission intensities.
7. Address the harmful impacts on health and environment from agro-industrial activities currently not regulated by the IED, as evidenced by decreasing trends of emission intensity.

Figure 2: Relationship between the problems and the objectives



5. WHAT ARE THE AVAILABLE POLICY OPTIONS?

5.1. What is the baseline from which options are assessed?

This section summarises the detailed description and discussion of the baseline provided in Annex 5.

The baseline implies the continuation of the existing legal framework and scope, coupled with further developments of BREFs and BAT conclusions under the information exchange mentioned in Article 13 of the IED and continued reporting of emissions under the E-PRTR Regulation.

The problems that have been identified with the implementation of the IED and the E-PRTR Regulation are assumed to remain, although their evolution would be subject to market developments and continuous efforts of the Commission to promote effective

implementation. Such measures would include: issuing guidance documents on implementation, providing platforms for discussions and exchange of best practices and encouraging voluntary improvements of the current processes. Whilst this could lead to some improvement, the impact is expected to remain marginal, given the voluntary and non-binding nature of these measures for Member States and individual business stakeholders.

The key parameters of the baseline are depicted in the following sub-sections.

Number of installations

Around 52 000 installations currently fall under the scope of the IED and, very largely (almost all), also under that of the E-PRTR Regulation (since an E-PRTR facility may comprise several IED installations). The number of IED installations remains largely static at the EU level. However, estimations based on the PRIMES model suggest that the number of IED installations could gradually increase to 65 000 by 2040. Other factors may affect the number of installations such as their consolidation due to the green transition.

Substances for which emissions are reported

Emissions are reported to the E-PRTR based on a list of 91 pollutants that has not been updated for 15 years, i.e. since 2006. Likewise, the reporting thresholds are outdated, as technological developments have enabled significant emission reductions since the thresholds were initially set to capture 90% of industrial emissions i.e. for some pollutants the current reporting is incomplete. This has significantly reduced the added value of the E-PRTR data for monitoring/evaluating various EU environmental policies, including air, soil, water, waste and chemicals.

In addition, the E-PRTR substances are not fully compatible with substance lists under other EU legislation e.g. REACH or priority hazardous substances under the Water Framework Directive.

IED influence on emission of pollutants and its cost

Continued implementation of the IED, with ELVs in permits based on BAT-AELs, is expected to lead to a further decline of emissions from IED installations over time. Past experience with some industry sectors[78] suggests that the decrease in emission intensity[79] during one BREF cycle, i.e. over an average period of 9-12 years, ranges between 35 and 70%. These reductions tend to be concentrated in the period starting a few years before the publication of the BREF until the date of entry into force of the BAT conclusions, with an average annual reduction of emissions of between 7-14%. These high overall reduction levels were observed for the first BREF cycle, and were driven by the IED's impact on levelling the playing field for installations across the EU. However, the prognosis is that reductions in emission intensity will be lower for future BREF cycles, as the installations' emission profiles will be relatively similar in the second BREF cycle (and subsequent cycles), unless transformational techniques (or processes) are identified and become eligible to qualify as BAT under the current conditions (backwards looking), causing significant differences in

[78] Estimate based on trend of emissions of the pulp and paper, cement, and glass production sectors. Evidence is not yet available for a number of other activities

[79] Emissions per unit of production

pollutant abatement performance. The potential for emission reductions remains high for rearing of pigs and poultry, as the first BAT Conclusions for this sector, adopted in 2017, introduced few BAT-AELs whilst setting clear emission monitoring requirements (representing a key source of data for the future BREF revision).

The total estimated damage costs of associated pollution will follow those trends and remain high.

Furthermore, the contribution of activities currently not covered by the IED, but nevertheless responsible for significant pollutant emissions, would remain unregulated at the EU level. Member States would be expected to gradually take measures to address this problem, but the lack of a common approach would lead to an uneven level of protection of the environment and distorted competition. The environmental pressures from activities currently not covered by the IED, like those it already currently covers, are to some extent covered by other EU more horizontal environmental legislation that does not control pollution directly at the source. The relevant existing EU legislation (e.g. Water Framework Directive, Effort Sharing Regulation, National Emission reduction Commitments (NEC) Directive) only addresses one or a limited number of impacts, for society as a whole including IED activities, and does not address the pollution in an integrated way. The candidate activities for inclusion within the IED scope are regulated to a varying extent by Member States, which does not contribute to a level playing field at EU level.

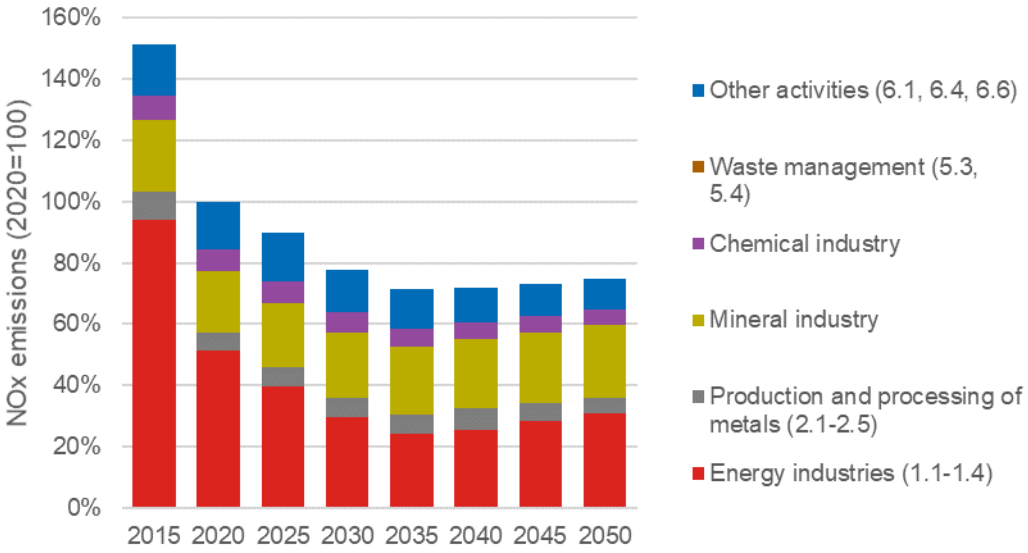
The baseline evolution of emissions of pollutants will depend strongly on the dynamics of industrial transformation.

Dynamics of industrial transformation

The New Industrial Strategy for Europe outlines the elements of the industrial transformation and, amongst them, climate policy is expected to have the main impact on emissions of pollutants. The expected evolution of the market context for the relevant agro-industrial sectors follows the projections modelled in the 'Fit for 55' (FF55) climate package as presented by the European Commission on 14 July 2021. The FF55 "MIX" model describes potential trends in decarbonisation for the various sectors, and provides a picture of how decarbonisation techniques would be developed and deployed. It is increasingly clear that emerging decarbonisation techniques will, in many cases, also deliver reductions of pollutant emissions to air, benefitting water and soil quality too.

However, as illustrated in Figure 3, whilst NO_X emission projections for the majority of the larger polluting industries covered by IED show substantial declines from 2020 through to 2035, after 2035 NO_X emissions increase again, driven primarily by the energy industries (high temperature combustion of hydrogen produces higher amounts of NO_X), suggesting the need for further longer-term policy action to have effect from the 2030s.

Figure 3: MIX scenario NO_X emissions projected by the GAINS model to 2050



Source: GAINS

The FF55 package represents the assemblage of policies for achieving the decarbonisation objectives up to 2030. The post-2030 forecasts are based on general 2050 decarbonisation policy objectives; implementing policies still remain to be agreed to meet the 2050 objective.

Three case studies in Annex 11 (cement, iron and steel and oil and gas refining sectors) illustrate how the expected industrial transformation could impact pollutant emissions, GHG emissions, the use of resources, and the future relevance of the IED and E-PRTR legal framework as well as overall other relevant EU legislation. This highlights that a number of challenges will arise:

1. A number of novel decarbonisation techniques will allow the reduction of both GHG and pollutant emissions, typically from 2030 onwards. In the absence of adequate mechanisms, BAT would likely continue to be defined in a manner that does not help driving synergistic and economically sound decarbonisation and depollution techniques, which would hence contribute to suboptimal (and possibly shorter-term) investment decisions.
2. In other cases, novel decarbonisation techniques having negative impacts on pollutant emissions may come onto the EU market. This would require BAT to be (rapidly) defined, in order to avoid adverse additional emissions of (possibly new) pollutants.
3. CCS/CCU[80] is likely to become relevant for several IED sectors, and would thus require the definition of BAT, amongst others to address potential environmental issues such as potential GHG leakage and impact on the quality of underground water. Developing a BREF for CCS/ CCU would be consistent with the current IED scope.
4. Certain sectors (e.g. oil and gas refining) are predicted to undergo profound modifications vis-à-vis their role in the value chain; they will likely redevelop new production processes adapted to these new roles. Hence, BAT will need to be defined for these novel production processes.

[80] Carbon Capture and Storage / Carbon Capture and Use

5. Most importantly, should an agro-industrial sector develop novel production processes which allow it to undergo a full/ step-change transformation, the question will arise as to whether BAT conclusions should define BAT at the level of the production processes as such. BAT conclusions may, for example, stipulate that the use of fossil fuel in certain production processes and IED sectors is no longer BAT. The implementation of such BAT conclusions would require the "deep transformation" of all installations included in that sector, and, as such, would directly drive investments in decarbonisation (and concomitant depollution) techniques. This would be similar to what was triggered by the BAT conclusions on chlor-alkali production[81] which, by stating that the mercury-cell process was not a BAT, stimulated the conversion of the whole sector to cleaner processes.

These issues will also generate new policy coherence challenges that need to be resolved regarding the ETS and the IED, and particularly to increase synergies and co-benefits of the investment cycles associated with requirements under the IED for pollution prevention and the ETS for decarbonisation.

5.2. Description of the policy options

The policy options have been constructed by selecting from a comprehensive list of more than 200 potential policy measures based on the evaluations of the existing legislation, and input from Member States and stakeholders. These measures were screened[82] to identify those that should be retained for further analysis. Annexes 12 and 13 provide the lists of measures that have been discarded, and the rationale behind their screening out from further consideration. Measures which could be taken into account without the need for changing policies or amending legislation, e.g. to improve implementation via issuing guidance and stepping up enforcement efforts, have been integrated into the baseline as they are likely to be applied in any event. Furthermore, a number of measures screened out concern the desirable update of the legal text to, e.g. as a number of recitals and articles have become obsolescent over time; these will be addressed in a codification to take place after completion of the legislative procedure on the revision.

The screening process resulted in a **list of 73 measures retained for impact assessment**: 43 concern IED, and 30 concern E-PRTR[83]. The measures are diverse, seeking to address a complex set of issues. Whilst most are relatively independent, some of them contribute to several specific objectives to at least a limited degree. Others are mainly relevant for a single objective.

Five **policy options** have been defined, which group together the individual **policy measures** retained.

The broad definition of the policy options aligned with each of the relevant problem areas, the measures they comprise and, where applicable, the alternatives, is provided below. The detailed overview of all the measures and to which policy option and sub-option they belong

[81] https://eippcb.jrc.ec.europa.eu/reference/production-chlor-alkali-0

[82] Screening (see Annex 4) was developed in accordance with Tool #17 of the Better Regulation Toolbox. The longlist of measures were assessed (or rated) against eight criteria, namely: legal feasibility, technical feasibility, stakeholder acceptability, effectiveness, efficiency, proportionality, EU value added and coherence.

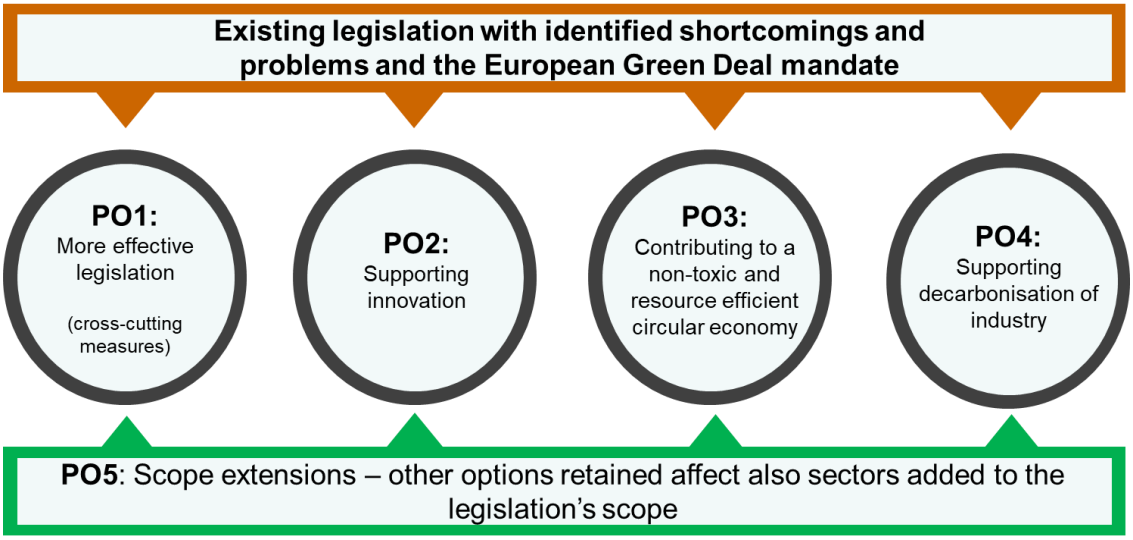
[83] Measures IED#7 and E-PRTR#7 were discarded at a late stage, with no renumbering of measures

is provided in Annex 7. Annex 2 provides further details on the stakeholder views summarised below for each option. In several cases there are contrasting views between NOGs and industrial stakeholders and Member States have intermediate views. In such cases options have been maintained for in-depth assessment.

General presentation of the policy options

Figure 4 presents how the options have been aligned to each of the five problem areas.

Figure 4: General presentation of options



PO1 brings together measures considered necessary to address the shortcomings related to problem area 1, as identified in the evaluations of the IED and the E-PRTR Regulation, as well as in the finding and recommendations of the Aarhus Compliance Committee. It presents sub-options addressing the different relevant aspects: PO1-a tackles the achievement of BAT-AELs, PO1-b seeks to homogenise implementation and enhance enforcement, PO1-c expands public access to information and access to justice, and PO1-d clarifies and simplifies existing legal requirements. Thereby, PO1 also contributes partly to resolving other problem areas. Supplementary actions, e.g., via other options and sub-options described below, will determine the actual, potentially higher, level of ambition of the initiative in each of those areas.

Policy Options **PO2** to **PO4** present options and sub-options of varying ambition that respond to the mandate given by the EGD to review EU measures to address pollution from large industrial installations, thus contributing to the zero pollution ambition whilst making such actions consistent with climate, energy and circular economy policies. This responds to each relevant problem areas:

- Problem Area 2 (ineffective promotion of innovation) is tackled by PO2-a (*frontrunners*), PO2-b (*stimulate innovation*) and PO2-c (*supporting transformation*). Whilst he main drivers of a deep transformation of industry are the carbon neutrality policies, the IED would accompany such transformation.
- Problem Area 3 (insufficient contribution to resource efficiency and less toxic production) is addressed by PO3-a *(performance levels)*, PO3-b (*Environmental Management System - EMS*), PO3-c (*symbiosis plans*), PO3-d (*pollutants list*), PO3-e

(*report resource use*), PO3-f (*tracking waste transfers*) and PO3-g (*report on products*).

- Problem Area 4 (insufficient contribution to decarbonisation) is tackled by PO4-a (*energy efficiency)*, PO4-b (*IED/ETS interface*), PO4-c (*disaggregated reporting*) and PO4-d (CO_2 *equivalent reporting*).

PO5 (sub-options a to i) aims to tackle the problem area 5. It identifies new agro-industrial activities that could be newly incorporated into the IED, based on their pollution risk profile, and insufficient coverage under other EU legislation. It also identifies where the limits of coverage of some current activities could be expanded. As shown by Figure 4, PO5 interacts with all other four policy options, since all new measures under PO1 to PO4 would have to apply to a larger number of installations and processes.

The preferred policy package described in Section 8 brings together the selected options.

5.2.1. 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[84]), into the following **4 policy sub-options** addressing the action needed to resolve a variety of issues across the two pieces of legislation.

Box 1 - 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. A*lternative* 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.

For sub-options PO1-a-achieving BAT-AELs and PO1-c-rights of the public, alternatives of varying ambition have been defined, to take account of the particular importance of, respectively, measure IED#5 (requiring the consideration of the full BAT-AEL range when

[84] Measure E-PRTR#7 was discarded at a late stage, with no renumbering of measures

setting ELVs in permits) and measure E-PRTR#2 (more granular reporting to E-PRTR in an at the more disaggregated level of the installation, rather that of the facility)**.**

Annex 7 provides detailed information on the measures included in each sub-option; Box 2 provides a short description of each measure.

Box 2: Short description of measures included in PO1
IED #1 Introduce a time limit for derogations granted under Article 15(4)
IED#2 Standardised methodology for assessing the (dis)proportionality between costs of implementation of BAT conclusions and the potential environmental benefits under Article 15(4) on derogations
IED#3 Require that indirect releases of polluting substances to water shall not lead to an increased load of pollutants in receiving waters compared to the application of BAT at installation level (Article 15(3))
IED#4 Amend Article 18 to specify the type of additional measures to be included in the permit, with a view to reducing the specific contribution of the installation to pollution, where environmental quality standards cannot be met by implementing existing BAT conclusions
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 most stringent 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 less stringent ELV within the BAT-AEL range
IED#6 Allow Member State Competent Authorities to temporarily suspend the operation of non-compliant installations in cases where non-compliance causes significant environmental degradation
IED#7 Common rules for assessing compliance with emission limit values under Chapter II of the IED
IED#8 Define penalties with due regard to the nature, gravity, extent and duration of the infringement (Article 79)
IED#9 Strengthen cooperation in cases of transboundary pollution between Member States (Article 26)
IED#10 Make Member States monitoring of the impact of Article 15(4) derogations publicly available
IED#11 Widen public participation in permitting as requested by the Aarhus Convention Committee and facilitate access to justice and redress in case of damages related to non-compliance
IED#12 Introduce a uniform, user-friendly permit summary and make them publicly available
IED#13 Information made available to the public to go on Internet and be free of charge
E-PRTR#1 Reduce the reporting thresholds for some pollutants to better meet the aim of 90% capture
E-PRTR#2 Introduce reporting at installation level
E-PRTR#3 Require operators to explicitly confirm that releases are below the reporting threshold
E-PRTR#4 Mandate the monitoring/calculation/estimation (M/C/E) hierarchy
IED#14 Clarify IED scope regarding gasification, liquefaction, pyrolysis and biogas plants
IED#15 Delete Annex II of the IED "List of polluting substances"
IED#16 Chapter II compliance assessment rules (IED#7) to take precedent over rules in other chapters
E-PRTR#5 Establish a 'sunset list' to remove pollutants that are no longer of concern
E-PRTR#6 Clarify that E-PRTR covers upstream oil and gas facilities (activity 3(a))
E-PRTR#8 Reword 5(d) landfills activity description to include flaring of vent gas
E-PRTR#9 Top-down reporting for livestock production and aquaculture

5.2.1.1. Stakeholder views on PO1

Stakeholder views are summarised across the four PO1 themes:

- **Ensuring that BAT-AELs are achieved:** NGOs are most supportive of measures tightening the implementation of BAT-AELs, with some support from public authorities, but an absence of support from industry. Competent authorities consider that any time limit to derogations should be determined at the local level. There are particularly contrasted views regarding measure IED#5 that requires Member States to use the whole BAT-AEL range rather than defaulting ELVs at the most lax end of those ranges. NGOs and Member States considered this measure would bring significant improvements with

regard to emissions to air and water, whilst Industry has indicated strong opposition to this measure and raised potential negative impacts on competitiveness. SMEs[85] called for a realistic adaption of ELVs with a range of flexibility. Industry also opposes tightening rules at source on indirect emissions to water, claiming that centralised (typically urban) waste water treatment plants can adequately treat the industrial pollutants at lower cost.

- **Homogenising and enhancing implementation and enforcement:** Member State authorities and NGOs support these measures that they consider would anticipate at least moderate improvement. Industry is not convinced that such improvements would occur. Only NGOs support strengthening transboundary cooperation through the IED. Other 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.

- **Improving and expanding the public's access to information, participation and access to justice:** Regarding public information, a large majority of environmental and civil society NGOs consider these provisions to be relatively or very important. This is consistent with NGO views in the environmental reporting fitness check where public access to the actual reporting of emissions was seen as having contributed to reducing them. Industry is less supportive and emphasised that there is a need to protect sensitive information. Furthermore, regarding E-PRTR, all stakeholder groups observed that automated Quality Assurance systems could help improve the quality of the reported data. However, most respondents - other than NGOs - considered that shorter reporting deadlines would not be feasible and would decrease data quality and increase reporting costs/ administrative burden in general. Regarding access to justice, business associations and company/business organisations have overall felt that the public access to justice functions very well for industrial activities. The opposite view is held by all NGOs, who typically state that public access to justice does not function well. Mixed views have been provided by public authorities.

- **Clarifying and simplifying existing legal requirements:** The main measures attracting positive interest from stakeholders, in particular SMEs, were those aimed at clarifying certain definitions (gasification, liquefaction and pyrolysis) and solving discrepancies in averaging periods used in the IED and BAT conclusions when setting ELVs and subsequently assessing BAT-AELs compliance.

- **The Fit for Future Platform (FFFP) Opinion on the IED:** The FFFP Opinion was submitted to the European Commission on 6.12.2021, subsequent to and separate from the Impact Assessment-related consultations that took place earlier. Many of the FFFP suggestions cover PO-1 type options, related to better implementation and effectiveness of the industrial emissions framework, e.g., improving the permit process and optimising the BREF procedure. Annex 2 contains the FFFP Opinion and information on related action taken, as tabulated in its Table A2-8 and Table A2-9.

[85] https://www.smeunited.eu/admin/storage/smeunited/20210604-final-position-ech-smeunited-zeropollution.pdf

5.2.2. Policy option 2 – Accelerating innovation

PO2 only concerns the IED. It comprises **6 individual measures** (IED#17-#22), which constitute the following **3 sub-options** aimed to improve the IED dynamism in supporting the uptake of innovative technologies/techniques:

Box 3 - PO2- Accelerating innovation
PO2-a-frontrunners (IED#17, #18): Facilitate the development and testing of emerging techniques *AND* allow more time for implementing these more innovative technologies and techniques
PO2-b-stimulate innovation (IED#19, #20):
Alternative 1 ***shorter BREFs cycle*:** Establish shorter BREF revision cycles
Alternative 2 ***INCITE***: Establish an INnovation Centre for Industrial Transformation & Emissions (INCITE) documenting innovation and recommending BREF revisions
PO2-c-supporting transformation (IED#21, 22):
Alternative 1 ***time***: allow more time to implement BATC if deep industrial transformation is required
Alternative 2 ***plans/review:*** establish a permit review obligation and require transformation plans
Alternative 3 ***plans/EMS****:* require transformation plans and integrate them in the EMS (see IED#25)

5.2.2.1. Stakeholder views on PO2

Whilst all stakeholder groups are generally in favour of measures supporting innovation, their views vary per measure and sub-option.

Stakeholders were rather neutral concerning options providing more time for innovative operators to test and deploy emerging techniques. IED operators and their trade associations, however, support such measures that provide flexibility. It is interesting to note that technology suppliers doubted this would have major impacts.

The multi-stakeholder High Level Group on Energy-Intensive Industries recommended that '*low carbon emission technologies under development should be assessed as potential emerging techniques during the BREF drawing and reviewing process'*. The alternative - 'short BREF cycles' - is not supported. Industry expressed concerns this could negatively impact investment cycles if existing installations were obliged to review their plans frequently. Member States have stressed the scarcity of human and financial resources that would be need for more frequent BREF reviews. The alternative 'INCITE' attracted support, especially from Member States, who considered this would allow the documenting and validating of evidence on innovative techniques; some suggested that the current pilot scale project (innovation observatory) should be formalised.

Industry supported the provision of more time for deep transformation, triggered by BAT conclusions, whilst pointing out that the IED is not the best tool to regulate the transition. Some Member States strongly supported the transformation plan alternative arguing this should be applied earlier than 2035.

The question was also raised as to whether the end of the 4-year period for an installation to operate in compliance with the revised BAT conclusions impedes innovation and should therefore be shortened. Input from stakeholders and experience point to the fact that this period is not excessively long for the correct performance of successive activities that require time: the reconsideration of the permit; the organisation of public participation by the competent authorities; the funding, planning and implementation of the necessary investments by the operator. Also, data gathered so far suggest that emissions start to decrease already before the end of the 4-year period.

5.2.3. Policy option 3 – A non-toxic and resource efficient circular economy

Policy option 3 comprises **12 individual measures** (4 IED#23-#26- + 8 E-PRTR#10-#17), regrouped into **7 sub-options** seeking to contribute to the use of safer and less toxic chemicals, improved resource efficiency and the circular economy, with attention also to water re-use in line with Climate Adaptation goals.

Box 4 - PO3- Contributing to a non-toxic and resource efficient circular economy
PO3-a-performance levels (IED#23, 24): Alternative 1 ***binding:*** 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) Alternative 2 ***binding and benchmarks:*** introduce both binding BAT-AEPLs AND performance benchmarks to be used in the Environmental Management System (EMS) **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

5.2.3.1. Stakeholder views on PO3

Overall, environmental NGOs were in favour of the PO3 measures proposed, especially binding BAT-AEPLs. However, industry was generally not in favour, indicating that the expected environmental benefits are small, while associated administrative and compliance costs would be significant; the water industry however supported these measures. Member States generally supported reporting mechanisms and benchmarks, giving a general preference for a resource efficiency and circular economy plan, which could be linked to reporting requirements and BREF benchmarks, rather than necessarily making BAT-AEPLs binding in the same manner as BAT-AELs (as in PO3-a). However, some Member States were also in favour of binding BAT-AEPLs wherever appropriate (PO3-a), whilst some also recognised that derogation conditions, such as those of BAT-AELs, could result disproportionately burdensome if these had to be applied to the case of binding BAT-AEPLs. Hence, a general overall preference for the second PO-3a alternative, ***binding and benchmarks***, is perceived.

Inclusion of a Chemical Management System in the EMS was seen by industry as overlapping with REACH, but environmental NGOs considered this would ensure better coherence between IED and REACH. Member States noted that some BREFs already include such systems and that this allows adaptation, according to the needs of each sector.

With regard to E-PRTR measures to collect better data on waste transfers and resource consumption (e.g., energy, water, and raw materials), public authorities, researchers, NGOs and the public were generally in favour. Industry stakeholders were less enthusiastic, citing additional burden and concerns with data confidentiality; the water industry supports more reporting regarding water use.

5.2.5. Policy option 4 – Supporting decarbonisation

Policy option 4 comprises **6 individual measures** (IED#27-#30 + E-PRTR#18 and #19), grouped into the following **4 policy sub-options,** which could contribute towards the decarbonisation of the agro-industrial activities:

Box 5 - PO4- Supporting decarbonisation of industry
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):** Alternative 1 ***review***: Plan a future review by 2028 to maximise coherence and synergies between the IED and the ETS in light of the dynamics of innovation Alternative 2 ***sunset***: introduce a sunset date on Article 9(1) Alternative 3 ***delete***: immediately delete Article 9(1) **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

5.2.5.1. Stakeholder views on PO4

From a general perspective, the multi-stakeholder High Level Group on Energy-Intensive Industries recommended in its masterplan[86] that '*The Industrial Emissions Directive permitting process should be adapted to support GHG abatement measures in energy-intensive installations throughout the transition.*'

More specifically, Member States generally consider that the IED should support decarbonisation. Environmental NGOs, including climate-specialised NGOs, vocally supported the introduction of ELVs for GHG and mandatory energy efficiency requirements in IED permits, considering these as complementary to the ETS. Industry, including SMEs[87], and a majority of Member States, considered that such an approach would create double regulation and cross-compliance problems, and risked adversely impacting the carbon market and hence effectiveness and efficiency of the ETS.

For the E-PRTR, most NGOs, and public authorities considered the disaggregated reporting of GHGs to provide considerable additional value, whereas industry representatives viewed the current reporting as sufficient.

5.2.6. Policy option 5 – Scope extensions

Policy option 5 comprises **25 individual measures** (13 IED: #31- #34[88], IED#36-IED#44 and 12 E-PRTR: #20-#31), regrouped into the following **9 sub-options** which could contribute towards addressing, as efficiently as possible, the environmental impacts of agro-industry installations currently not regulated:

[86] https://ec.europa.eu/docsroom/documents/38403

[87] https://www.smeunited.eu/admin/storage/smeunited/20210604-final-position-ech-smeunited-zeropollution.pdf

[88] Measure IED#35 was discarded at a late stage, with no renumbering of measures

Box 6 - PO-5- Industrial scope
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 farms above a threshold within the range of 50-150 LSU, expand coverage to pigs and poultry farms above a threshold within the range of 50-150 LSU *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):
Alternative ***fully:*** Revise E-PRTR activity descriptions by aligning to the Medium Combustion Plants Directive (MCPD) *AND* the Urban Waste Water Treatment Directive (UWWTD)
Alternative ***partially:*** expand the E-PRTR scope to cover (MCPs between 20 and 50 MW *AND* UWWTPs between 20 000 and 100 000 person equivalents
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

For PO5-a (*cattle and tailored permitting*), Annex 8 analyses the impacts of setting the threshold in PO5-a at 50, 100, 125, 150, 300, 450 and 600 LSU (*livestock unit*). Three criteria have been used to select the threshold to be used in the option retained for assessment: the cost benefit ratio, the degree of coverage of emissions from the sector[89], and the number of farms regulated. The cost-benefit analysis is favourable in all cases, but lower as the LSU threshold value decreases; it is higher for cattle at all LSU threshold values than for pigs and poultry[90]. In terms of number of animals and the proportion of emissions covered by the legislation, setting a threshold between 50-150 LSU would result in around 80-95% of pigs and poultry covered but only about 40-80% of cattle. Under 100 LSU, the number of farms included increases considerably, especially for cattle. Setting the threshold between 50-150 LSU for cattle, pigs and poultry farms would result in the following proportion of non-subsistence farms[91] being covered by the legislation: 18-37% of pigs farms (80-94% of animals), 15-32% of poultry farms (87-98% of animals), and 10-39% of cattle farms (40-80% of animals), with a benefits to costs ratio around 4-9 for pigs and poultry and 7-14 for cattle.

Furthermore, as such scope extension would bring a number of smaller, less complex installations under the IED, it is appropriate to design a tailored permitting system to limit compliance and administrative costs. The tailored permit that is integrated into PO5-a will build on national permitting systems, include only basic requirements, will not entail the revision of each individual permit, and will focus on a limited number of key environmental

[89] The emissions covered by the option are directly in proportion of the number of animals covered.

[90] Pigs and poultry mainly emit ammonia whilst cattle also emit considerable amounts of methane, resulting in more favorable cost benefit ratios for regulating cattle.

[91] Farms below 10 LSU are considered to be subsistence farms; they represent by far the largest number of farms and are not considered in this assessment. All numbers in this assessment concern non-subsistence farms.

issues such as the emission of methane, ammonia and nitrates. It will not include components of IED permits that have a significant administrative burden for operators, e.g. the baseline report or the EMS.

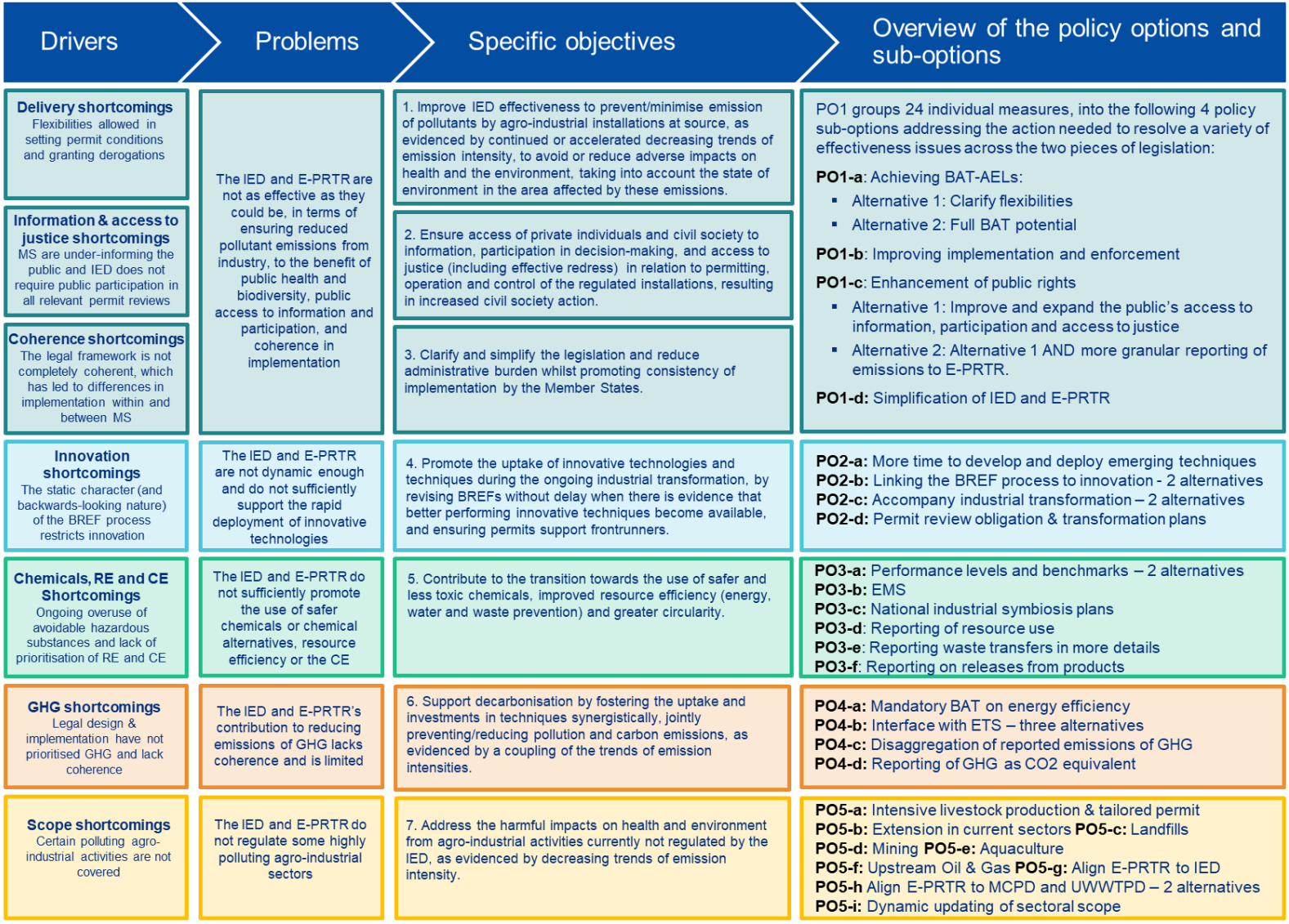
5.2.6.1. Stakeholder views on PO5

Stakeholder views are diverse: NGOs strongly support scope expansion across the board, Member States support certain scope expansions, whilst the individual sectors concerned oppose extension of IED scope to their activities, pointing to the monitoring and reporting burdens imposed on smaller installations; at the same time, opinions from the open public consultation gave information that the environmental impact of small and medium sized plants is limited compared to large plants. Moreover, industry generally considers that the agricultural sector should contribute its fair part to preventing pollutant emission.

With regard to specific sub-options:

- Concerning livestock: expansion to include part of cattle rearing seems most supported, including by a portion of the sector. Tailored permitting attracted interest across all stakeholder groups. However, NGOs and Member States consider that the approach of using thresholds may lead to avoidance of regulation, via livestock operators deciding to adjust farm sizes just below the threshold. Industry identified manure management as a problematic issue. Drinking water companies and water authorities also regularly express concerns about the increase of water treatment costs, notably related to emissions to water from rearing of livestock.
- Regarding landfills, only NGOs support the lowering of the scope threshold; Member States consider smaller landfills as not viable. However, over half of Member State respondents thought IED should define BAT for landfills falling within its scope.
- Concerning mining and quarrying: Member States' authority stakeholders note that the application of the IED to mining and quarrying activities would have the largest environmental impact of all potential new activities. Industry representatives consider that mining and quarrying activities are sufficiently covered by other EU and national law.
- Concerning aquaculture: There is significant support from Member States, as well as NGOs. Whilst recognising the environmental impacts of aquaculture, industry stakeholders consider that the inclusion of aquaculture in the scope of IED would result in economic costs unlikely to lead to significant, additional environmental improvements.
- Concerning upstream oil and gas: Stakeholders' input confirmed that upstream oil and gas operations could also be linked to environmental pressures other than methane emissions, such as water and soil pollution, indicating that impacts from upstream oil and gas industries are significant for greenhouse gases, and emissions to air, water, and soil.

Figure 5 maps these policy options with the core problem drivers, problem areas and specific objectives for the revision of the IED



6. WHAT ARE THE IMPACTS OF THE POLICY OPTIONS?

6.1. Introduction

This section presents an assessment of the impacts of all options against the baseline. This is complemented by Annex 10 that provides a series of boxes and tables summarising key information.

The vast majority of the individual measures considered in this impact assessment relate to improving existing processes, such as the drafting of BREFs and BAT conclusions and the issuing of permits to installations. The remaining measures *introduce new processes*, such as INCITE to monitor emerging innovative techniques to address decarbonisation and depollution, as well as measures addressing resource efficiency. Hence, the ultimate impacts of the measures and related sub-options will depend on a sequence of successive processes and events that may vary significantly.

Of particular importance are firstly, the levels of ambition of BAT requirements and secondly, the degree to which they are implemented effectively by the relevant industry sectors and the competent authorities who must set permit conditions taking the local and specific circumstances of the installations into account.

Therefore, the majority of the measures considered do not lend themselves to quantitative assessment of economic, environmental and social impacts. The impact assessment is in those cases qualitative, and seeks to both identify the type of potential impacts and to rate their potential magnitude.

The administrative burden for full implementation of the requirements associated with the overall proposed revisions to the IED are split between operators and Member States. A summary of the administrative burdens is provided in Annex 10, which gives details of the resources that Member States will need to dedicate in order to fully implement the IED revisions. Successful implementation of the revised IED will require Member States to fully allocate the required resources. The IED is essentially a process directive, reliant on full implementation by all parties concerned; the full impacts of any of the revision options presented may not be realised if Member States' implementation resources are jeopardised.

The vast majority of industrial installations covered by the IED do not meet the SME definition criteria[1], the exception being the scope extension under PO5-a livestock sector, where to ease the economic burden on smaller (SME) installations, a tailored permitting approach is proposed.

However, as most measures improve existing processes or establish new ones, it has been possible to monetise the administrative burden of implementing them. Detailed tables providing the administrative costs are provided in Annex 10.

Policy sub-options PO5-a to PO5-i (sectoral scope expansion) are a notable exception and their assessment could, to a degree, include quantitative elements where data was available, such as the number of installations concerned and the related environmental impacts of the

[1] SME definition: https://ec.europa.eu/growth/smes/sme-definition_en; also SWD (2021)279

activities concerned[2]. Furthermore, where assumptions could be made on what could likely be defined as BAT, potential environmental and economic impacts could be quantified. However, this has been limited by the availability of data and information and by the uncertainty of which techniques would eventually qualify as BAT. An important feature to be taken into account in the assessment of PO5 is that, by design, the IED and the BREF process ensure that the definition of EU BAT requirements and their implementation in permits remain proportionate. Annex 10 includes a table summarising the key information on these options.

As options and sub-options are packages of measures, the impact assessment builds on the assessment of the impacts of the individual measures, which is available in Annexes 8 (IED measures) and 9 (E-PRTR measures). Where some individual measures dominate in the impact assessment, the summary of the impacts of those individual measures is provided in Annex 10.

Colour coding is used to summarise the assessment of impacts referring to the direction (positive or negative) and magnitude (small or large) of any expected impacts (see Table 3).

Table 2: Coding used to present expected impacts

××××× ×××××	×××××	×	0	✓	✓✓✓✓✓	✓✓✓✓✓ ✓✓✓✓✓	U
Extremely negative	Strongly Negative	Weakly negative	"Zero": i.e. no or limited impact	Weakly positive	Strongly Positive	Extremely positive	"U": Unclear

An iterative process (see Annex 4) was used to obtain these point ratings, on a scale of "-10 to +10", with 10 crosses representing the maximum negative impacts, and 10 ticks representing the maximum positive impacts. This scale has more divisions than the more usual scale of from "-5 to +5", and was used owing to the wide disparities in the impacts, and the need to represent impacts progressively from individual measures, to amalgamating them into packaged options/sub-options. Each policy area was addressed by a dedicated independent expert team, within the consultant team supporting this impact assessment, and then the iterative process explained in Annex 4 was used to ensure coherence and consistency between the scores given by individual teams for individual measures. This allowed comparisons within and across policy areas. E-PRTR measures were rated in a similar manner, enabling IED and E-PRTR scores also to be combined; note that the majority of E-PRTR measures represent smaller, incremental positive or negative impacts, and thus often score one, occasionally two ticks or crosses, compared to larger IED measures.

This impact assessment is one of the pilot cases for the one-in-one-out principle announced by the European Commission on 1 December 2019[3]. Therefore, particular attention has been

[2] Given this exception for PO5 options, a separate summary of the key impacts and of the (quantitative) assessment results for PO5 options are provided in Annex 10.

[3] Commission working methods P(2019)2; https://ec.europa.eu/info/sites/default/files/working-methods.pdf

paid to providing comprehensive information on administrative burden. Those costs are systematically presented under each option (with totals in the tables in Section 7), whereas a more in-depth discussion can be found in Annexes 8 and 10. For ease of presentation, costs provided in this report combine one-off and recurrent costs foreseen for 20 years, which then are presented per annum. The former are linked mainly to BREF revisions, issuing, reconsidering and updating a permit, application for a derogation or exemption, drafting reports or plans. The latter involves monitoring, reporting and inspections that are an important component of a number of measures. In addition, for the preferred policy package, a detailed table on the calculation of administrative costs, broken into one-off and recurrent costs, is included in Annex 3. Underlying assumptions behind the calculations are provided in Annex 4.

6.2. Effectiveness: Analysis of Policy Option 1

See section 5.2.2 for short description of the measures; Annex 7 provides more detail.

6.2.1. Economic impacts

Administrative burden on businesses and public authorities: **PO1-effectiveness** would lead to increased administrative activity by IED operators and public authorities. This would include under **PO1-a-achieving BAT-AELs** employing more resources due to increased frequency and/or depth and breadth required in producing, collecting and reporting large and/or new amounts of data and evidence; permit reconsiderations; derogations; and enforcement activities under **PO1-b-implementation and enforcement**. **PO1-a-achieving BAT-AELs** and **PO1-c-rights of the public** would require that operators and public authorities spend marginally more resources bringing together and sharing data and information online or otherwise. However, this additional administrative burden from the IED elements would be limited. This corresponds per option to:

- **PO1-a-achieving BAT-AELs** €1.4 million per year for operators and €0.89 million per year for public administration in the Alternative 1 and €9.4 million and €7.89 million per year in the Alternative 2;
- **PO1-b-implementation and enforcement** €4.6 million/year for operators and €5.65 million/year for public administration;
- **PO1-c-rights of the public** offers two Alternatives: with or without the E-PRTR#2 introducing reporting on installation's level. This translates into €0.5 or €0.56 million of admin costs per year for operators and doesn't change for public administration: €2.9 million per year in both alternatives;
- **PO1-d- simplification** offers savings for both for operators: €11.8 million and for public administration: €0.670 million.

Once the initial time and resources investment has been made in modernising private and public administrations and maximising the use of the latest digital technologies for data management, this should reduce significantly over time. The E-PRTR elements of PO1 are estimated to bring an administrative saving of some €10.2 million per year for operators and costs of about €0.9 million per year for public authorities.

Operating costs and the conduct of businesses: **PO1-effectiveness** may also lead to an increase in and/or bring forward costs of doing business for IED operators, primarily by introducing more stringent requirements and limiting the duration and/or reducing the

likelihood of approval of derogations from implementing BAT conclusions. Here it should be recalled, that as safeguard for future competitiveness concerns, the IED definition of BAT in Article 3 requires that it is cost-effective and during the drawing up and reviews of BREFs , economic viability is evaluated at the sector level. Usually, the economic viability of a technique is established by noting that it is used in various installations across various countries, under competitive market conditions.

PO1-a-achieving BAT-AELs – alternative *full BAT* potential includes measure IED#5, encouraging the most stringent end of the BAT-AEL range for setting ELVs, which could entail significant capital (CAPEX) and operational expenditures (OPEX) for installations across the EU. Whilst the specific investments and operating costs of IED#5 could not be reliably quantified, as a partial illustration for one pollutant (NO_X) and only five IED activities[4], it was assumed that about 10% of installations would be affected by this measure, and each of these installations might be required to invest at least €0.5 million additional or earlier than in the baseline. This would bring the potential EU-wide CAPEX at €210 million per year. However, the scale of these substantive compliance costs remains uncertain, especially in this example where the measure would not mandate but encourage, where possible, a more ambitious approach (by default) - to setting ELVs.

Competitiveness: Whilst uncertain, PO1 costs are expected to remain limited compared to the overall costs and the turnover of installations in the concerned sectors. Again, as an illustration of the relative impact on costs of doing business: the Iron and Steel BAT conclusions ex-post assessment estimated total annualised compliance costs of the sector at around €134 million per year, the annual turnover at around €123 billion and its annual investment costs to be €3.9 billion. This sector includes about 300 installations and the illustrative additional investment for NOx abatement of €15 million, representing 0.1% of annual turnover. Hence, it is unlikely that IED#5 would have a significant impact on sector's global competitiveness. Furthermore, a growing number of non-EU countries around the world are implementing legislation based on the BAT concept or using EU BREFs to provide information for setting emission limit values, further mitigating any impact on international competitiveness. The OECD is organising an exchange of information between international experts on BAT-like legislation, which help to reduce differences in environmental requirements at international level.

Furthermore, the overall improved environmental performance is also expected to have operational and competitiveness benefits in the medium to longer term, for example, through increased energy efficiency. Improved air quality would improve productivity through reduced number of lost working days due to health impacts of air pollution. Finally, the IED measure IED#6 may lead to the (temporary) closure of installations, which might also affect the costs of doing business in the EU; but suspension of activities is not expected to be a common occurrence.

Level playing field: PO1-effectiveness would have a positive impact on the level playing field in the EU, primarily by homogenising and clarifying the requirements that businesses must comply with and expected enforcement practices and more effective access to justice and redress.

[4] Glass; cement, lime and magnesium; large combustion plants, pulp and paper; refining of mineral oil

6.2.2. Environmental impacts

PO1-effectiveness is expected to have positive impacts especially on air, water and soil quality with co-benefits for biodiversity and enhanced climate-resilience. These impacts would result from **PO1-a-achieving BAT-AELs** introducing shorter and/or fewer derogation (IED#1, #2) and encouraging or setting stricter environmental performance requirements (IED#3, #4, #5), and from **PO1-b-implementation and enforcement** ensuring stepped up enforcement of, and compliance with, the IED regulatory framework (IED#6, #7, #8, #9). The most significant environmental impacts are likely to result from **PO1-a-achieving BAT-AELs – *alternative full BAT potential*** specifying that the starting point for setting emission limit values should be closer or at the most stringent limit of the BAT-AEL range (IED#5). This alone is expected to generate significant health and environmental benefits from reduced emissions. Whilst these could not be reliably quantified, as a partial illustration for one pollutant, monetised health and environmental benefits accruing from estimated potential reductions of NO_X emissions from the implementation of IED#5 across five sectors range from €860 million to €2 800 million per year. Setting stricter ELVs in permits will also result in lowered pollutants emission to water and may encourage phasing out the use of substances of concern.

Indirectly, we would also expect that **PO1-c-rights of the public – alternative *public rights*** would improve the public's access to information, participation and justice (including effective redress) (IED#11, #12, #13, E-PRTR #1, #3, #4) and increase the public's leverage and ability to influence the environmental performance ambitions, which may result in marginal reductions in emissions over time, when compared to the baseline. These impacts would be slightly stronger for **PO1-c-rights of the public – alternative *public rights*** that introduces more disaggregate reporting (E-PRTR#2); this would provide policy relevant very information for allowing to better track improvements in environmental performance.

Similarly, by clarifying and simplifying legal requirements **PO1-d- simplification** would likely have indirect positive impacts on compliance with the legislation, which would result in indirect positive impacts on the natural systems and public health. There is limited available evidence, thus limiting the quantification and monetisation of these benefits.

6.2.3. Social impacts

All sub-options under **PO1-effectiveness** are unlikely to have any significant impacts on employment in the EU. On the one hand, some measures will require additional staff to carry out additional, or more intensive, administrative activities and enforcement/compliance-related, when compared to the baseline. On the other hand, overall increases in the costs of doing business and any additional, albeit limited, temporary closures of installations may put pressure on businesses to increase their operating efficiency, including by reducing the numbers of staff employed in the EU-27. There is limited evidence available to conclude on the overall net effect. There are however other social impacts that **PO1-a-achieving BAT-AELs (IED#4) and PO1-c-rights of the public** bring in, namely improving transparency on permitting and emissions monitoring, and contributing to empower the public. For example, this would allow researchers and concerned organisations and citizens to make informed criticisms and requests relating to the state of industrial emissions.

Moreover, the environmental impacts outlined earlier, especially the reduction in pollutants emission to the environment resulting from **PO1-a-achieving BAT-AELs – *alternative full***

BAT potential (IED#5), are likely to have positive impacts on public health in the EU by reducing the exposure to pollutants and the subsequent risk of disease, especially respiratory and cardiovascular diseases, and by leading to reductions in health and social care costs affecting EU citizens, residents and public authorities primarily. Health damage costs are provided in the environmental impacts section.

When costs towards business cannot be passed on through changes in prices of products sold, they may impact profitability and, therefore, employment. However, the illustrative calculation of costs potentially incurred under the most onerous measures retained (IED#5) suggest that additional costs would be of the order of magnitude of less than 0.1% of annual turnover. Hence, it is unlikely that this would perceivable impacts on consumer prices.

6.3. Accelerating innovation: Analysis of Policy Option 2 (PO2)

See section 5.2.3 for short description of the measures; Annex 7 provides more detail.

6.3.1. Economic impacts

Administrative burden on businesses and public authorities: All three PO2 options would increase administrative burden for IED operators and public authorities overall, when compared to the baseline. **PO2-a-frontrunners** would primarily include a number of installations seeking flexibility to develop and/or test innovative emerging techniques that are additional to the baseline. This is expected to entail additional administrative cost for business of around €1 million a year for business as well as of around €0.5 million a year for the competent authorities. **PO2-b-stimulate innovation** would require managing and engaging with more frequent BREF processes that may not completely substitute, but rather complement, the baseline. Both alternatives would trigger additional or more demanding permit reconsiderations and updates. Systematic short BREF cycles (IED#19) would likely cause more frequent permit reviews than BREF reviews triggered by INCITE (IED#20). This option would also yield further costs for public authorities, via the set up and operation of INCITE. Finally, **PO2-c-supporting transformation** would require that operators demonstrate to competent authorities that they need more time, as part of a derogation (IED#21), for deep transformation or that they develop Transformation Plans (IED#22) as either a part of a permit review or they will integrate Transformation Plans in the EMS. The administrative burden will depend on the number of derogation or permit review procedures they will drive; derogations would concern a limited number of operators, whilst transformation plans would be required from all operators. The central estimate is €0.6 million a year for businesses and €0.3 million for competent authorities in IED #21. Making Transformation Plans (IED#22) part of a permit review will cost €50 million for both operators and competent authorities, and integrating them in EMS (PO3-b) would limit the admin burden for operators to €20 million p.a and would relieve competent authorities from having to review the permit (there will be no permit review).

Innovation and research: **PO2-a-frontrunners, PO2-b-stimulate innovation** and **PO2-c-supporting transformation** are likely to encourage more investment in the development and testing of innovative techniques and technologies. This will bring a push for a higher uptake of low-emission techniques becoming then a benchmark for taxonomy criteria, documented in BREFs. There is limited quantified evidence, and substantial uncertainties regarding the positive impacts of these measures on innovation and research. However, as part of the

consultation activities, the majority of stakeholders also agreed that these policy sub-options may contribute, from moderately to significantly, to increasing the uptake of innovative technologies by IED operators. When these options were explored through focus groups and interviews, including of experts, it was highlighted that, for the IED to encourage operators to invest in innovative technologies, these options should be complemented by financial and policy incentives, as well as clear legal requirements. This would be, e.g. funding via Horizon Europe or the Innovation Fund, and potential avenues of incentives via pending policies currently being revised, e.g. EU Taxonomy decisions and state aid guidelines. It is also intended that the revised IED/ E-PRTR framework should serve to improve the provision of information on sustainable industry practices, mainly technologies, to then be useful in the development of future initiatives under EU funding instruments and sustainable finance policy.

Operating costs and the conduct of businesses: **PO2-c-supporting transformation** may lead to an increase in and/or bring forward costs for IED operators, especially CAPEX, by encouraging industrial transformation and favouring innovative and emerging technologies. The scale of impact will depend on the speed of technological advancement and technology cost curves. For example, CAPEX and OPEX from operators would depend upon the Transformation Plans and/or novel techniques selected to contribute to their "deep transformation". Cost that could be brought forward are linked to earlier retrofits to existing heavy industry installations; this would concern one-off investments ranging from €0.5 to €200 million per IED site, based on expert opinion. The plan would ensure alignment of investments required for pollution reduction and decarbonisation. **PO2-a-frontrunners** and **PO2-b-stimulate innovation** could have similar effects, although evidence available and expert opinion suggest that these are likely to be less significant than the impacts from PO2-c.

Competitiveness: The available evidence is unclear as to what extent **PO2-b-stimulate innovation** and **PO2-c-supporting transformation** may affect the competitiveness of businesses in a global context. The main drivers of a deep transformation of industry are the carbon neutrality policies, the IED would accompany such transformation rather than trigger it. On the one hand, these options may increase the cost of doing business relative to competitors in the global context and thus reduce the competitiveness of EU industry. On the other hand, these options could put the EU's industry in the vanguard of transformation, potentially gaining first-mover advantage and even exporting any acquired know-how or innovative techniques. In addition, a low environmental footprint and resulting compliance with criteria under the EU taxonomy for sustainable activities[5] will facilitate access to green finance putting the industry in an advantageous position on the financial market. Finally, through introducing a price on carbon in imports of specific products the carbon border adjustment mechanism[6] may mitigate some of the impacts of these options on competitiveness, where they are related with higher CO_2 emission abatement.

6.3.2. Environmental impacts

PO2-a-frontrunners, PO2-b-stimulate innovation and **PO2-c-supporting transformation** would be likely to have positive environmental impacts by encouraging innovative

[5] https://ec.europa.eu/info/business-economy-euro/banking-and-finance/sustainable-finance/eu-taxonomy-sustainable-activities_en

[6] COM(2021) 564 final

technologies with improved environmental performance. **PO2-b-stimulate innovation** and **PO2-c-supporting transformation** are likely to have more significant positive impacts on air, water and soil quality and resources, especially if INCITE (IED#20) triggering BREF reviews to take account of the availability of high maturity emerging techniques and the permit review obligation (IED#22) are taken forward. **PO2-c-supporting transformation** would also have positive impacts on the climate by encouraging GHG emission reductions from industrial sectors covered by the IED.

The scale of environmental impacts across the selected categories would depend on technological progress and the outcomes of INCITE, together with any more frequent BREF reviews and resulting actions triggered.

6.3.3. Social impacts

PO2-a-frontrunners, PO2-b-stimulate innovation and **PO2-c-supporting transformation** are unlikely to have any significant impacts on employment in the EU. On the one hand, some measures entailing additional Research and Innovation and other, possibly including administrative, activities, may require additional staff.

Moreover, environmental impacts, especially the reduction in emissions to air, are likely to have positive impacts on public health in the EU by reducing the risk of disease, especially respiratory and cardiovascular diseases, and by leading to reductions in health and social care costs across the EU.

6.4. Resource efficiency and chemicals: Analysis of Policy Option 3 (PO3)

See Section 5.2.4 for short description of the measures; Annex 7 provides more detail.

6.4.1. Economic impacts

Administrative burden on businesses and public authorities: All seven sub-options envisaged by PO3 (see Table 2) would increase administrative activity by operators and public authorities, when compared to the baseline.

PO3-a-performance levels would essentially require operators to provide measurable information as regards resource efficiency, waste prevention and circular economy performance levels (BAT-AEPLs) when seeking a new permit/updating an existing one, as well to carry out related reporting and compliance activity. BAT conclusions already include specific plans to monitor and manage resource efficiency of water, energy, and certain materials, and operators subject to these requirements will face a limited increase in admin burden compared to the baseline. Evidence collated suggests that 20-40% of IED operators may not be currently subject to any permit conditions based on BAT-AEPLs and could, therefore, be affected by an increase in their administrative costs associated with permit reconsideration and compliance/reporting activities. The measure privileging binding BAT-AEPLs (IED #23) will result in €7 million/year (around 540 EUR/year per installation) for business above the baseline and €6 million/year for administration; for the alternative allowing use of either binding BAT-AEPLs or benchmarks used in the operator's EMS (IED#24), the estimate is €16 and €12 million accordingly.

PO3-b-EMS would require operators to produce, implement and/or monitor a Resource Efficiency and Circular Economy Plan and a Chemical Management System (CMS) as part of the Environmental Management System (EMS). Both may require additional

administrative efforts by operators, to assemble the information and/or plans as well as to maintain the EMS periodically. The scale of these costs would depend on the complexity of the plans and systems, and thus their maintenance and audit requirements; this is estimated to be €46 million a year for business and €23 million for the administration.

Both **PO3-a-performance levels and PO3-b-EMS** will require additional enforcement-related activity from public authorities, including managing confidential business information issues, monitoring and enforcing binding BAT-AEPLs, and the evaluation and control of the EMS of each installation, including of how benchmarks contained in BAT conclusions are addressed in the EMS.

PO3-c-symbiosis plans would require public authorities to develop and implement a plan of action related to industrial symbiosis. The scale of this impact is unknown, although this is likely to be limited in the shorter term, and it would likely have both highlight new opportunities whilst required supplementary administrative activity from businesses.

PO3-d-pollutants list entailing the dynamic updating of the list of pollutants to be reported, would make the E-PRTR more responsive to emerging environmental issues. It would lead to a greater number of facilities having to report data for air, water and soil emissions, but this could be offset, to some extent, by the corollary 'sunset' list for removing the need to report on other pollutants. The estimated burden for operators should not exceed €3.9 million a year.

PO3-e-report resource use would require additional administrative efforts by operators (€35 million/year) to gather data on progress made in achieving enhanced resource efficiency. There are also likely to be issues regarding confidential business information, which could restrict data usefulness.

Similarly, the additional reporting requirements on waste transfers under **PO3-f-tracking waste transfers** would require significant additional administrative efforts by operators and a cautious estimations due to the numerous and complex waste flows indicate that they should not exceed €0.7 million/year. The **PO3-g-report on products** would create significant administrative impact for competent authorities required to gather information on environmental releases via products and also significantly diverge from the E-PRTR's core role. It also has the potential to overlap with other initiatives, notably the product passport under the Sustainable Products Initiative that would, contain inter alia similar information. Because of the complexity of implementing PO3-g, these costs could not be quantified.

Operating costs and the conduct of businesses: **PO3-a-performance levels** and **PO3-b-EMS** will likely require upfront CAPEX from operators (although PO3-b should already be partly established by operators in all IED sectors). These may include energy and resource efficiency measures, including water reuse, which may reduce OPEX in the longer term. Other operational measures may introduce additional costs into production processes, such as the use of less-toxic chemical alternatives as an input to production. The scale of these economic impacts would vary across Member States; however, it is expected that the net economic impact would be somewhat negative in the shorter term, and the long-term trend is hard to anticipate. It will depend in large part on how the investment costs decline due to technological advances, and the evolution of resource costs. **PO3-c-symbiosis plans** could also have impacts on operating costs and the conduct of business in the EU, although these

will depend on the nature and approach taken by national authorities to produce and implement industrial symbiosis plans.

Competitiveness: The available evidence is unclear as to what extent this option will impact competitiveness. Whilst increased operating costs may affect it negatively, increased transparency on overall performance generates confidence, facilitates cross-sectoral and cross-value chain collaboration; and would lead to efficiency-based cost reductions. Transparency will not involve sharing confidential and sensitive, which would negatively affect business.

Innovation and research: **PO3-a-performance levels, PO3-b-EMS** and **PO3-c-symbiosis plans** are likely to encourage innovation and research. An explicit binding status of BAT-AEPLs could further encourage businesses to identify innovative processes and techniques that would enable them to meet BAT-AEPLs at the lowest possible cost. This impact may be limited, however, since BAT-AEPLs are already implemented in this way in some Member States. Any increase in focus on research and innovation is likely to indirectly benefit the implementation of strategies and plans focussed on improving energy and resource efficiency, resource circularity and a transition to less toxic chemicals as these will necessarily require new or adjusted process technologies, eco-design, and cross-sectoral collaboration (e.g. industrial symbiosis). These conclusions are also supported by findings from the IED evaluation (Ricardo et al, 2020), which showed that a majority of stakeholders (>75%) somewhat or strongly agreed that the IED, BREFs and BAT conclusions stimulated innovation, with BAT conclusions being indicated as the most important driver.

Although administrative and compliance costs will marginally increase for all businesses, those costs will be more significant for SMEs. Energy and resource efficiency strategies, as well as the use of less toxic chemicals or alternatives are likely to increase operating costs at the installation level, which might pose challenges, particularly for smaller businesses with more restricted access to the technological and financial resources needed to innovate and optimise processes. However, resource efficiency is one of the main drivers of companies' competitiveness as they spend, on average, 40% of their costs on raw materials, with energy and water pushing this to 50%[7]. Therefore, improving the resource efficiency of SMEs offers enormous potential for reducing production cost and increasing productivity while, at the same time, making a significant contribution to addressing environmental and climate challenges. Furthermore, 25% of EU SMEs work on green products or services[8], and might particularly benefit from increased focus on energy, resource efficiency and safer chemicals. Improved water use and reuse practices contribute to enhanced resilience to climate change, as recognised and called for in the EU Climate Adaptation Strategy[9]. There is limited evidence available to conclude on the overall net effect.

[7] https://www.fitreach.eu/sites/default/files/editor/publications%20ENG/FFR_Finl%20report_cover%20version%202%20full.pdf

[8] Eurobarometer survey: SMEs are important for a smooth transition to a greener economy https://ec.europa.eu/commission/presscorner/detail/en/MEMO_12_218

[9] https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52021DC0082&from=EN

6.4.2. Environmental impacts

Efficient use of resources: **PO3-a-performance levels, PO3-b-EMS** and **PO3-c-symbiosis plans** would likely result in an improved and more efficient use of energy, water and materials by industry. This could in particular contribute to combating increasing water scarcity. Efficiency measures encouraged by the proposed policy options, especially **PO3-a-performance levels** and **PO3-b-EMS**, would aim to decrease consumption of resources per unit of production, both in-house and upstream or downstream in the production chain. It would also ensure that chemicals risk management is appropriately addressed in the operator's EMS[10] resulting in use of safer substances, the use of which is not prohibited under REACH, and reduced toxic emissions. The use of materials can be (i) minimised, by producing less waste per unit of production output; (ii) eliminated, referring particularly to the use of toxic and hazardous substances, which should thus reduce the hazardousness and increase the recyclability of the installation's production residues; (iii) substituted, e.g. by recycled, waste-based, or less resource intensive materials; or (iv) better managed, by implementing measures that reduce material losses over the production process. These strategies will particularly affect industrial installations of the most material-intensive production chains. The scale of these impacts would depend upon the extent to which:

- Binding BAT-AEPLs or benchmark are taken forward by IED operators, although evidence suggests that the introduction of the sub-option to introduce the possibility of both binding BAT-AEPLs and benchmark levels (IED#24) could be more effective in encouraging a more efficient use of resources when compared to the baseline.
- Resource Efficiency and Circular Economy Plans, and Chemical Management Systems (PO3-b) set by operators are ambitious, effectively implemented by operators, and monitored and enforced by competent authorities.

Waste production, generation and recycling: Energy, water and materials efficiency improvements (**PO3-a-performance levels** and **PO3-b-EMS**) will indirectly have significant positive effects, by reducing waste production and generation and/or increasing material re-use and recycling. National plans (**PO3-c-symbiosis plans**) may increase the uptake and implementation of industrial symbiosis, avoiding waste generation when compared to the baseline. There is, however, very limited evidence regarding the potential uptake of industrial symbiosis based on national plans; industrial symbiosis is rather dependent on local conditions, such as proximity of symbiosis partners and by-products that instead of becoming waste are used as a "circular" input to other processes.

Climate: Energy, water and materials efficiency measures and improvements should result in reductions in industrial GHG emissions, and support adaptation to climate change. **PO3-a-performance levels** will encourage or require BAT-AEPLs on energy use/efficiency, and/or materials consumption, with consequent reductions in environmental footprints. **PO3-b-EMS** would require Resource Efficiency and Circular Economy Plans, decreasing consumption of resources per unit of production, including fossil energy carriers, and consequent indirect

[10] The Fit for REACH project financed under Life concluded that '*Chemicals risk management is not sufficiently considered in the environmental management systems (EMAS, ISO 14000, corporate sustainability reporting, etc.)*
https://www.fitreach.eu/sites/default/files/editor/publications%20ENG/FFR_Finl%20report_cover%20version%202%20full.pdf

GHG emissions. Adopting measures oriented towards resource efficiency will likely have knock-on, positive impacts on GHG emissions, particularly on installations within the most energy-intensive production chains. **PO3-c-symbiosis plans** may also lead to direct and indirect reductions of emissions of GHGs, although with greater uncertainty, depending on national plans and local conditions.

6.4.3. Social impacts

The PO3 group of policy options are unlikely to have any significant impacts on employment in the EU. The reduction and/or recovery of waste and the use of safer chemicals could have positive social and public health impacts across the EU. These impacts have not been quantified due to limited availability of evidence.

6.5. Decarbonisation: Analysis of Policy Option 4 (PO4)

See Section 5.2.5 for short description of the measures; Annex 7 provides more detail.

6.5.1. Economic impacts

Administrative burden on businesses and public authorities: The four sub-options under PO4 would lead to increased administrative activity by IED operators and public authorities overall, when compared to the baseline, although this would be very limited for the alternative of **PO4-b-IED/ETS interface review** (IED#28). **PO4-a-energy efficiency**, as well as the more ambitious alternatives within **PO4-b-IED/ETS interface** sub-options to introduce a *sunset date* for Article 9(1) IED (IED#29) and *immediately delete* Article 9(1) (IED#30), will require adjustments to the BREF and permitting processes, which are likely to increase the frequency and duration of administrative activities for businesses and public authorities. The sub-option of *a future review* of Article 9(1) **PO4-b-IED/ETS interface (IED#28)** would have a very limited administrative burden primarily on public authorities, although operators may be consulted. The IED elements would entail an administrative burden of €100 million per year for operators and €72 million per year for public authorities, over the next 20 years. The E-PRTR elements would have an administrative burden of around €0.004 million per year for operators and about €0.006 million per year for public authorities.

Innovation and research: PO4-a-energy efficiency and alternatives within **PO4-b-IED/ETS interface (IED#29, IED#30)** will likely encourage more investment in developing and testing innovative techniques and technologies, to help operators comply in a cost-efficient manner with potentially more stringent energy efficiency and GHG requirements.

Operating costs, and the conduct of businesses: **PO4-a-energy efficiency** and alternatives within **PO4-b-IED/ETS interface** that delete Article 9(1) later (IED#29) or immediately (IED#30**)** will also lead to an increase in CAPEX and OPEX for IED operators, who would be required to increase decarbonisation and energy efficiency efforts. This, however, could lead to more carbon allowances becoming available for trading in the ETS, which could impact the carbon price and affect incentives for emissions reductions in other ETS sectors. The scale of impact will depend on whether measures are taken to address potential impacts on the carbon price, e.g. through the Market Stability Reserve, the timing of measures, derogations allowed, speed of technological advancement, technology cost curves, and energy efficiency gains achieved. Subsequent to the initial investment, operators' life cycle costs would diminish. Given the evidence available and significant uncertainties, it has not been possible to quantify these impacts. The alternative requiring a review (IED#28) would not have impacts until action has been implemented subsequently to the review

6.5.2. Environmental Impacts

PO4-a-energy efficiency would likely have positive environmental impacts, by requiring that industrial operators improve their energy efficiency. The scale of this impact will likely vary by sector, with those operating bespoke energy systems, such as iron and steel installations, likely to see less savings than those sectors using a more standard energy boiler/generator system, although the evidence is limited. This option should also have positive knock-on effects on air quality and other environmental categories via reduced fuel use and combustion.

PO4-b-IED/ETS interface could have a wide range of impacts, depending on the selected alternative: review clause (IED#28), sunset date for deletion (IED#29) or immediate deletion of Article 9(1) (IED#30). Immediate deletion would likely result in GHG emission reductions at the specific installations, depending on the stringency of GHG emission limits derived under IED. This may also have other positive environmental impacts, such as on air quality and resource use, as decarbonisation techniques may have also positive impacts on overall depollution, and hence environmental protection. Introducing a review (IED#28) or sunset (IED#29) clause into Article 9(1) may delay potential positive impacts.

Reporting hydrofluorocarbons (HFCs) and perfluorocarbons (PFCs) as individual pollutants (**PO4-c-disaggregated reporting**) would provide a better understanding of GHG contributions, since HFCs and PFCs are currently reported as total masses, even though component species have different global warming potentials. The costs of doing so should be limited, since the required data should be already available to operators. Reporting individual HFCs and PFCs via their mass of CO_2 equivalent (**PO4-d- CO2 eq. reporting**) would also give a better understanding of GHG contributions compared to the current aggregated data. This measure is likely to have limited economic impact as it involves a relatively simple additional step before reporting data to the E-PRTR.

6.5.3. Social impacts

PO4-a-energy efficiency and **PO4-b-IED/ETS interface** are unlikely to have any significant impacts on employment in the EU. Moreover, environmental impacts, especially the reduction on emissions to air, are likely to have positive impacts on public health in the EU, by reducing the risk of disease, especially respiratory disease, and leading to reductions in health and social care costs across the EU. Any reductions in GHG emissions would contribute to climate change mitigation.

6.6. Sectoral scope: Analysis of Policy Option 5 (PO5)

A short description of the measures is provided in Section 5.2.5 whilst Annex 7 provides more detail. Annex 10 includes a table summarising the key information underpinning the assessment of Policy Option 5.

6.6.1. Economic impacts

Administrative burden on businesses: All nine sub-options entailed by PO5 would lead to additional administrative activity by operators, when compared to the baseline. IED permit review and compliance with permit conditions (i.e. implementation of BAT) occur within four years of publication BAT conclusions. **PO5-a-cattle and tailored permitting** would affect the highest number of installations which could amount to an additional 84 000-330 000 cattle farms and 77 000-187 000 extra pig and poultry farms; resulting in IED covering

the largest and most polluting cattle, pigs and poultry farms existing in the EU representing 10-40% of all non-subsistence farms. These additional operators would then need to apply for permits, and implement BAT as defined in BAT conclusions, as well as address permit (re)considerations and reporting under E-PRTR. Implementation by Member States of the tailored permitting included in this sub-option results in lower administrative costs. The full IED permitting process would amount to €2182-595 million per year (depending on the specific threshold within the range of 50-150 LSU). The tailored approach reduces this by €63-232 million for farms newly brought under the IED scope; there would be additional reductions should Member States opt for also applying the tailored permit to the farms already covered by IED. The new CAP promotes more sustainable, including less polluting, farming. Hence, until the new IED introduces binding EU standards, Member States may include, in their CAP strategic plans, measures to support emissions reductions also at relevant farms. Once they will become binding EU standards, compliance with them will however be seen as compliance cost, in principle no longer eligible for EU co-funding. Given the number of potential installations per sector and despite significant uncertainties, **PO5-b-expand existing IED activities, PO5-c-landfills, PO5-d-mining, PO5-e-aquaculture** and **PO5-f-oil and gas** could yield a total administrative burden on businesses of around €43million per year, primarily from engaging with the relevant permitting processes following the publication of BAT conclusions (assuming publication of two BAT conclusions and thus two permit reviews within 20 years), as well as related monitoring and reporting requirements, and inspections. The E-PRTR elements of **PO5 (g-align to IED and h-align to other law)** are expected not to exceed €37 million per year for businesses.

Administrative burden on public authorities: All **PO5** sub-options would lead to additional administrative activity by public authorities, when compared to the baseline. These costs would be driven primarily by the BREF and permitting processes, although other related activities such as enforcement and inspections would also be relevant. **PO5-a-cattle and tailored permitting** would have the relatively highest burden on public authorities, reaching €182-595 million per year (range of 50-150 LSU) for full IED permitting of farms over a period of 20 years, including the cost of engaging with the BREF and permitting processes for hundreds of thousands of farms, and related compliance and enforcement activities. A tailored regulatory process may require significantly less input from public authorities, reducing this burden significantly by €63-232 million per year (range of 50-150 LSU). **PO5-b-expand existing IED activities, PO5-c-landfills, PO5-d-mining, PO5-e-aquaculture** and **PO5-f-oil and gas** could yield an administrative burden on public authorities of €30 million per year over a 20-year period, primarily from the relevant BREF and permitting processes, as well as carrying out inspections. PO5-h, depending on the measure will cost €5.5 million (E-PRTR#29) or €3.5 million (E-PRTR#30) for operators and €0.3 or €0.2 million for the authorities. The E-PRTR elements of **PO5** would have an administrative burden in the range of €2.8 to €3 million per year for public authorities.

Industrial installations newly brought into the scope will differ in size and activity significantly, also covering a wide range of industrial sectors, which will impact their administrative costs. These will be significantly lower for the tailored permitting system applied to farms than to other industrial installations newly brought into the scope. Furthermore, administrative cost were estimated in Annex 8 taking a fictitious baseline of zero IED-like controls being currently applied by Member States. As at least part of such

controls will in fact already be applied at national level on part of all of these installations, the estimated administrative costs are over-estimated.

Operating costs and the conduct of businesses: All options would lead to substantial compliance costs, both one-off and recurring, for operators, when compared to the baseline. **PO5-a-cattle and tailored permitting** would likely have significant compliance costs on businesses. Ricardo (2021) identified two key environmental issues for the sector of rearing of animals, that is, the reduction of emissions to air of ammonia and methane. The total EU-27 compliance costs are estimated to be around €265-812 million per year for applying abatement techniques tackling ammonia and methane emissions. Overall compliance costs are likely to be higher in practice after all BAT are defined and implemented, not just on techniques tackling ammonia and methane emissions. **PO5-b-expand existing IED activities, PO5-c-landfills, PO5-d-mining, PO5-e-aquaculture** and **PO5-f-oil and gas** would also yield substantial compliance costs. Although fewer installations would be affected by these, PO5-b through to PO5-f sub-options, these installations could have more complex and costly BAT requirements. The scale of impact on operating costs and the conduct of businesses across the sectors covered by these sub-options is highly dependent upon the stringency of the adopted BAT requirements.

While the IED typically covers large, complex and capital intensive activities, PO5-a may affect SMEs as the livestock farms tend to be more often smaller installations. A clear breakdown of farms by employment level and turnover is not available to determine the SMEs population within the sector. There is extremely limited information available on whether farms meet the SME defining criteria. It is however likely that the scope increase will capture a number of the bigger SMEs of the sector (much bigger than subsistence farms). Therefore, PO1-a implements the *tailored* permit[11] to mitigate any impacts on the SMEs, with less complex regulatory means and focussing on a smaller number of key issues**.** Furthermore, as livestock installations are not complex, typical compliance costs are significantly lower than for other IED activities.

Innovation and research: **PO5-a-cattle and tailored permitting, PO5-b-expand existing IED activities, PO5-c-landfills, PO5-d-mining, PO5-e-aquaculture,** and **PO5-f-oil and gas** are likely to encourage some innovation and research. The IED evaluation concluded that the IED, BREFs and BAT conclusions had stimulated innovation, albeit that more could be done. Hence, inclusion of these sectors may have a similar limited positive impacts on innovation and research. However, any sub-options addressing problem area 2 on innovation retained in the preferred policy package would contribute to amplifying this promotion of innovation.

Competitiveness: PO5-a-cattle and tailored permitting, PO5-b-expand existing IED activities, PO5-c-landfills, PO5-d-mining, PO5-e-aquaculture, and **PO5-f-oil and gas** will lead to an increase in the cost of the doing business in the EU and, as a result, these policy options may negatively affect competitiveness. Nevertheless, little information is available on the potential impact on competitiveness in the international meat or dairy products markets.

[11] The tailored permit will build on national permitting systems, including only basic requirements and will not entail the revision of each individual permit. It will not include components of IED permits that have a significant administrative burden for operators, e.g. the baseline report, the EMS nor the transformation plan.

Whilst production costs of newly covered farms are expected to increase to meet the requirements, available estimations suggest that compliance and administrative costs are very small compared to turnover[12], representing indicatively about €2300 for an average farm. It is therefore clear that there are significantly stronger factors affect the competitive position of the EU producers, such as disease outbreaks, costs of feed, changing consumption habits (e.g. growing sales of meat substitutes) or growing meat/diary production capacities in other parts of the world. The 2014 study[13] which looked into farmers' costs of compliance with the EU legislation concludes that any effect on competitiveness under PO1-a is likely to be overshadowed by more significant forces than environmental legislation such as movements in exchange rates, shifts in consumer demand, differences in labour costs, health and safety standards or trade policies. Moreover, the IED evaluation concluded that there was no evidence that the IED so far materially impacted the EU's competitiveness in the global context. This should hold in particular also for the expanded scope under PO1-a to f, and any potential negative impact on business competitiveness is, therefore, likely to be limited.

Level playing field: **PO5-a-cattle and tailored permitting, PO5-b-expand existing IED activities, PO5-c-landfills, PO5-d-mining, PO5-e-aquaculture,** and **PO5-f-oil and gas** will improve the level playing field EU-wide, especially in the case of PO5-a and PO5-d; experience shows that that bigger pig or poultry farms were being artificially split into smaller farms, to escape the IED regime. In addition, available evidence suggests that cattle farming has been regulated differently across the EU; as such, the introduction of cattle farming under the scope of the IED should address these differences and level the EU regulatory playing field.

6.6.2. Environmental Impacts

PO5-a-cattle and tailored permitting. In the EU, overall, the rearing of cattle, pigs and poultry emits each year 2138kt of ammonia to air. The IED already covers a number of pigs and poultry farms representing 18% of those emissions. The scope extension raises that coverage to 60-88%, as the farms newly covered by the IED emit between 950-1 548kt ammonia per year, depending on the specific LSU threshold (50-150 LSU). Conservative estimations, based on a limited set of techniques very likely to be included in BAT requirements, suggest reducing ammonia emissions by the newly regulated farms by at least 115-185kt each year, i.e. a reduction by at least 12% of their emissions[14]. These 115-185kt of ammonia emissions would represent an annual saving of 3-5% of total EU-27 ammonia emissions.

In the EU, overall, the rearing of cattle, pigs and poultry emits each year 6100kt of methane, which represents the overwhelming majority of GHG emitted by those activities[15]. The IED already covers a number of pigs and poultry farms representing 3% of those emissions. The scope extension raises that coverage to 42-77%, as the farms newly covered by the IED emit

[12] This is also confirmed by the study referred to in a next footnote (environmental compliance costs are marginal in total costs of production of diary and meat production).

[13] CRPA Assessing farmers' costs of compliance with EU legislation in the fields of the environment, animal welfare and food safety; final report. Environmental legislation included among other things the IED predecessor, the IPPC Directive (2008/1/EC).

[14] Weighted average for all three types of livestock; it is 12% for cattle, 7% for pigs and 20% for poultry.

[15] Methane represents 84% of all GHG emissions from the rearing of cattle, pigs and poultry.

2 500-4 740kt methane per year. Conservative estimations, based on a limited set of techniques very likely to be included in BAT requirements, suggest reducing methane emissions by the newly regulated farms by at least 260-460kt each year, i.e. a reduction by at least 10% of their emissions[16]. These 260-460kt of methane emissions would represent an annual saving of around 1.6-2.8% of all EU-27 agricultural sector GHG emissions. This has particular relevance for the 2030 and 2050 EU climate objectives, as methane is a GHG having a higher global warming potential (GWP)[17] in the 20-year timescale (84) than in the 100-year timescale (28 – used in the above calculations).

Using EEA damage costs, the reductions of ammonia and methane are valued at between €5 450 and €9 240 million per year. Around half these reductions estimated to accrue in France, Germany and Spain.

This sub-option is likely to have limited to weakly positive impacts on water and soil quality and resources; however, available evidence is limited, and the scale of impacts is uncertain. Water pollution from these activities is mainly related to manure land runoff and/or seepage of pollutants to surface water or groundwater (organic matter, nutrients, pesticides).

PO5-b-expand existing IED activities. The activities regulated under this sub-option may contribute to improving air quality, albeit this is expected to be significantly lower than PO5-a. This sub-option is likely to have limited to weakly positive impacts on water and soil quality and resources. Some activities under this sub-option consume large quantities of water (e.g. cold rolling of steel), and others such as textile finishing in particular, can lead to polluted water being discharged. Battery gigafactories that will be constructed will comprise energy-intensive processes and entail a number of complex manufacturing procedures using hazardous substances, potentially leading to impacts to air, water (use and quality) and waste generation. In addition to these impacts, it is expected that the BAT conclusions for these activities could be effective in addressing the use of resources, chemicals and in accident prevention (e.g. through an EMS). This sub-option may also contribute to reducing GHG emissions, albeit significantly less than PO5-a. Evidence on the potential reduction of GHG emissions of activities has been somewhat limited and, therefore, it has not been possible to further quantify these impacts.

PO5-c-landfills. Landfill installations contribute to 1.3% of total NMVOC from all IED industry sectors, 1.9% of ammonia totals, and 1.4% of SO_X totals, part of which can be abated as a result of the BREF and permitting processes. This sub-option is likely to have limited to weakly positive impacts on water and soil quality and resources. In particular this sub-option could further improve the prevention or reduction of water pollution from leachate ending up in groundwater and/or surface water. However, available evidence is limited, and the scale of impacts is uncertain. This sub-option may also contribute to reducing GHG

[16] Weighted average for cattle and pigs; it is 8% for cattle and 37% for pigs. This is a conservative assessment as significantly higher methane emission reduction potential is reported in some publications. Detailed assessment of specific feeding techniques is required to validate such potential. This would take place as part of the preparation of the BAT requirements for these activities.

[17] GWP indicates the effectiveness of a substance to absorb thermal infrared radiation relative to CO_2. On a 100-year timescale, methane has 28 times greater GWP than CO_2 and is 84 times more potent on a 20-year timescale. F-gases, other powerful GHGs, have a GWP that can be thousands of times higher than that of CO_2

emissions, albeit significantly less than PO5-a. Evidence on the potential reduction of GHG emissions of activities has been somewhat limited and therefore, could not be quantified.

PO5-d-mining. Minerals extraction activities may lead to substantial emissions of PM_{10}, equivalent to around 4.4% of total industrial emissions covered by the IED (E-PRTR data). Therefore, this sub-option is likely to have a positive impact on air quality, though further work is needed to ascertain the extent to which dust suppression techniques are already deployed in the non-energy minerals extractive industry and associated potentials for further reductions. PO5-d will likely lead to weakly positive or positive impacts on water pollution, depending on the subsector, as different extracted materials can lead to different impacts on the water quality and the quantity used. Land is also affected by extractive activities, with land use change practices potentially contributing to a loss of soil functions and of biodiversity. This sub-option may also contribute to reducing GHG emissions, albeit significantly less than PO5-a. Evidence on the potential reduction of GHG has been limited and, therefore, could not be quantified.

PO5-e-aquaculture is unlikely to have any significant impact on air quality. PO5-e is likely to have weakly positive impact on water quality and resources. The main environmental issue caused by aquaculture which falls within the scope of the IED is nutrient loading, caused by excessive release of nitrogen and phosphorus into the natural environment. Nutrient releases could lead to changes in water chemistry, leading to eutrophication within water bodies. Including aquaculture under the scope of the IED could be equivalent to regulating an additional 3% of total industry releases of nitrogen and approximately 5% of total industry releases of phosphorus for the industry sectors reporting under the E-PRTR (data from 2018). Aquaculture however also contributes to other environmental issues that are not typically regulated by the IED, including pharmaceuticals contributing to antibiotic resistance, damaging wild fish populations by reducing genetic diversity, introduction of invasive species, and, finally, diseases with potential impacts on biodiversity. This sub-option is unlikely to have significant climate impacts.

PO5-f-upstream oil and gas installations contribute to methane emissions, with fugitive emissions from these installations accounting for 54% of the emissions in the energy sector. Upstream oil and gas installations appear to contribute around 0.75% of NOx emissions and 1.75% of NMVOC covered by the IED. This sub-option is likely to have limited to weakly positive impacts on water and soil quality and resources; however, available evidence is limited, and the scale of impacts is uncertain.

Sub-options PO5-g (align E-PRTR to IED) and PO5-h (align E-PRTR to other law) ensure that the coherence between the E-PRTR Regulation and the IED, as well as other instruments, is enhanced. These sub-options can have an indirect impact on the environment through for example enabling a better comparison of performance of activities across the EU as well as a greater engagement of citizens in environmental decision-making.

PO5-i-watch mechanism. By monitoring emerging concerns related to emissions from agro-industrial installations and including relevant activities within the scope of the IED and/or the E-PRTR, this sub-option has the potential to enable an increased scope coverage over time and hence further emission reductions.

6.6.3. Social impacts

PO5-a-cattle and tailored permitting, PO5-b-expand existing IED activities, PO5-c-landfills, PO5-d-mining, PO5-e-aquaculture, PO5-f-oil and gas and PO5-i are likely to have mixed effects on employment in the EU. Net impacts on employment are unclear. When costs towards business cannot be passed on through changes in prices of products sold, they may impact profitability and, therefore, employment. However, the costs incurred by farms newly brought into the scope of the IED are very limited, estimated at €2300 for an average farm, which would be unlikely to affect consumer prices.

Importantly, environmental impacts, especially the reduction on emissions to air, are likely to have positive impacts on public health in the EU, by reducing the risk of disease, especially respiratory and cardiovascular, and leading to reductions in health and social care costs across the EU. Significant benefits have been monetised for **PO5-a-cattle and tailored permitting**, as a result of air quality improvements from implementing a tailored permitting system for livestock farms.

7. HOW DO THE OPTIONS COMPARE?

This section compares the options per problem area. It seeks to highlight the key aspects of the impact assessment relevant for supporting decision-making on the choice of options and sub-options to include in the preferred package. In particular, it identifies which sub-options have a favourable cost-benefit profile. Furthermore, where sub-options include alternatives, their impacts are compared. The sub-options retained for inclusion in the preferred policy package are presented at the end of the section concerning each problem area.

7.1. Effectiveness

7.1.1. Comparison of sub-options

PO1 comprises four sub-options that can all be combined. PO1-a and PO1-c each include two alternatives. Table 3 compares the impacts of these sub-options.

Table 3: Summary of impacts for PO1-a to PO1-d

Policy option	Main impacts			Admin. costs €million/y	Key aspects
	Econ.	Env.	Social		
PO1-a achieving BAT-AELs Alternative ***clarify flexibilities***	×	✓✓	O	Business 1.4 Public authorities 0.89	Clarifies the limits of flexibilities to ensure more consistent implementation by Member States and contributes to levelling the playing field at a high level of protection.
PO1-a achieving BAT-AELs Alternative ***full BAT potential***	××	✓✓✓✓	O	Business 9.4 Public authorities 7.89	Clarifies the limits of flexibilities to ensure more consistent implementation by Member States. Implements better the polluter pays principle, in line with the recommendations of the European Court of Auditors Contributes to levelling the playing field at a high level of protection.
PO1-b implementation and enforcement	×	✓✓	×	Business 4.6 Public	Promotes better implementation and enforcement, also through better functioning, penalty and damage redress systems.

Policy option	Main impacts			Admin. costs €million/y	Key aspects
	Econ.	Env.	Social		
				administration 5.65	
PO1-c rights of the public Alternative ***public rights***	×	✓	O	Business 0.5 Public administration 2.9	Ensures compliance with, and better implementation of, the EU's international obligations under the Aarhus Convention and Kyiv Protocol.
PO1-c rights of the public Alternative ***enhanced public rights***	×	✓	O	Business 0.56 Public administration 2.9	Ensures compliance with, and better implementation of, the EU's international obligations under the Aarhus Convention and Kyiv Protocol. Ensures better coherence between the closely-related IED and E-PRTR Regulation, and related data.
PO1-d simplification	✓	O/✓	O	Business -11.8 Public administration -0.670	Clarifies provisions that stakeholders have flagged as problematic. Reduces administrative burden, in particular of farms.

Overall, benefits are likely to outweigh costs for all sub-options, in particular:

PO1-a-achieving BAT-AELs-*full BAT potential* is the most significant sub-option as it contains measure IED#5 (requiring setting stricter ELVs within the BAT-AEL range). It is expected to generate significant health benefits. Whilst these could not be reliably quantified, as a partial illustration, potential reductions of NO_X emissions from the implementation of IED#5 across five sectors were monetised to range from €860 million and €2 800 million per year while the corresponding CAPEX was estimated at €210 million per year.

PO1-b implementation and enforcement will promote more consistent and proportionate Member States approaches and thereby promote a more level playing field and reduce any territorial divergence of environmental performance of industry across Member States.

PO1-c rights of the public will significantly empower the public through eased access to information and access to justice, and enhanced participation in permitting processes. The harmonised digital permit summary will solve serious problems in accessing information on permit provisions, such as emission limit values, which will also facilitate monitoring of compliance at all levels of government.

PO1-d simplification introduces simplifications identified as needed by Member States and stakeholders. A codification after adoption of the revised act will allow eliminating provisions that have become obsolete.

7.1.2. Retained sub-options

Table 4 lists the sub-options addressing the effectiveness of the legislation retained in the preferred policy package. It also summarises the broad rationale for selecting or discarding sub-options. Retained sub-options/alternatives appear in bold.

Table 4: Sub-options included in and discarded from the preferred policy package

2- Supporting innovation	
PO1-a achieving BAT-AELs *Sub-option clarify flexibilities (discarded)* ***Alternative full BAT potential***	Clarifies the limits of flexibilities to ensure more consistent implementation by Member States. Sub-option *full BAT potential* implements better the polluter pays principle than sub-option *clarify flexibilities*, resulting in significantly higher environmental and health benefits, in line with the recommendations of the European Court of Auditors. Contributes to levelling the playing field at a high level of protection.
PO1-b implementation and enforcement	Promotes better implementation and enforcement, also through better functioning, penalty and damage redress systems.
PO1-c-supporting transformation *Alternative public rights (discarded)* ***Alternative enhanced public rights***	Ensures compliance with, and better implementation of, the EU's international obligations under the Aarhus Convention and Kyiv Protocol. Ensures better coherence between the closely-related IED and E-PRTR Regulation than sub-option *public rights*.
PO1-d simplification	Clarifies provisions that stakeholders have flagged as problematic. Reduces administrative burden, in particular for farms.

7.2. Innovation

7.2.1. Comparison of sub-options

PO2 comprises three options that can all be combined. PO2-b and PO2-c include two alternatives. Table 5 compares the impacts of the sub-options.

Table 5: Summary of impacts for PO2-a, PO2-b, and PO2-c

Policy option	**Main impacts**			**Admin. costs €million/y**	**Other key aspects**
	Econ.	**Env.**	**Social**		
PO2-a-frontrunners More time to develop and deploy emerging techniques	×	✓✓	O/ U	Business 1 Public authorities 0.5	Supports front-runners. Accelerates innovation by creating better conditions for deploying emerging techniques. Avoids investments in traditionally determined BAT when Emerging Techniques are expected to be available in short to mid-term.
PO2-b stimulate innovation Alternative 1: shorter BREF cycles (***shorter BREF cycles***)	×	✓	O/ U	Business 3 Public authorities 5	Short BREF cycles would require substantial increase of resources dedicated to BREF reviews by Member States, stakeholders and the Commission. Frequent updates would create too short or even overlapping investment cycles, negatively affecting economic costs and efficiency of policy as emphasised by Member States and industrial stakeholders.
PO2-b-accelerate innovation Alternative 2:	×	✓✓✓	O/✓	Business 3	Enables continuous monitoring of IED-relevant innovative techniques at EU and international level.

Policy option	Main impacts			Admin. costs €million/y	Other key aspects
	Econ.	Env.	Social		
INnovation Centre for Industrial Transformation & Emissions (***INCITE***)				Public authorities 4	Informs the European Commission on the best timing/prioritisation of BREFs reviews to harness innovation and accelerate transition to clean and decarbonised production.
PO2-c-transformation Alternative 1: more time to implement deep transformation BAT (***plans***)	×	✓	O/✓	Business 0.6 Public authorities 0.3	The moment of technological readiness for deep transformation is unknown and will vary across sectors and installations and requires case by case planning. Concerns only the sectors where a significant process change has been qualified as BAT.
PO2-c-transformation Alternative 2: Permit review & Transformation Plans ***(review)***	××	✓✓✓	O/✓	Business 50 Public authorities 50	Makes the perspective of transformation (depollution and decarbonisation, in line with 2050 targets) concrete for all operators and competent authorities via an organised case-by-case approach. Promotes predictability for all operators and competent authorities regarding upcoming required transformations.
PO2-c-transformation Alternative 3: **integrating** Transformation Plans in EMS	×	✓✓✓	O/✓	Business 20 Public authorities 0	Similar to the Alternative 2 but achieved at lower costs.

Overall, benefits are likely to outweigh costs. In particular:

- **PO2-a-frontrunners:** The overall scale of benefits is likely to be relatively small, albeit nevertheless beneficial and having particularly importance for the frontrunners concerned, to encourage the testing and uptake of emerging technologies, especially when coupled with other existing R&I incentives and available funding.
- **PO2-b-stimulate innovation:** The benefits of the alternative measures, **shorter BREF cycles (Alt 1 - IED#21)** or establishing **INCITE (Alt.2 – IED#22)**, are likely to outweigh costs. However, INCITE is expected to result in a more effective and efficient intervention, especially as it would be designed to monitor sectors and update BAT Conclusions and/or trigger BREF reviews, rather than following a shorter yet periodic cycle that substitutes or complements the existing BREF process. The magnitude of costs and benefits associated with INCITE is uncertain and depends on the output of INCITE's work, as well as its future-oriented ability to efficiently encourage and/or trigger stricter environmental requirements in as many installations as possible.

- **PO2-c-supporting transformation:** Similarly, the benefits of the alternatives, allowing more time to implement BAT conclusions where deep transformation is required **(IED#21)** or Transformation Plans **(IED#22)**, are likely to outweigh costs. The IED#22 is likely to gain more traction with IED operators, as it should improve the collective understanding of all IED industry sectors' transformation needs and overall preparedness for industry to accelerate implementation and increase transparency and provide confidence that specific actions will be taken forward by industry. Within the IED#22, the alternative to integrate Transformation Plans in EMS allows for achieving those objectives at lower costs than the permit review alternative.

7.2.2. Retained sub-options

Table 6 lists the sub-options supporting innovation retained in the preferred policy package. It also summarises the broad rationale for selecting or discarding sub-options. Retained sub-options/alternatives appear in bold.

Table 6: Sub-options included in and discarded from the preferred policy package

2- Supporting innovation	
PO2-a-frontrunners	Lifts obstacles for testing and deploying more environmentally effective emerging techniques.
PO2-b-accelerate innovation *Alternative shorter BREF cycles (discarded)* ***Alternative INCITE***	Creates a permanent mechanism, *the INnovation Centre for Industrial Transformation & Emissions (INCITE)*, to monitor innovation and trigger the review of BREFs when emerging techniques reach a high level of maturity. By contrast, shorter BREF cycles would be costly and cumbersome to implement and would not be sufficiently flexible to adapt to the dynamics of innovation.
PO2-c-supporting transformation *Alternative time (discarded)* *Alternative plans/review (discarded)* ***Alternative plans/EMS***	The vast majority of IED operators will need to fundamentally transform their installations in response to the challenge of global warming. *Transformation plans* develop by 2030 meet this need and allow better predictability for operators and competent authorities. On the other hand, introducing *more time* for transformation required by BAT conclusions would only concern a limited number of operators acting upon their publication. Under two alternatives for developing Transformation Plans, the less costly was chosen.

7.3. Efficient use of resources and use of less toxic chemicals

7.3.1. Comparison of sub-options

PO3 comprises seven sub-options that can all be combined. PO3-a includes two alternatives. Table 7 compares the impacts of the sub-options.

Table 7: Summary of impacts for PO3-a to PO3-g

Policy Option	Main impacts			Admin. Costs €million/y	Other key aspects
	Econ.	Env.	Social		
PO3-a Alternative 1: Only binding performance levels (***binding***)	×	✓	O/U	Business 7 Public authorities 6	Setting at EU level meaningful binding BAT associated environmental performance levels (BAT-AEPLs) is only possible for activities that are highly homogenous across the EU. Industrial stakeholders emphasised that this could be economically inefficient.
PO3-a Alternative 2: Binding	×	✓✓	O/ U	Business 16	Enables BREF TWGs to address both activities that are homogeneous across the EU (binding levels) and activities that vary

Policy Option	Main impacts			Admin. Costs €million/y	Other key aspects
	Econ.	Env.	Social		
performance levels and benchmarks (***binding and benchmarks***)				Public authorities 12	depending on local conditions or installation specificities (benchmarks). Although the benchmarks are not binding, operators will have the obligation to monitor, analyse and report the concerned parameters.
PO3-b Environmental management system (EMS)	×	✓✓	O/U	Business 46 Public authorities 23	Provides a transparent instrument to secure implementation of parts of BAT conclusions that Member States struggle to incorporate in permit conditions. Builds on the already required EMS under IED, thereby limiting the additional administrative burden suggested by industrial stakeholders. Supports the proposed Energy Efficiency Directive by ensuring that relevant audits and plans required by the EED and integrated into the EMS are controlled by the IED competent authorities, and actions monitored. Supports chemicals policy in promoting use of less toxic substances. Flexibility of EMS allows adaptation of requirements to the needs of individual installations.
PO3-c National industrial symbiosis plans	U/×	U/✓	O/U	0	Industrial symbiosis requires action at the local level where supporting partnerships between businesses can take place. This limits the potential effectiveness of national plans. However, action under the baseline to include in BREFs information on industrial symbiosis opportunities may support such local action
PO3-d Dynamically updating the list of pollutants to be reported	×	✓	O	Business 3.9 Public authorities 0.3	Ensures continuous relevance of the E-PRTR, which can then be responsive to information needs regarding emerging (water) priority substances and other pollutants of concern.
PO3-e Reporting of resource use	×	✓	O	Business 35 Public authorities 0.03	Provides a more holistic picture of the environmental impacts of industrial activities and information supporting circular economy aspirations.
PO3-f Reporting waste transfers in more detail	××	✓	O	Business 0.6 Public authorities 0.03	The most important transboundary waste transfers are tracked under other EU law (waste shipment regulation). Tracking all intra-EU waste transfers between all operators would be even more complex.
PO3-g Reporting on releases from products	××	✓	O	Not assessed	Other EU initiatives may be more effective and efficient in making information on products available to the public, in particular product passports that are being considered under the Sustainable Products Initiative.

Overall, benefits are likely to outweigh costs for PO3-a and PO3-b, PO3-d and PO3-e. Doubts remain about the following measures: the introduction of national symbiosis plan requirements via the IED (PO3-c), more detailed reporting of waste transfers (PO3-f) and reporting on products (PO3-g). In more detail:

- **PO3-a-performance levels:** The benefits of the alternative measures, clarifying explicitly binding BAT-AEPLs **(IED#23)** or for explicitly binding BAT-AEPLs and setting benchmark levels for inclusion in EMS **(IED#24)**, are likely to outweigh costs. More flexibility for the TWG is provided by the latter option (**IED#24**) that would likely result in a more efficient and practical approach when compared to the "binding" option put forward by measure (**IED#23**). The scale of the benefits, however, would depend on the uptake of the binding BAT-AEPL and/or benchmark-setting options when compared to the baseline.
- **PO3-b-EMS:** The benefits that may be accrued from introducing Resource and Energy Efficiency Plans and Chemical Management Systems via the EMS could be significant, especially in improving energy and resource efficiency, and reducing waste and industrial sectors' overall carbon footprint. These options would entail economic costs for operators and public authorities, but these are expected to be comparatively much lower in magnitude and they can be mitigated to some extent by promoting digital solutions, and there will be reduced cost of resources thanks to reduced use of resources and energy. The scale of these costs and benefits would depend upon the ambition and effective implementation, monitoring and enforcement of the plans outlined as part of the EMS.
- **PO3-c-symbiosis plans:** The evidence remains uncertain regarding technical feasibility, and whether benefits would outweigh the costs of requiring Member States to develop and implement national symbiosis plans, especially via the IED. In particular, the effectiveness of this measure is very uncertain. However, action under the baseline to include in BREFs information on industrial symbiosis opportunities may support such local action.
- **PO3-d-pollutants list:** Introducing a mechanism, most likely a delegated act, for dynamically updating the E-PRTR pollutant list would have economic costs for operators, as it will lead to a greater number of facilities having to monitor/assess/report data for air and water emissions. This would partly be offset by synergies and avoided costs related to monitoring efforts for surface water pollutants under EU water legislation and reduced need for reporting the same data under various instruments, as well as promotion of digital solutions. Significant benefits would also accrue via better aligning the E-PRTR with up-to-date information needs, thus better supporting associated policies such as REACH and EU water legislation.
- **PO3-e-report resource use:** Adding requirements, for operators to report their use of energy, water and raw materials would have significant economic costs for operators since the reporting obligation could apply to every E-PRTR facility. This extra cost is particularly marked for the use of raw materials, since data gathering will depend on a number of factors, such as the types of products and processes. The environmental benefits are slightly positive, as it may enable benchmarking of the environmental performance of different industrial activities. However, this may be compromised by data sharing restrictions stemming from business confidentiality issues.
- **PO3-f-tracking waste transfers:** The more detailed reporting of waste transfers within between installations in a Member State would have significant economic costs for operators, since reporting obligation would apply to a large number of E-PRTR facilities.

Benefits: a better understanding of waste flows and improved corporate accountability on waste management.

- **PO3-g report on products:** Gathering information on products in the E-PRTR would not be technically feasible due to the diverse and complex nature of industrial products, and would mean a significant divergence from the E-PRTR's core role, which would likely be better delivered by the Commission's Sustainable Products Initiative and its concept of a product passport.

7.3.2. Retained sub-options

Table 8 lists the sub-options contributing to a non-toxic and resource efficient circular economy retained in the preferred policy package. It also summarises the broad rationale for selecting or discarding sub-options. Retained sub-options/alternatives appear in bold.

Table 8: Sub-options included in and discarded from the preferred policy package

3- Contributing to a non-toxic and resource efficient circular economy	
PO3-a-performance levels *Alternative binding (discarded)* ***Alternative binding and benchmarks***	It will be possible to set binding resource efficiency performance levels only in a few cases where industrial processes are highly homogeny across the EU and the performance is directly related to well-defined techniques. Non-binding benchmarks will give valuable information to all relevant operators and competent authorities on the potential for improving resource efficiency performance also in cases where the processes are not so homogenous across the EU or the performance depends highly on local circumstances and technical characteristics of the installations. Therefore, both binding levels and non-binding benchmarks should be available in BREFs, as appropriate. Benchmarks would be particularly efficient when combined with option PO3-b-EMS.
PO3-b-EMS	Strengthening the role of the already required EMS clarifies the legal status of BAT conclusions. It provides a means of implementation for those conclusions that require adaptation to the circumstances of individual installations, e.g. conclusions including resource efficiency benchmarks and a list of measures to be considered by operators to reach those benchmarks.
PO3-c-symbiosis plans (discarded)	National plans are not the right level of intervention for promoting industrial symbiosis, which rather requires local action tailored to the specificities of businesses and markets. However, action under the baseline to include in BREFs information on industrial symbiosis opportunities may support such local action.
PO3-d-pollutants list	Allows E-PRTR to better take into account substances of emerging concern. Thereby enhances coherence within relevant environmental polices (air, water, soil, chemicals).
PO3-e-report resource use	Enables the benchmarking of different industrial activities.
PO3-f-tracking waste transfers (discarded)	Reporting more detail on waste transfers between installations (both within and between Member States) is unlikely to provide reliable data and would have high administrative costs.
PO3-g-report on products (discarded)	Gathering information on products in the E-PRTR would not be technically feasible. The EU's Sustainable Products Initiative will better address public information on environmental characteristics of products.

7.4. Decarbonisation

7.4.1. Comparison of sub-options

PO4 comprises four sub-options that can all be combined. PO4-b includes three alternatives. Table 9 compares the impacts of these sub-options.

Table 9: Summary of impacts for PO4-a to PO4-d

Policy option	Main impacts			Admin. costs €million/y	Key aspects
	Econ.	Env.	Social		
PO4-a Inclusion of mandatory binding conditions on energy efficiency in the permits	×	✓✓	O/U	Business 29 Public authorities 21	Levels the EU playing field by ending the situation where installations were subject to binding permit conditions on energy efficiency in some Member States, but not in others. Supports the aim of the newly proposed revisions to Energy Efficiency Directive by ensuring that IED permitting authorities are mobilised to monitor implementation, and enforce obligations and actions.
PO4-b IED/ETS interface Alternative IED#28 IED and ETS review (***review***)	O	O	O	0	Mirrors the FF55 ETS revision proposal that includes a review of its interaction with the IED in light of industry decarbonisation evolution dynamics. Sets the date at which both reviews are to be undertaken, thus strengthening the legal signal for innovation to increasingly tackle both decarbonisation and depollution challenges.
PO4-b IED/ETS interface Alternative IED#29 Sunset date for Art. 9(1) (***sunset***)	U/×	U/✓	✓	Business 15 Public administration 11	There is a limited understanding of how innovation and industrial transformation dynamics will affect coherence between the ETS and the IED in the medium- to long-term, also limiting the possibility to assess impacts of this option.
PO4-b IED/ETS interface Alternative IED#30 Immediate deletion of Art. 9(1) (***delete***)	U/×	U/✓	✓	Business 56 Public administration 40	May negatively affect effectiveness and efficiency of the ETS market mechanism. It could lead to more carbon allowances becoming available for trading, ultimately reducing carbon market-based incentives for emissions reductions across ETS sectors.
PO4-c Disaggregation of reported GHG emissions	×	✓	O	Close to 0.02 to both	Improves understanding and emission control of the sources of various types of GHGs and their fuller environmental impacts, e.g., for types of refrigerants.
PO4-d Reporting of GHG as CO_2 equivalent	×	O	O	Close to 0.02 to both	The same objective could be met by including automated protocols in E-PRTR software to convert reported amounts of GHGs into CO_2 equivalents.

Overall, benefits are likely to outweigh costs. In more detail:

- **PO4-a-energy efficiency:** The scale of benefits is likely to be relevant but small, especially dependent on how energy efficiency and reductions in emissions of associated GHG and other pollutants - incentivised via the IED - may interact with the EU ETS framework. This would include potential air quality and other benefits, depending on the

measures taken by individual operators. The overall environmental benefits are expected to outweigh the associated costs.

- **PO4-b-IED/ETS interface:** The alternative measures 'sunset clause' (IED#29) and 'delete immediately' (IED#30) are expected to reduce GHG emissions, but the extent of these reductions is uncertain. It may interfere with the objective of the EU ETS to achieve GHG emission reductions in the most cost-effective manner. The alternative 'future review' (IED#28) secures consistency with the policy approach chosen by the European Commission in the recently tabled Fit for 55 package, strengthens the signal in terms of needed technological innovation tackling both decarbonisation and depollution, whilst granting sufficient time to identify concrete opportunities for strengthening the synergies between the IED and the ETS.
- **PO4-c-disaggregated GHG:** Knowledge benefits will accrue to all E-PRTR users from this refinement and the costs are minimal since the data readily exist.
- **PO4-d- CO2 equivalent:** Few benefits from this measure as CO_2 equivalent can be calculated from the already provided raw data.

7.4.2. Comparison of sub-options

Table 10 lists the sub-options addressing decarbonisation of industry retained in the preferred policy package. It also summarises the broad rationale for selecting or discarding sub-options. Retained sub-options/alternatives appear in bold.

Table 10: Sub-options included in and discarded from the preferred policy package

4- Addressing decarbonisation of industry	
PO4-a-energy efficiency	Ends the situation where installations were subject to binding permit conditions on energy efficiency in some Member States, but not in others. Supports the Energy Efficiency Directive by ensuring that IED permitting authorities are mobilised to monitor implementation and enforce obligations.
PO4-b-IED/ETS interface ***Alternative review*** *Alternative sunset (discarded)* *Alternative delete (discarded)*	The impacts of *deleting* or putting a *sunset date* on Art. 9(1) of the IED are unclear and may negatively affect the EU ETS carbon market. The *review* is consistent with the FF55 ETS revisions proposal and will allow revisiting, at a set date still within this decade, the coherence and potential for enhanced synergies between the IED and the ETS, in light of the dynamics of innovation.
PO4-c-disaggregated reporting	Provides better and low cost information on pollutants such as CFCs that are currently reported as combined totals.
PO4-d- CO_2 eq. reporting (discarded)	This information can be derived by calculations based on already reported data. PO4-c and PO4-d were considered as alternative measures. There were pros and cons to both and the preferred way only became apparent late in the impact assessment. The chosen measure, PO4-c, provides more useful information as emission data is obtained for each GHG, from which the CO_2 equivalent can be calculated, as needed.

7.5. Sectoral scope

7.5.1. Comparison of sub-options

PO5 comprises nine sub-options that can all be combined. Table 11 compares the impacts of the sub-options.

Table 11: Summary of impacts for PO5-a, to PO5-i

Policy option	Main impacts			Admin. costs €million/y	Other key aspects
	Econ.	Env.	Social		
PO5-a Livestock production & tailored permit	×××	✓✓✓✓ ✓✓	×	Businesses: c. 148-392 Public authorities c. 122-366	These activities are a main contributor to ammonia and methane emissions and have historically not contributed as much as other sectors of industry and society to emission reductions. Brings under the scope additional 84 000-330 000 cattle farms and 77 000-187 000 pigs and poultry farms, resulting in the 10-40% largest EU non-subsistence farms to be covered by the legislation. The tailored permitting approach significantly reduces the administrative cost by 20 to 30%, depending on the specific activity. The increased scope enhances IED coverage from 18 to 60-88% of emissions of ammonia by rearing of cattle, pigs and poultry and from 3% to 42-77% for methane emissions. Minimum expected reductions in methane and ammonia emissions are valued at between €5 450 and €9 240 million/year and the related compliance costs would be between €265-812 million/year.
PO5-b Extension in current sectors	×	✓✓	O	Businesses: c. 17 Public authorities: c. 11	Covers smaller activities (lower thresholds or associated activities) related to existing Annex I activities and addresses the potential negative environmental impacts of rapidly growing batteries gigafactories. The environmental impacts of these smaller and associated activities are well known and can be addressed by the IED approach. Ensures that certain loopholes in the scope of the IED are closed (smaller smitheries, textiles finishing, forging presses, cold rolling and wiredrawing). Battery production is a growing sector surrounded by more uncertainty in terms of installations and their emissions profile. IED covers already many activities in the batteries value chain. The option would bring in additional 725 to 1 000 installations under the scope of the IED (full IED permitting). This includes c. 20-95 battery factories.
PO5-c Landfills	×	✓✓	O	No/Limited	Adoption of BATC would lead to improvement in existing standards and continuous improvement moving forward. The adoption of BATC can contribute to

Policy option	Main impacts			Admin. costs €million/y	Other key aspects
	Econ.	Env.	Social		
					the EU Methane Strategy. This option does not change the number of landfills covered by the legislation.
PO5-d Mining	××	✓✓✓	O	Businesses: c. 12 Public authorities: c. 8	The demand for critical minerals and base metals will continue to place demands on specific mining installations in the EU and outside the EU. Could facilitate a level playing field across the EU, and ensure confidence in pollution control post-EIA. The option could support one of the Commission's priority actions in 2022, i.e. streamlining permitting procedures for battery raw material projects in Member States, in line with highest environmental standards. The option, which would include metallic and industrial minerals and exclude quarrying, would include between 800-900 minerals extraction installations to be regulated under the IED.
PO5-e Aquaculture	×/U	✓/U	O/×	Businesses c. 2 Public authorities c. 2	The demand for seafood is expected to increase and EU-based aquaculture can help to meet that demand. The sector includes about 12 000 installations mainly micro-enterprises or SMEs, 80% employ 5 or less workers. There are between 55 and 250 aquaculture installations which produce >1000t a year. Whilst IED could help addressing nutrient loading (nitrogen and phosphorus), some key environmental pressures (use of pharmaceuticals, invasive species, diseases, antibiotic resistance) from the sector are not typically regulated by the IED (pollution prevention and control).
PO5-f Upstream Oil & Gas	××	U/✓	O/×	Businesses c. 23 Public authorities c. 15	A Commission proposal is forthcoming under the Methane Strategy to address methane leaks (by far the main pollutant emitted from these activities). There are around 1 000-2 000 installations (offshore and onshore) in the EU.
PO5-g Align E-PRTR to IED (***full alignment***)	×	✓	O	Businesses c. 0.3 Public authorities close to 0.01	Re-establishes the E-PRTR as a primary implementation check on IED activities.
PO5-h - Align E-PRTR to MCPD and UWWTD Alternative E-PRTR#29 (***fulll alignment***)	×	✓	O	Business 5.5 Public authorities 0.3	Creates reporting obligations for a large number of small installations.
PO5-h - Align E-PRTR to	×	✓	O	Business 3.5	Creates better E-PRTR coherence with two closely-related EU instruments.

Policy option	Main impacts			Admin. costs €million/y	Other key aspects
	Econ.	Env.	Social		
MCPD and UWWTD Alternative E-PRTR#30 (***partial alignment***)				Public authorities 0.2	
PO5-i Dynamic updating of sectoral scope	U/×××	U/✓✓✓	U/×		Enables "future-proofing" of the IED and E-PRTR regarding dynamic scope extension possibilities, without the need for primary legislation changes.

All new legislative measures introduced by PO1-PO4 will have to apply to a larger number of installations proposed in PO5. Therefore, costs associated with PO1-PO4 are calculated and presented in the total costs of PO5. Activities newly brought within the IED scope would fall under the existing proportionate framework, i.e. BAT being defined as the most environmentally effective and economically viable techniques, with derogations being allowed in cases where EU-defined BAT implementation in an individual installation would lead to disproportionate costs. However, these activities more or less lend themselves to regulation via the IED.

Overall, benefits are likely to outweigh costs for PO5-a, PO5-b, PO5-c, PO5-d, PO5-g, PO5-h and PO5-i. At this stage, it is, however, uncertain whether the benefits generated by PO5-e and PO5-f would outweigh the costs. In more detail:

- **PO5-a-cattle and tailored permitting:** Potential benefits are likely to be significant and outweigh costs. About 13-31% of pigs and poultry farms[18] and 10-40% of cattle farms would be newly brought under the IED's framework, representing an additional 161 000-517 000 farms added to the scope. This would result overall in about 10-40% of pigs, poultry and cattle non-subsistence farms being covered by the IED. Reductions in methane and ammonia emissions from widening the IED coverage of livestock farms are valued at between €5 450 and €9 240 million/year and the related compliance costs would be between €265-812 million/year. Challenges with the implementation of such a significant scope expansion, especially the administrative burden on competent authorities, would be mitigated by introducing the tailored permitting framework. This adjusted framework would improve the efficiency of permitting within the IED, whilst retaining its effectiveness. Cleaner livestock rearing would also help preserving and improving the quality of rural territories.
- **PO5-b-expand existing IED activities, PO5-c-landfills and PO5-d-mining:** Potential benefits are likely to outweigh costs, although there is limited quantitative evidence available, especially with regards to the potential scope of option PO5-c and PO5-d.
- **PO5-e-aquculture and PO5-f oil and gas:** The balance of benefits and costs associated with this measure is uncertain and the scale of benefits, although uncertain, is unlikely to be significant when compared to the benefits that may accrue from PO5-a and even PO5-b.

[18] In addition to 4% of pigs and poultry farms already covered by the IED.

- **PO5-g align E-PRTR to IED***:* Although there is limited quantification of the benefits and costs, this measure would improve the coherence of the two instruments thus providing greater overall effectiveness.
- **PO5-h - align E-PRTR to MCPD and UWWTPD**: Whilst there are weakly negative economic impacts from this measure, there are considerable benefits from improved data on the environmental performance of MCP and UWWTP, as well as enhanced coherence between the two instruments and their reporting mechanisms resulting. This will empower citizens and policy makers, and therefore drive improved performance.
- **PO5-i-watch mechanism:** As this is a mechanism that may trigger future decisions, it is only when future decisions are in the making that impacts can be assessed. The mechanism includes a requirement for assessing impacts, suggesting that sectors would only be included in the scope where the cost-benefits balance is favourable. In the meantime, this sub-options ensures transparent monitoring of the relevance of sectors for inclusion in the scope, thereby informing society and policy makers.

Territorial distribution of activities is uneven across the Member States. Hence, Member States will not be equally impacted by the different PO5 sub-options. For example, EU aquaculture production is mainly concentrated in four Member States: Spain, France, Italy, and Greece; most of the upstream oil and gas activities are located in eight Member States: Croatia, Denmark, Germany, Greece, Italy, the Netherlands, Poland and Romania; extraction of non-energy minerals mainly takes place in countries such as Bulgaria, Germany, Greece, Finland, Portugal, Spain, and Sweden.

7.5.2. Retained sub-options

Table 12 lists the sub-options on industrial scope retained in the preferred policy package. It also summarises the broad rationale for selecting or discarding sub-options. Retained sub-options/alternatives appear in bold.

Table 12: Sub-options included in and discarded from the preferred policy package

5- Industrial scope	
PO5-a-cattle and tailored permitting	Steers the reduction of pollution from activities that have much less contributed to reducing emissions of pollutants than other sectors of society, in particular as regards ammonia and methane emissions. The scope increase results in the 10-40% largest farms being covered by the IED. The light tailored permitting regime allows proportionate regulation of the wide range of farm sizes.
PO5-b-expand existing IED activities	Closes loopholes in sectors and activities already covered by the IED where sub-activities with high pollution potential were not covered, e.g. textile finishing. Addresses the potential negative environmental impacts of rapidly growing batteries gigafactories.
PO5-c-landfills ***Alternative BAT conclusions*** *Alternative cover smaller landfills (discarded)*	Removes legal obstacle preventing the updating of historic BAT requirements dating from the 1990's, for landfills already falling under the IED. IED already covers the vast majority of landfills; covering smaller landfills would not be efficient.
PO5-d-mining	Contributes to establishing a level playing field at a high level of protection for extraction activities forecast to grow fast and responsible for significant emissions of pollutants. Regulates the emissions from the most polluting non-energy mineral extraction activities (metallic and industrial minerals).

PO5-e-aquaculture (discarded)	The sector is mainly comprised of micro-enterprises (around 80% of enterprises having less than 5 employees within the EU27 and are often 'family-owned'). Though nutrient loading is an important pressure that could be addressed by the IED, some other main environmental pressures (use of pharmaceuticals, invasive species, antibiotic resistance, biodiversity) from the sector are not typically regulated by the IED.
PO5-f-oil and gas (discarded)	A Commission proposal is forthcoming under the Methane Strategy to address methane emissions in the oil, gas and coal sectors (by far the main pollutant emitted from these activities).Whilst methane emission is a major environmental pressure from this upstream oil and gas operations, other emissions to water and soil pollution are considered significant. Hence, these activities are not at this stage retained for inclusion in the scope and would be monitored under the watch mechanism.
PO5-g-align E-PRTR to IED	Ensures that reporting under E-PRTR takes place for all IED installations, thereby enhancing coherence between the instruments.
PO5-h- align E-PRTR to other law *Alternative full alignment (discarded)* ***Alternative partial alignment***	E-PRTR is a useful instrument to establish reporting synergies with other EU law, in particular with the MCP Directive and the UWWTP Directive. Full alignment of scope would however require reporting by numerous SMEs. Partial alignment ensures proportionality of the measure.
PO5-i-watch mechanism	Organises ongoing monitoring of emerging concerns related to emissions from agro-industrial installations and inclusion of relevant activities within the scope of the IED and/or the E-PRTR, through delegated/implementing powers, based on clear criteria and full assessment of impacts.

8. PREFERRED POLICY PACKAGE

Table 13 lists the sub-options retained in the preferred policy package, as presented in section 7. Annex 3 presents the overall impacts of the preferred policy package. In case where the sub-options retained included a choice between two alternatives, the retained alternative is shown in italics as previously summarised in Section 7.

Table 13: Sub-options included in the preferred policy package

PO1- More effective legislation
PO1-a-achieving BAT-AELs-*full BAT potential:* Clarify rules on derogations, indirect releases of pollutants to water and on taking environmental quality standards into account, ensure transparent monitoring of related impacts on air and water quality, and require consideration of the full BAT-AEL range when setting ELVs **PO1-b-implementation and enforcement:** 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-*enhanced public rights:*** 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:** 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
PO2- Accelerating innovation
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- *INCITE***: Establish an INnovation Centre for Industrial Transformation & Emissions (INCITE) documenting innovation and recommending BREF revisions

PO2-c-supporting transformation-*plans:* integrating the operator's transformation plan in EMS
PO3- Contributing to a non-toxic and resource efficient circular economy
PO3-a-performance levels-*binding and benchmarks:* introduce both binding BAT-AEPLs AND performance benchmarks to be used in the Environmental Management System **PO3-b-EMS:** Require operators to address Resource Efficiency, Circular Economy and Chemicals Management in their Environmental Management System **PO3-d-pollutants list:** Dynamically updating the list of pollutants to be reported **PO3-e-report resource use:** Require information on resource efficiency (energy, materials and water)
PO4- Supporting decarbonisation of industry
PO4-a-energy efficiency: Delete exemptions from setting energy efficiency requirements in IED permits **PO4-b-IED/ETS interface-*review***: Plan a review by 2028 of the interface between the IED and the ETS to maximise synergise between the instruments in light of innovation dynamics **PO4-c-disaggregated reporting:** Require more granular reporting for some GHG, in particular refrigerants
PO-5- Industrial scope
PO5-a-cattle and tailored permitting: Broaden current sectoral coverage of the IED and E-PRTR Regulation in rearing of animals (include cattle farms above a threshold within the range of 50-150 LSU, expand coverage to pigs and poultry farms above a threshold within the range of 50-150 LSU), and introduce a tailored permitting process for the rearing of animals **PO5-b-expand existing IED activities**: Extend the IED and E-PRTR sectoral scope by closing loopholes for smaller smitheries, regulating associated activities of textiles finishing, forging presses, cold rolling and wiredrawing; better coverage of the battery value chain by including the rapidly growing batteries gigafactories **PO5-c-landfills-*BAT conclusions***: enable the adoption of BAT conclusions for landfills **PO5-d-mining**: Include metallic and industrial minerals extraction in the IED scope[19] **PO5-g-align E-PRTR to IED**: Align E-PRTR activity descriptions to IED activity descriptions **PO5-h- align E-PRTR to other EU laws-*partially:*** E-PRTR scope to cover medium combustion plants between 20 and 50 MW and urban waste water treatment plants between 20 000 and 100 000 person equivalents **PO5-i-watch mechanism**: Establish a dynamic system to identify and include emerging activities/sectors of concern, according to significance of pollutant emissions, and the potential to address these issues

[19] Based on the assessment of impacts (Annex 8), it is concluded to focus the scope of this measure on only extraction and treatment of metallic and industrial minerals, i.e. to exclude quarrying activities.

The preferred policy package will generate significant and positive environmental impacts and incur limited negative economic impacts. Overall costs, will be largely outweighed by the benefits, whilst the problems identified by the IED and the E-PRTR Regulation evaluations would be comprehensively addressed, in addition to contributing to the EU's general objectives embedded in the EGD, the Glasgow Global Methane Pledge, and to levelling the playing field at a high level of protection.

The IED includes in its design safeguards to ensure that BAT requirements remain proportionate, i.e. that societal benefits are larger than economic costs incurred[20]. This proportionality was confirmed whenever a cost-benefit analysis (CBA) could be conducted. Quantification has been achieved for the two measures having the most significant impacts.

Under PO1-a, illustrative calculations, for NO_X emission reduction by five sectors resulting from measure IED#5, have estimated health benefits to be at least between €860 million and €2 800 million/year, and CAPEX and OPEX for businesses to be €210 million/year.

Furthermore, the assessment shows in particular that the main scope extension, under PO5-a *cattle and tailored permitting*, is proportionate. Based on the assessment of setting the threshold at 50, 100, 125, 150, 300, 450 and 600 LSU (*livestock unit*), thresholds within the range of 50-150 LSU for cattle, pigs and poultry farms came out as proportionate and most effective. This covers (i) an additional between 161 000 and 517 000 livestock farms covered by a tailored permitting process (approximately between 84 000-330 000 cattle farms and 77 000-187 000 pigs and poultry farms, depending on the specific LSU threshold), resulting in the 10-40% largest farms of the sector being covered by the legislation[21], out of a EU's existing c. 1.5 million non-subsistence farms. It would result in at least reducing the emissions of newly regulated farms by 12% for ammonia and 10% for methane[22]. The monetised benefits from reducing methane and ammonia are valued at between €5 450 and €9 240 million/year, depending on the specific LSU threshold, while the compliance costs are €265-812 million and administrative costs for both operators and public administrations, are €270-758 million[23], i.e. a benefit to cost factor of between 5-10 for the whole livestock (from which 4-8 for pigs and poultry and 7-14 for cattle).

Other scope increases bring under IED between 1 500 and 1 900 installations from other sectors covered by full IED permitting, i.e. an increase by 7% of the total of number of installations other than farms covered by the IED. As for industrial activities already within the IED scope, these are typically large, often multinational, companies. There is no evidence[24] of an intrinsically differing economic viability for BAT among Member States. If for an individual installation this does not hold, then a derogation can be applied for.

Little evidence could be found on a potential impact on competitiveness and prices of final products. Past reports summarising the cumulative costs of EU regulation of the EU energy

[20] see Article 3(10) on the BAT definition and Article 15(4) on derogations

[21] These 10-40% largest farms are responsible for 60-88% of emissions ammonia and 42-77% of methane from the rearing of cattle, pigs and poultry.

[22] This represents a 3-5% reduction of total EU ammonia emissions and 1.6-2.8% reduction of total methane emissions from the agricultural sector.

[23] This is split in €148-392 million for business and €122-366 million for public authorities, depending on the threshold within the range of 50-150 LSU.

[24] IED evaluation SWD(220)181 final.

intensive industry[25] indicate that environmental legislation is not a leading factor contributing to costs of operation. Within this picture, IED compliance costs are small compared to other costs (energy, carbon emissions allowances, workers safety) and it is very unlikely that sectors whose commodities are traded on global markets (e.g. aluminium, copper, meat) will pass IED compliance costs onto consumers.

The total administrative burden is estimated within a range of €356-600 million/year for industrial operators and €265-509 million/year for public authorities. Administrative activities and costs estimated for the selected policy measures will necessarily have some overlaps (e.g., many measures require adjustments of permit reconsiderations and updates and, therefore, some efficiencies could be identified), resulting in over-estimation of the overall administrative costs.

The preferred package will significantly support the EU's decarbonisation agenda and promote synergies and consistency of the EGD policies. In the shorter term, the scope extension will amplify the current IED role in regulating non-ETS GHG emissions[26], in particular methane, thereby supporting the Effort Sharing Regulation. Furthermore, the proposals to make BAT on energy efficiency mandatory across all IED permits and to require all IED operators to include in their Environmental Management Systems the outcome of energy audits will support the Energy Efficiency Directive. In the medium to longer term, the progressive uptake of technologies which cut both pollutant and GHGs emissions implies that, over time, more synergies will occur between the IED and the ETS, as well as impacts on the carbon market. Hence, coherence issues and opportunities for enhanced synergies that may arise will be addressed by the review, proposed also as part of the FF55 package.

Furthermore, actions under the innovation area will also contribute to a better understanding of how pollution reduction, decarbonisation and also a circular economy will be achieved. INCITE will provide a better mapping of innovative technologies that are relevant for depollution and decarbonisation. The requirement for IED operators to design, towards the end of this decade, their transformation plans will allow them to focus efforts towards achieving maximum beneficial synergies, based on technological innovation, between depollution, decarbonisation and circularity for the 2030-2050 horizon.

9. HOW WILL ACTUAL IMPACTS BE MONITORED AND EVALUATED?

The overall emissions of pollutants per sector, based on data reported by operators to the E-PRTR, will remain key indicators to track progress against the objectives of this initiative. The OECD has also identified[27] that PRTR data can be used to evaluate progress towards achieving United Nations Sustainable Development Goals, especially SDG 12.4. The improved E-PRTR will also allow better monitoring of industry's environmental performance at sector level:

[25] Implementing the "For a European Industrial Renaissance" communication COM(2014) 14 final; studies were carried out among others: for steel, aluminium, chemicals and ceramics sectors.

[26] Non-ETS GHG emissions currently covered by IED represent 4% of overall EU GHG emissions. After scope extension, this will be about 15% of overall GHG emissions.

[27] https://www.oecd.org/chemicalsafety/pollutant-release-transfer-register/using-prtr-information-evaluate-progress-towards-sustainable-development-goal-12.pdf

- The increased granularity of reporting of pollutant emission at installation level will allow analysis of the main processes within sectors whose environmental performance is improving or is lagging behind;
- The inclusion of reporting of resource use will allow defining new indicators on use of materials, water and energy, that will enable tracking of resource efficiency improvements;
- More dynamic updating of the list of substances covered by E-PRTR will allow defining emission indicators of substances of emerging and current concern. This will enable the tracking of improvements in the use and management of such substances.

These improvements will also help ensure that this monitoring can be effectively used in the wider Zero Pollution Monitoring and Outlook framework which will be published every two years from 2022 onwards[28]. At the same time, the data on air, water and soil pollution available through the Zero Pollution Monitoring will help evaluate the impacts of emission reductions stemming from the installations falling under the IED/E-PRTR Regulation.

A central concern in the revision of the IED is to ensure that the whole range of BAT-AELs is used. Analysis of this issue has been complex due to the lack of transparency of, and difficult access to, permits. The future harmonised 'permit summary' will dramatically ease the harvesting of ELVs set in permits, through automated IT tools. This will allow analysis sector by sector of the distribution of ELVs within the BAT-AEL ranges, at the end of permit revision cycles triggered by adoption of BAT Conclusions and improve clarity of information contained in the permits to public.

The scale of progress in emissions reduction will depend on the technological progress, outcomes of INCITE, any more frequent BREF reviews, and any actions that may be triggered as a result. Understanding this requires monitoring of the pace of development and uptake of innovations and the resulting required transformation of IED sectors for meeting the EU's 2030 and 2050 objectives. The harmonised permit summary will allow the quantification of the number of cases where new flexibilities supporting frontrunners in testing and deploying emerging techniques have been used. Wider impacts on innovation dynamics will be more complex to monitor. New indicators will be defined in an industrial transformation scoreboard published by INCITE that may include new indicators such as e.g.:

- Technology Readiness Level (TRL) of emerging techniques per sector;
- Emissions performance of emerging techniques;
- The anticipated "on the ground" uptake timeline of such techniques;
- Distance to target indicators, for each IED sector.

For the E-PRTR measures, the key indicators will include the timeliness and the completeness of reporting, broken down by Member States, sector and by environmental media. Web statistics from the Industrial Emissions Portal will allow the measurement of progress, with regard to the public's accessing of IED/ E-PRTR combined information.

Periodic publication of implementation information by Member States will complement this by providing readily-accessible, machine-readable, common-format information on key provisions via dynamic IT means. This will include information on:

[28] See COM(2021) 400 and SWD(2021) 141

- The granting of flexibilities to support emerging techniques;
- The setting of stricter permit conditions in permits where required to meet environmental quality standards;
- The granting of derogations allowing pollutant emissions higher than the BAT-AEL range;
- Enforcement action taken.

Perceptions on improvements to legal clarity will be monitored via the BREF process, through e-surveys addressed to the IED and E-PRTR stakeholder community.

The review, at a set date still within this decade, of the interaction of IED with the ETS and decarbonisation developments will be a key milestone in monitoring and evaluating this revamped and more holistic policy approach.