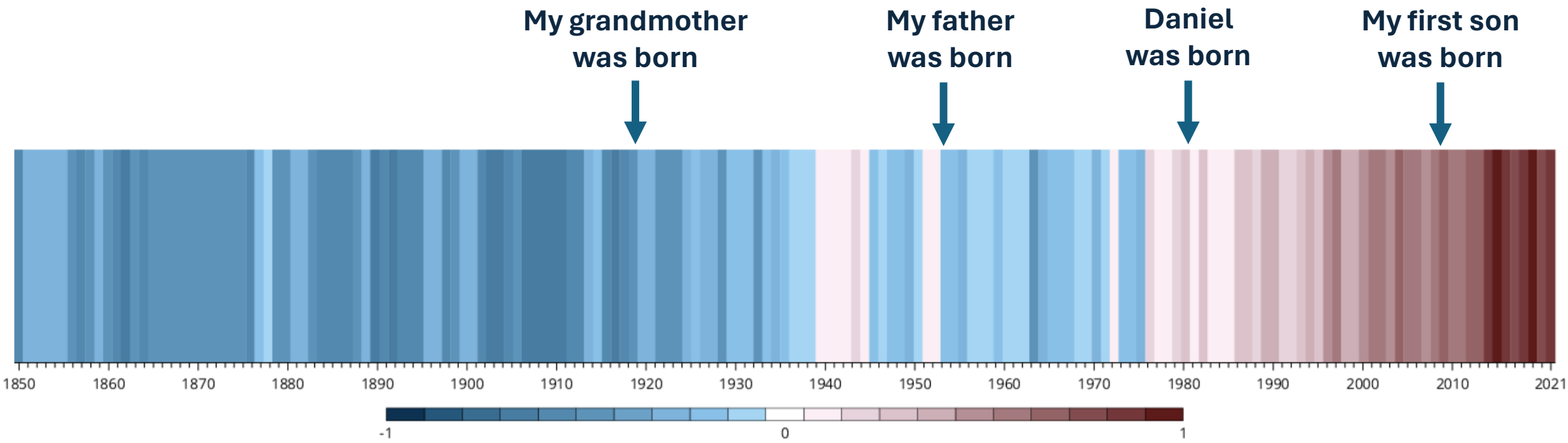
EEA products and policy support

Use cases for the inventories

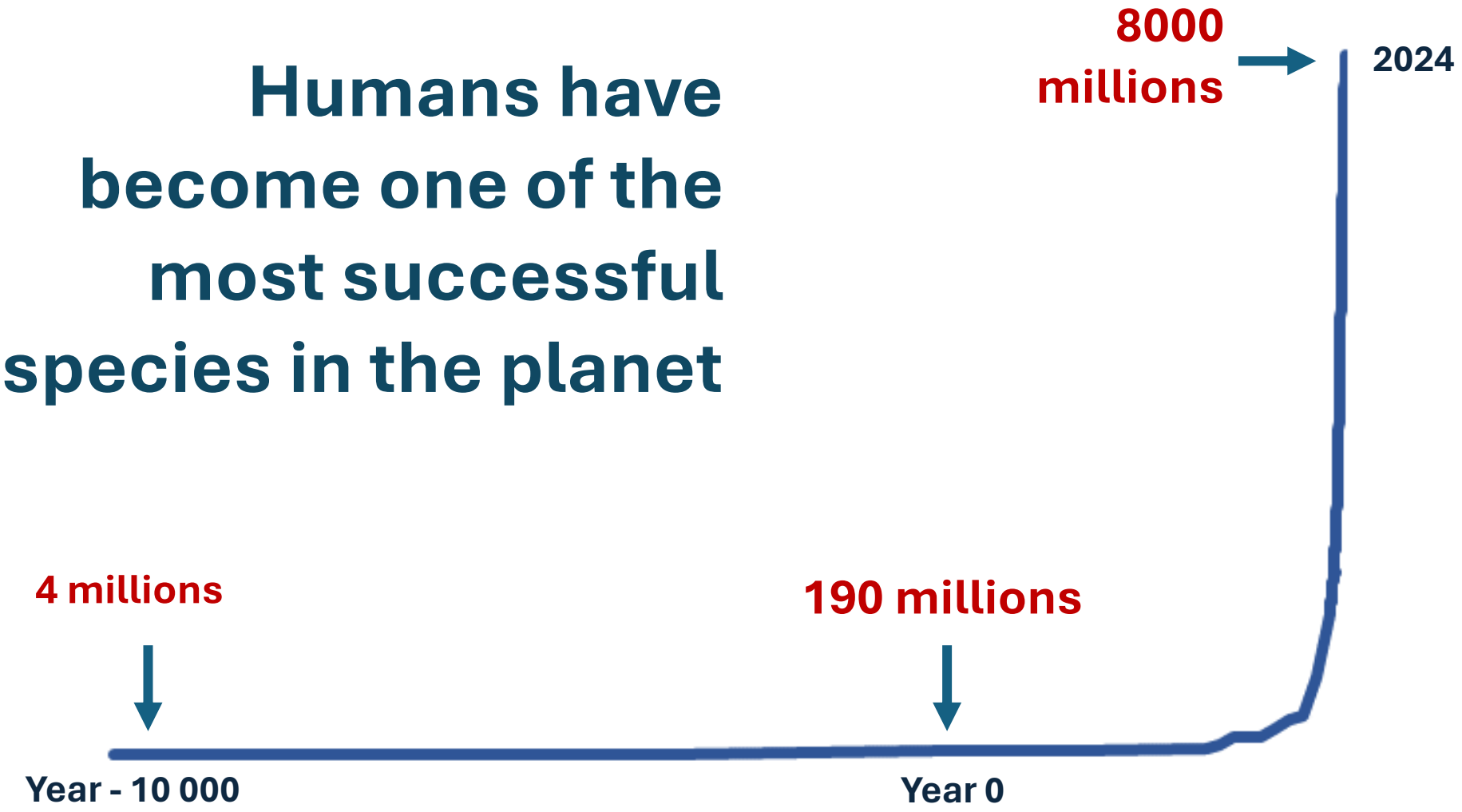
Daniel Montalvo/ TFEP/ 15 May 2024

European Environment Agency

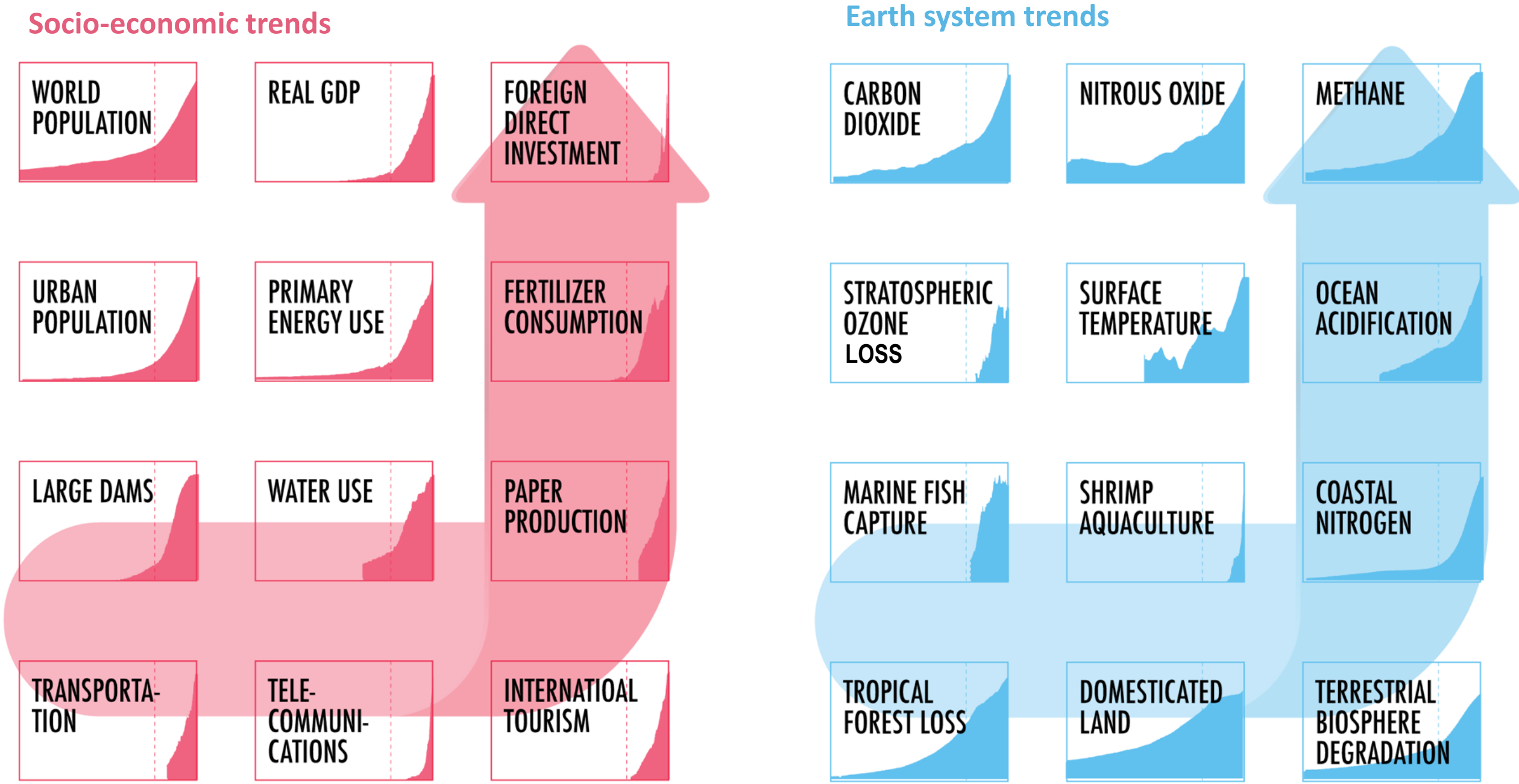


Source: Modified by EEA from (Hawkins, 2022) and based on HadCRUT5 data (Met Office Hadley Centre, 2022).

Humans have become one of the most successful species in the planet



Source: World population, Our World in Data


Socio-economic trends
WORLD POPULATION
REAL GDP
FOREIGN DIRECT INVESTMENT
URBAN POPULATION
PRIMARY ENERGY USE
FERTILIZER CONSUMPTION
LARGE DAMS
WATER USE
PAPER PRODUCTION
TRANSPORTA-TION
TELE-COMMUNI-CATIONS
INTERNATIOAL TOURISM
Earth system trends
CARBON DIOXIDE
NITROUS OXIDE
METHANE
STRATOSPHERIC OZONE LOSS
SURFACE TEMPERATURE
OCEAN ACIDIFICATION
MARINE FISH CAPTURE
SHRIMP AQUACULTURE
COASTAL NITROGEN
TROPICAL FOREST LOSS
DOMESTICATED LAND
TERRESTRIAL BIOSPHERE DEGRADATION

A combination of technological progress and systemic change

1

We no longer can approach environment policy solely with incremental changes based on technology

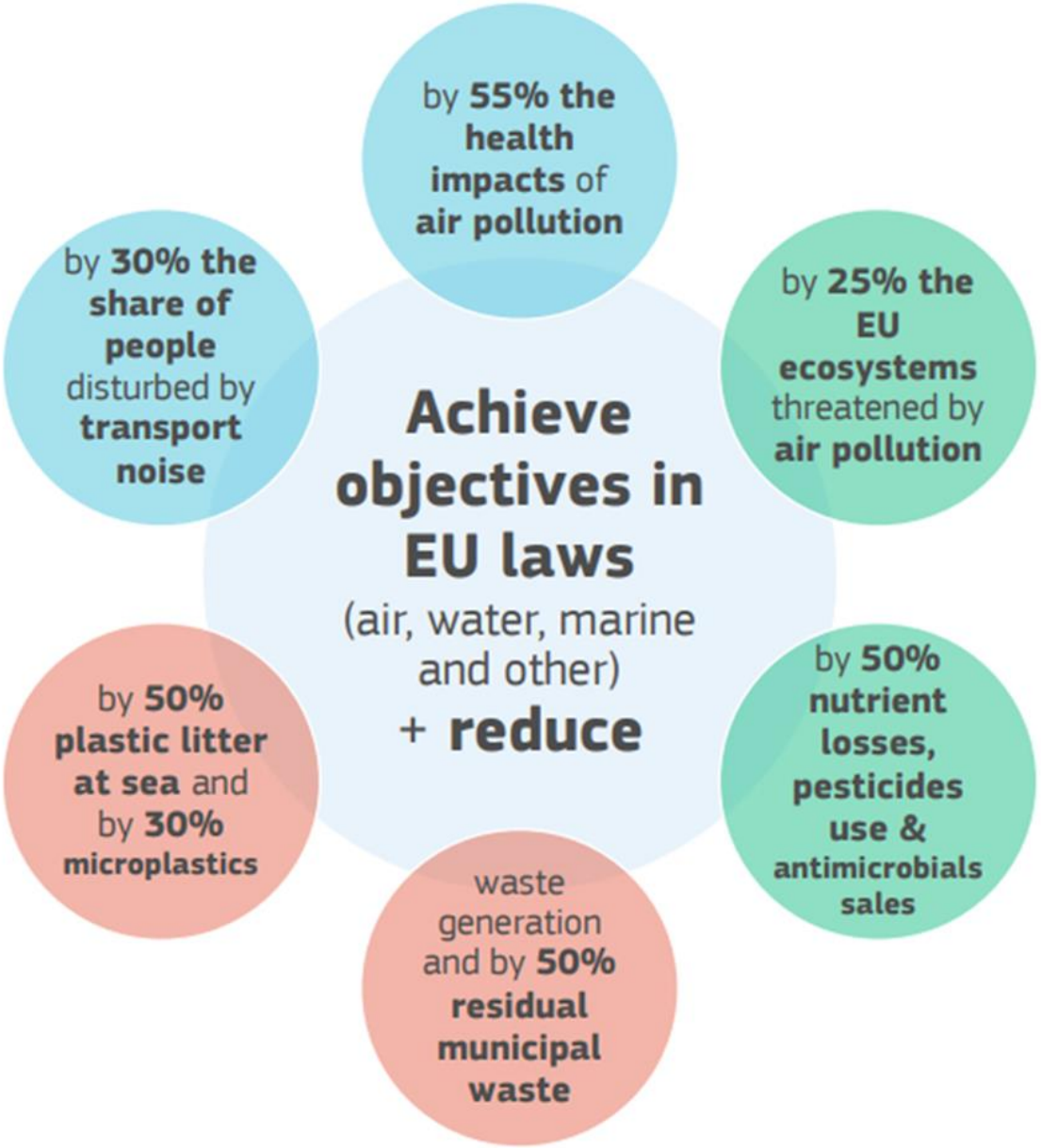
2

Solutions will imply a rethinking of business models, consumption patterns and governance

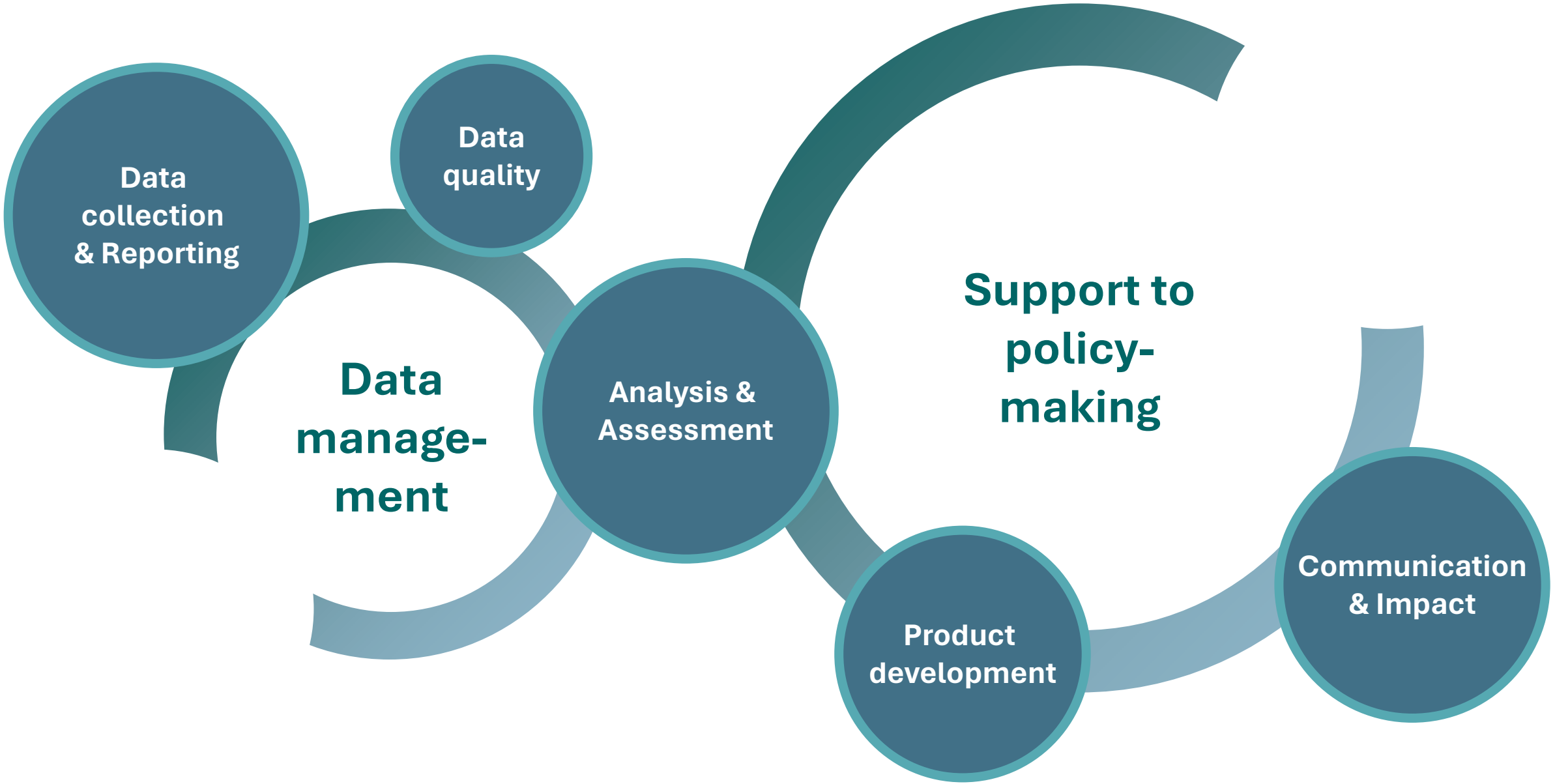
3

An ecological transition will only happen if it is just, both within Europe and at global scale

A new narrative for pollution



The EEA value chain

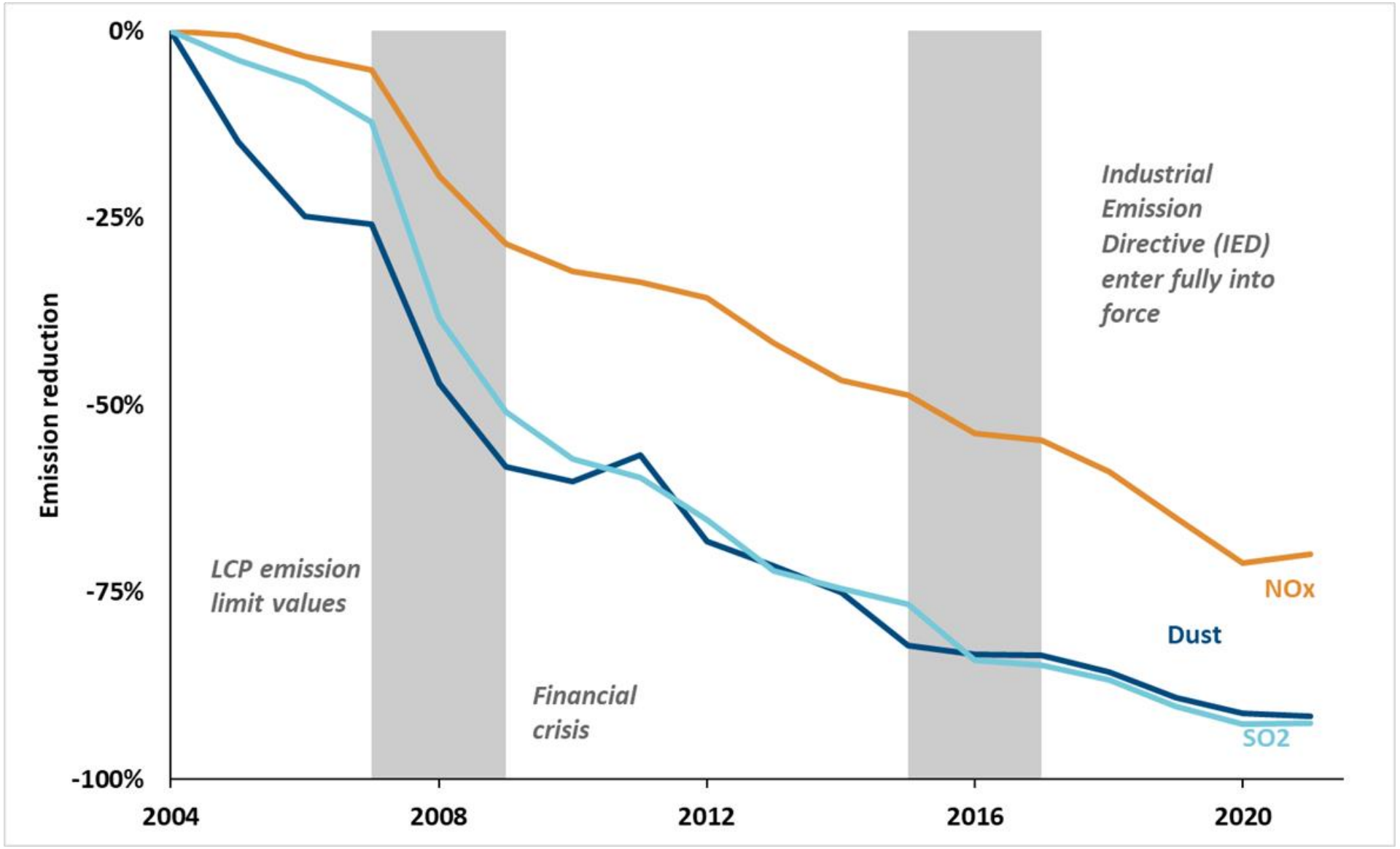


Pollution inventories influencing and supporting policy

Sector Industry

How policy evolved informed by inventories

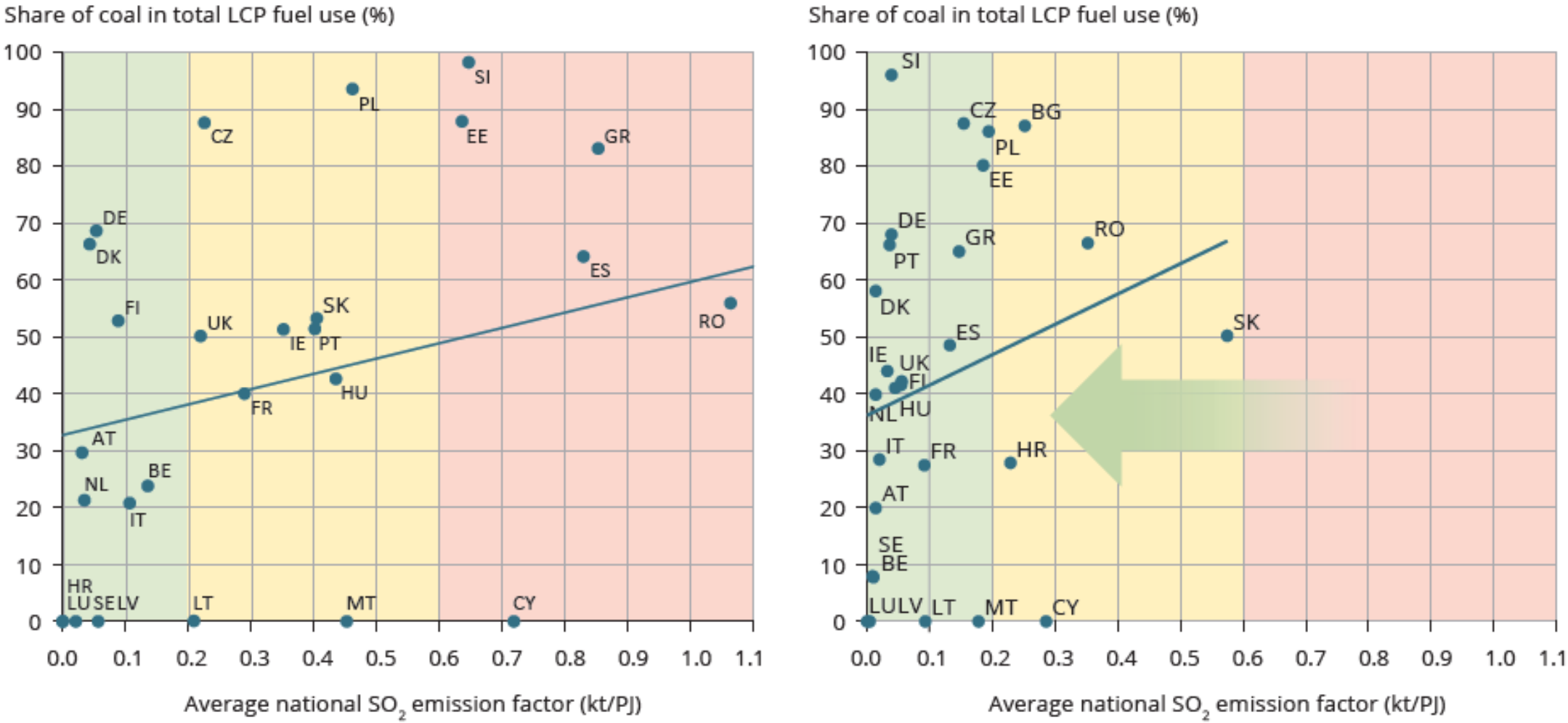
Series of policy changes driving change, powered by inventories



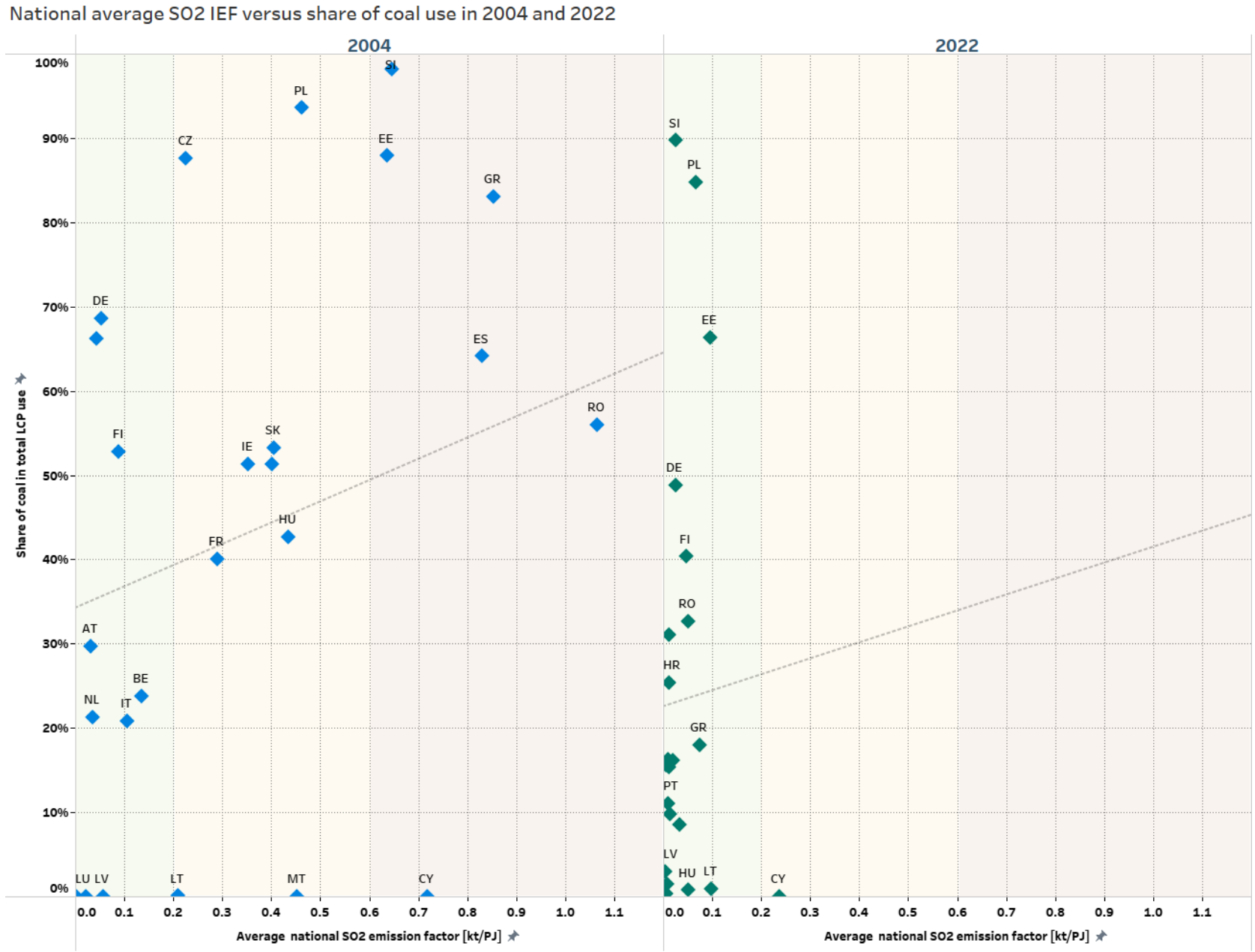
Air emissions, LCP reporting

The European project at work

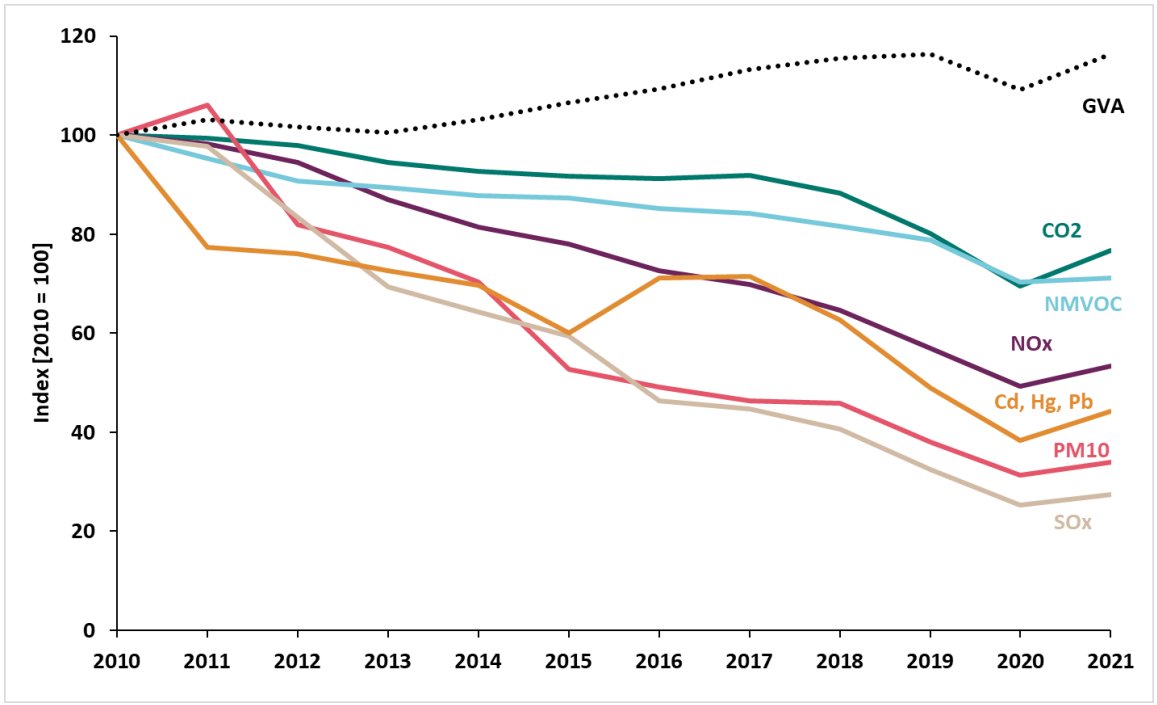
Figure 3.1 **National average SO_2 IEF versus share of coal use, in 2004 (left) and 2015 (right)**



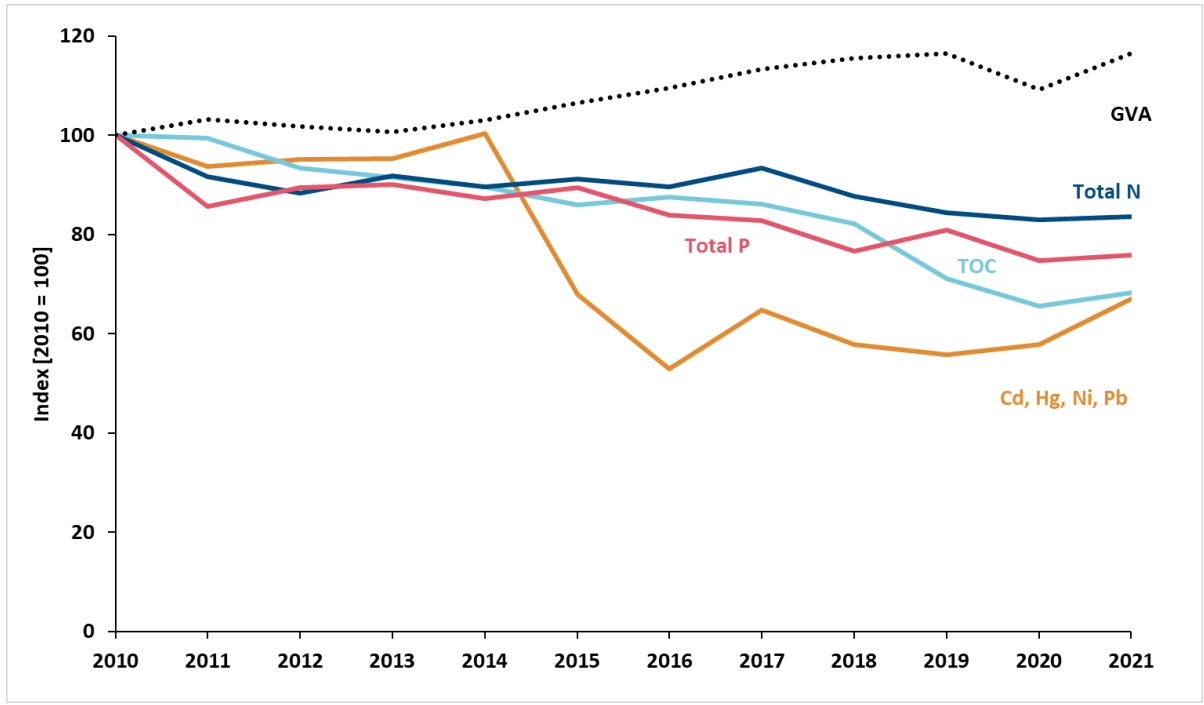
The European project at work



Environmental regulation for industry pays off

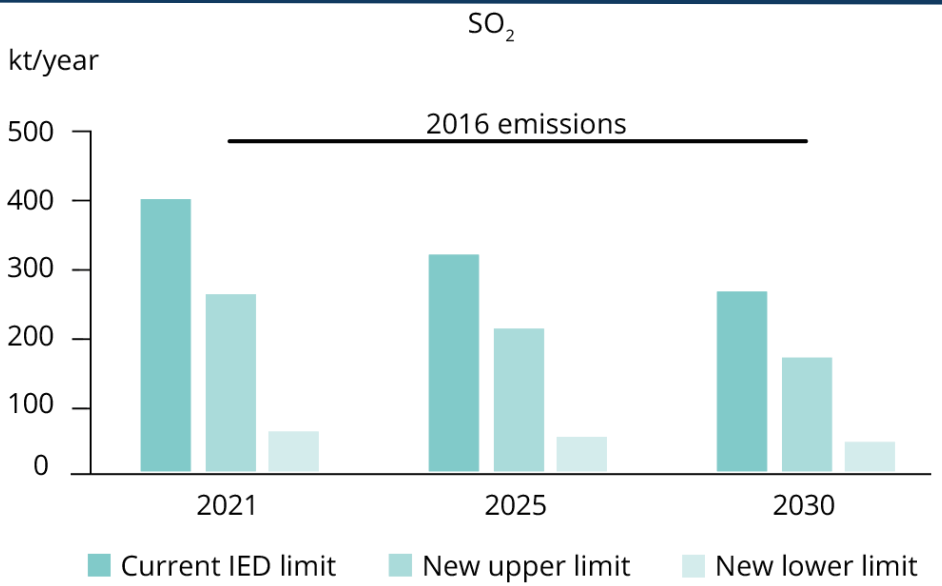


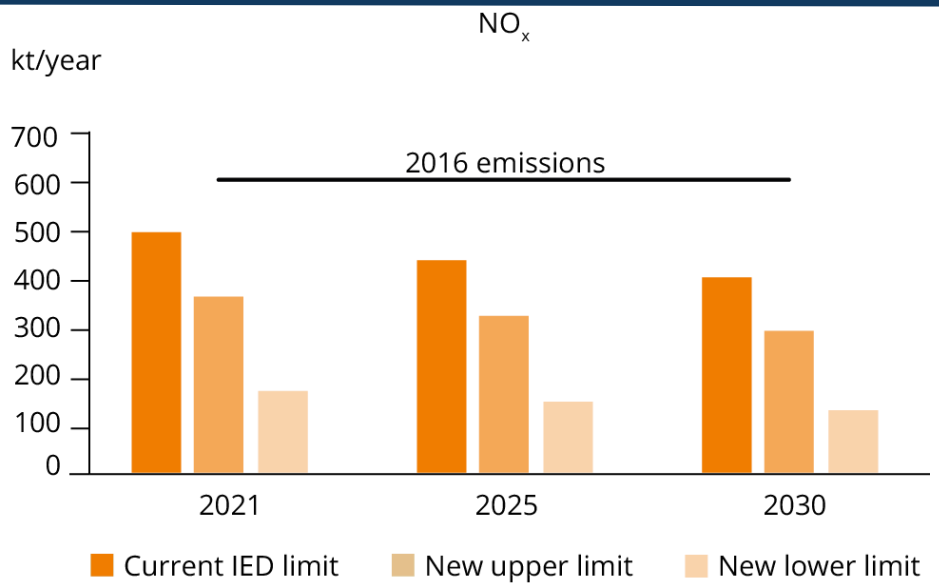
Air emissions, E-PRTR reporting

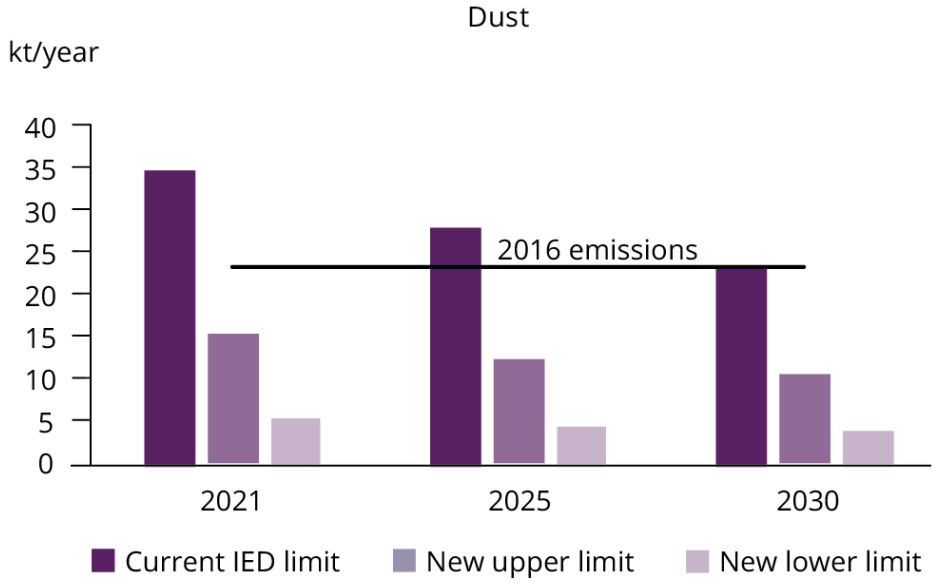


Water emissions, E-PRTR reporting

Implementation is key

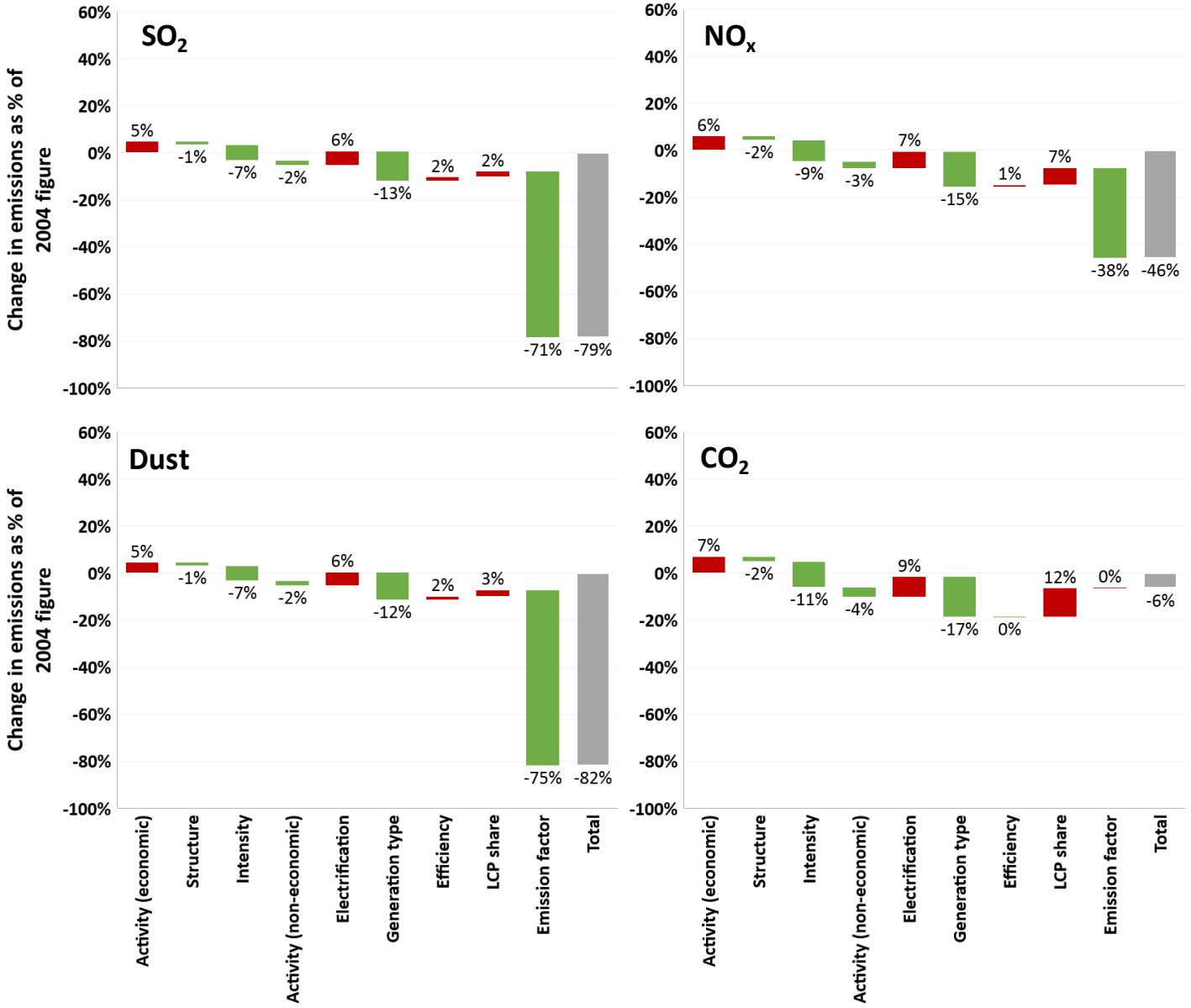






Notes: kt/year: kilotonnes per year;
IED: Industrial Emissions Directive 2010/75/EC.

The Industrial Emission Directive method works

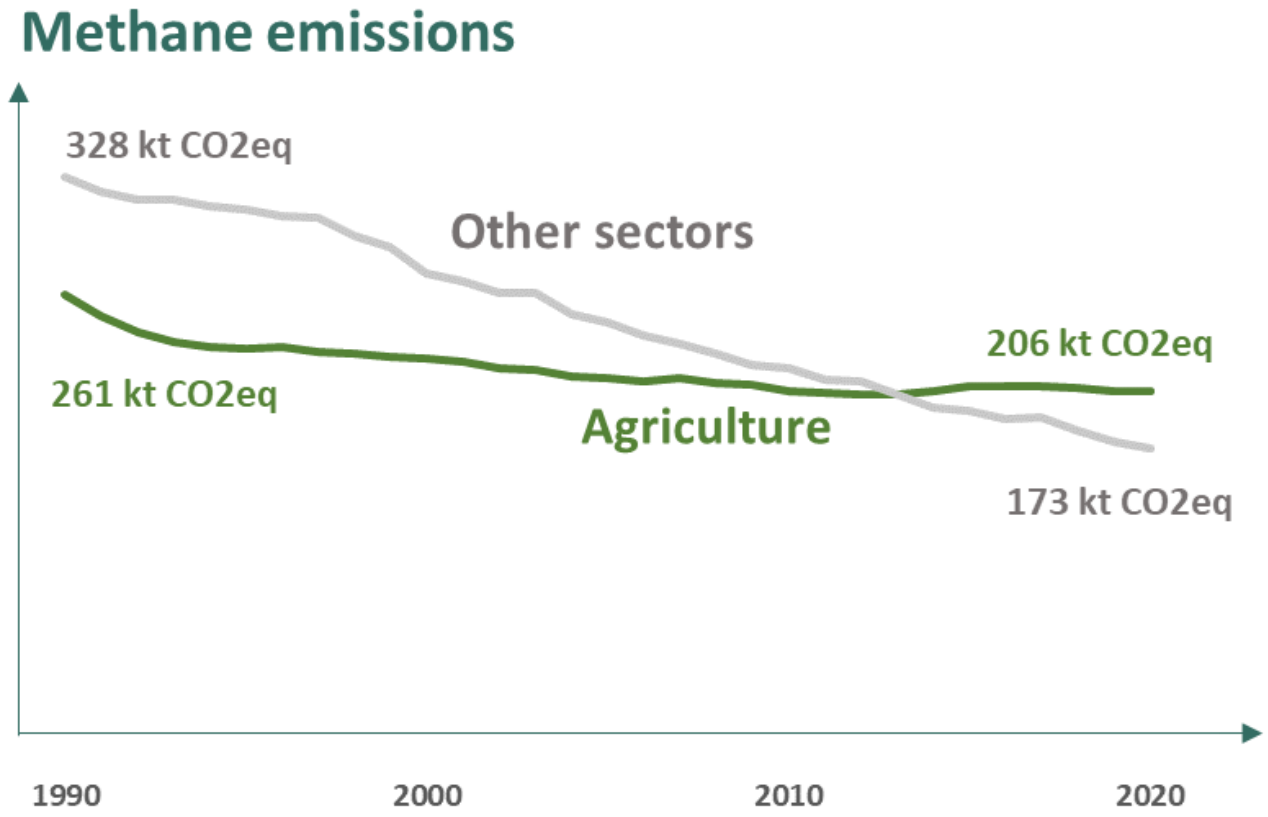


Sector agriculture

A delicate challenge where policy makers will need to find a constructive model

The issue of methane

- Methane emissions have decreased only slightly
- Changes in practices led to **more emissions/animal** – BAT can help



Change methane per animal 1990-2020

22%

8%

5%

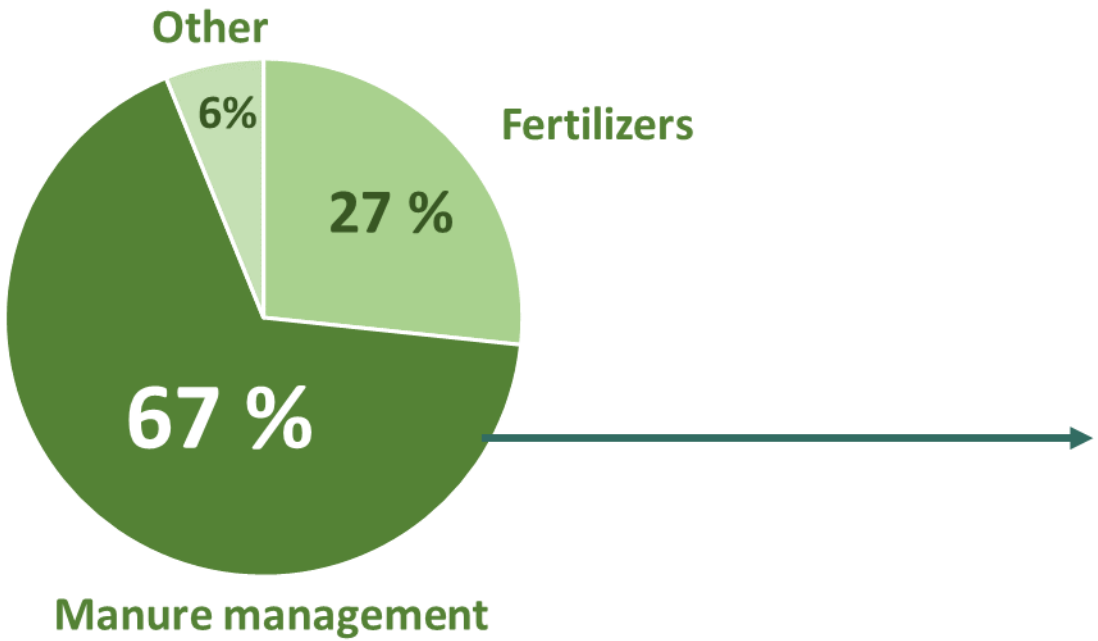
-11%

(only enteric fermentation)

The issue of ammonia

- While reductions are apparent, the contribution of manure management is still very high – opportunity to further reduce
- More progress is needed to achieve the EU´s commitments

Source of current ammonia emissions



Change of ammonia emissions 1990-2020

-35%

-18%

-33%

-38%

-11%

(manure management)

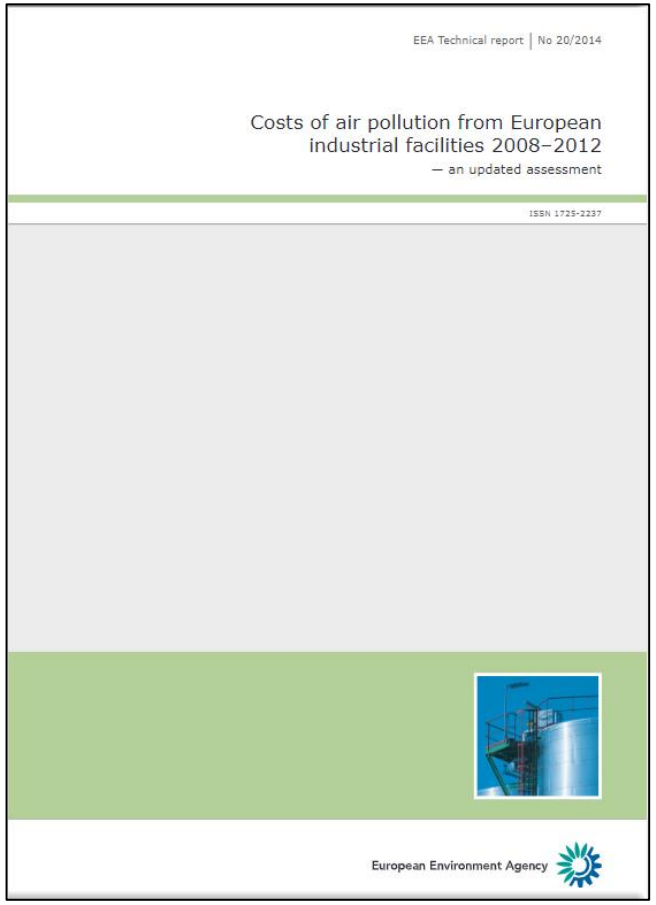
A possible new opportunity – the IED review clause for the scope covered for intensive livestock rearing

Externalities

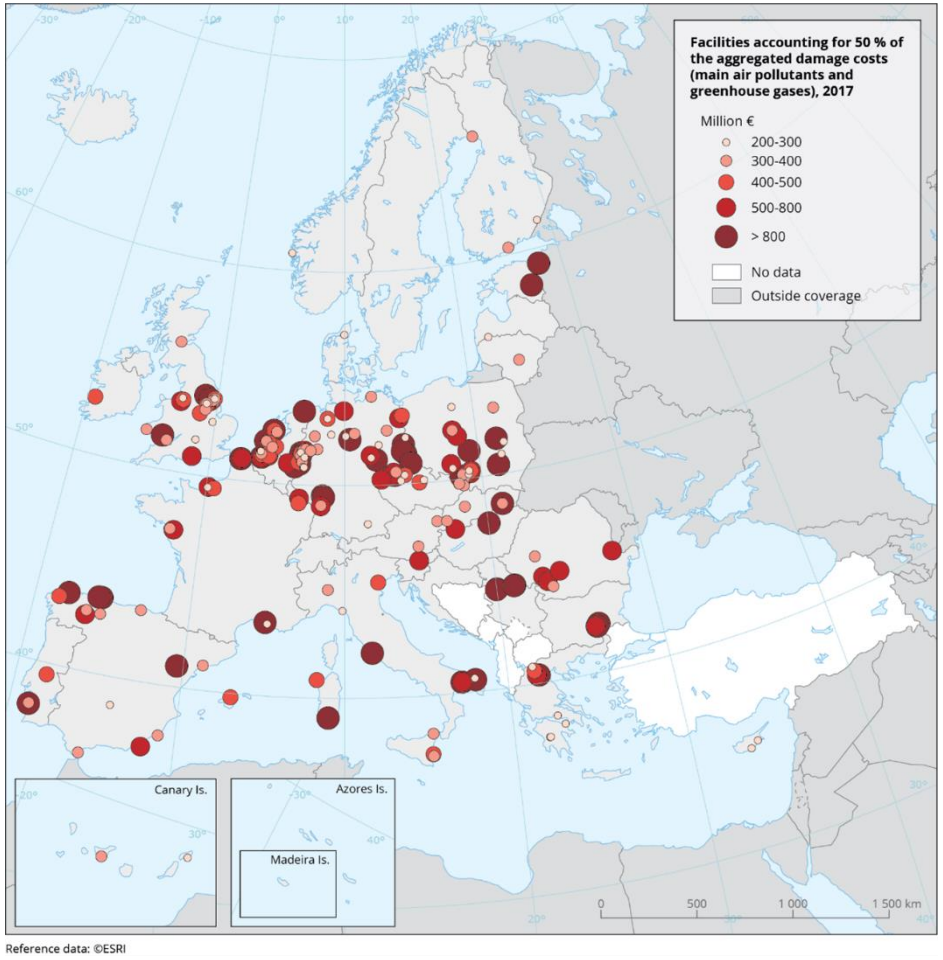
Using reported data and heavily reliant on Air Convention processes

Previous EEA work on the topic

EEA report: Revealing the costs of air pollution from industrial facilities in Europe (2011)



EEA report: Costs of air pollution from European industrial facilities 2008–2012 (2014)



EEA briefing: Counting the costs of industrial pollution (2021)

Methodology - Scope

- Damage costs per tonne calculated for 39 European countries:
  - Main air quality pollutants ($PM_{2.5}$, PM_{10}, SO_2, NH_3, NOx, NMVOC)
  - Heavy metals (As, Cd, Cr(VI), Pb, Hg, Ni)
  - Organic pollutants (1,3 butadiene, benzene, formaldehyde, PAH, dioxins and furans)
  - GHG (CO_2, CH_4, N_2O)

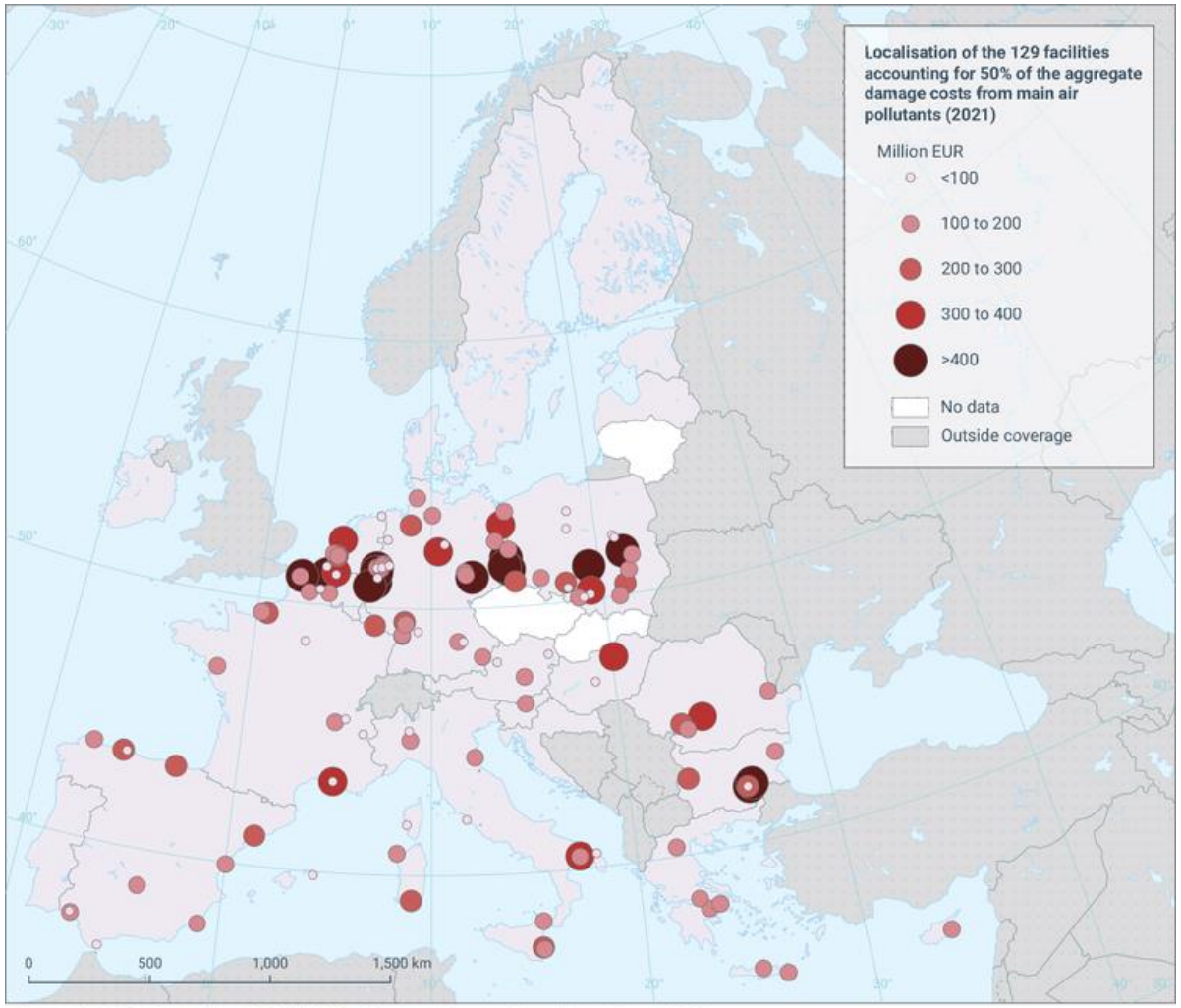
- Impacts:
  - Health
  - Crops and forests
  - Material damage to buildings
  - Ecosystems

- E-PRTR emissions (2012-2021)

Quantification of impacts

- Health impacts: Mortality and morbidity
- GHG: Climate change avoidance costs
- O_3: Yield loss (120 crops), biomass loss in forests
- NOx and SO_2: Buildings
- NOx and NH_3: Impacts on ecosystems from eutrophication

Results

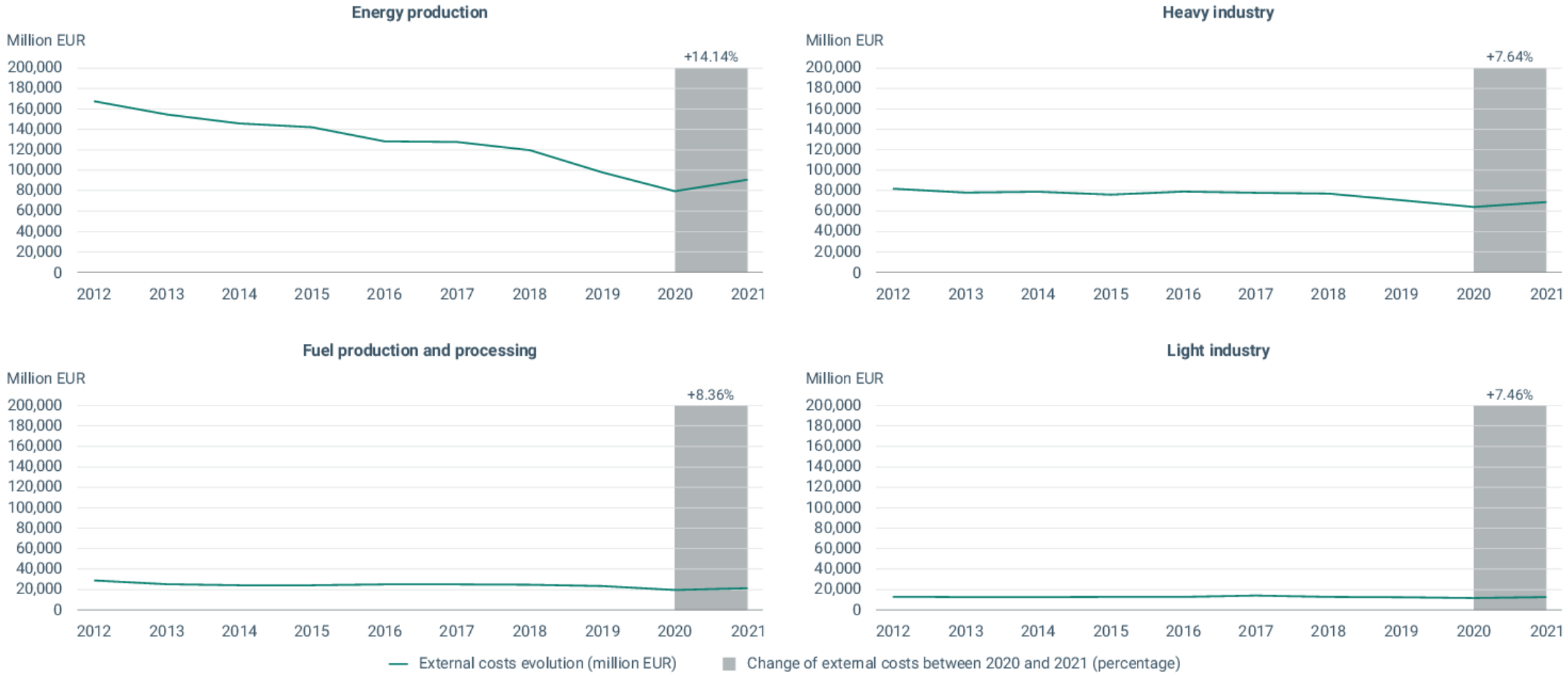


Reference data: © EuroGeographics, © FAO (UN), © TurkStat Source: European Commission – Eurostat/GISCO

Link to interactive version

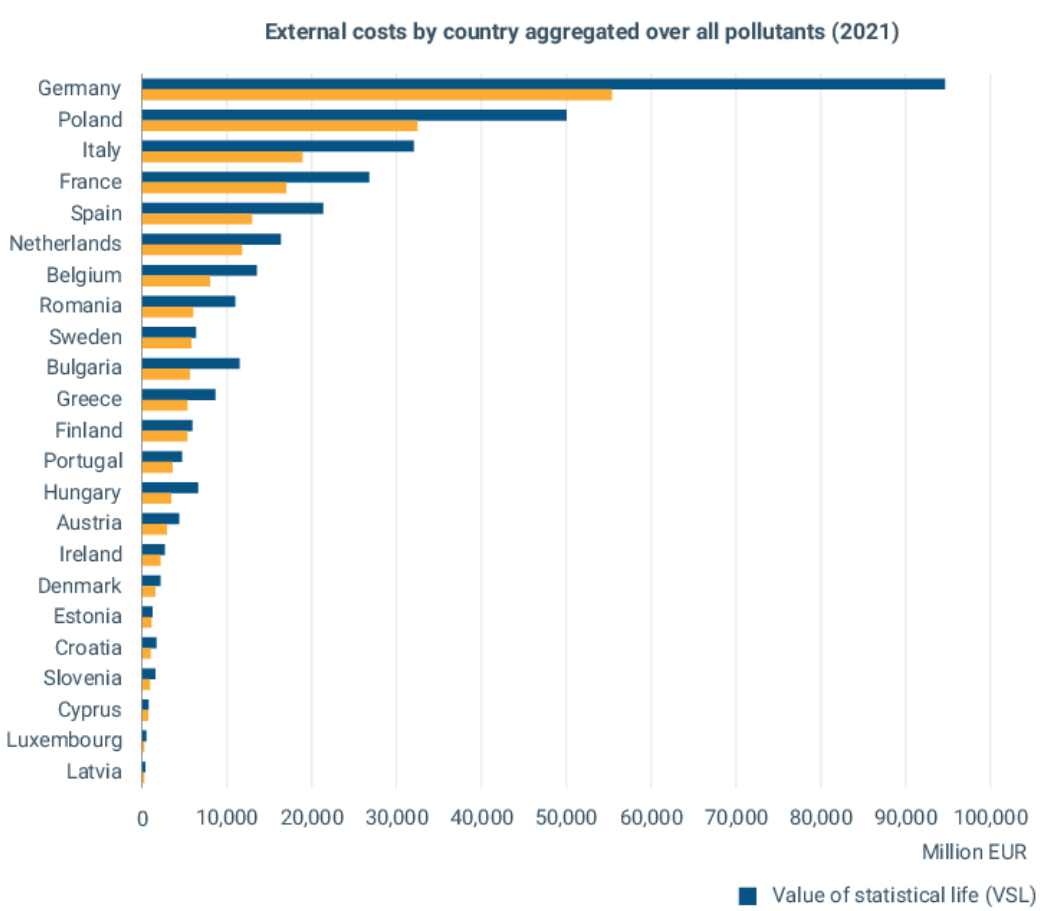
The 129 facilities that together account for 50% of the aggregate damage costs estimated from main air pollutants (2021)

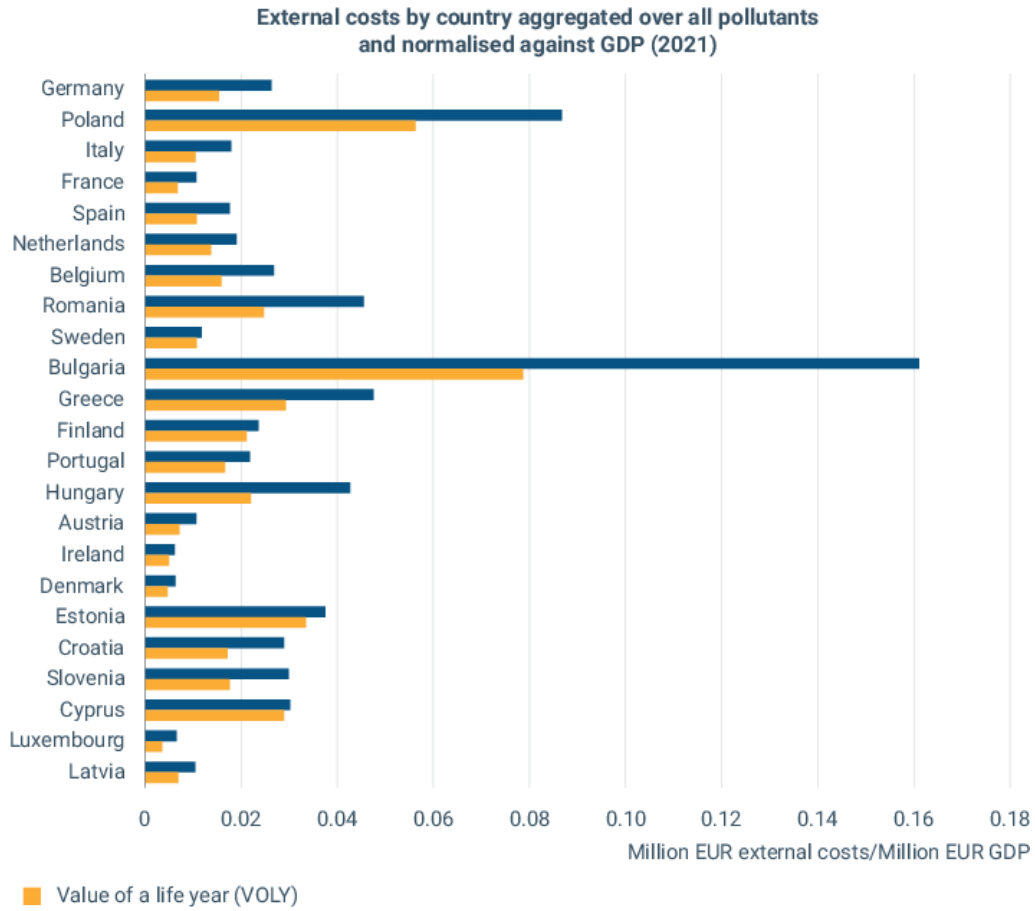
Results



External costs by sector aggregated over all pollutants (2012-2021)

Results



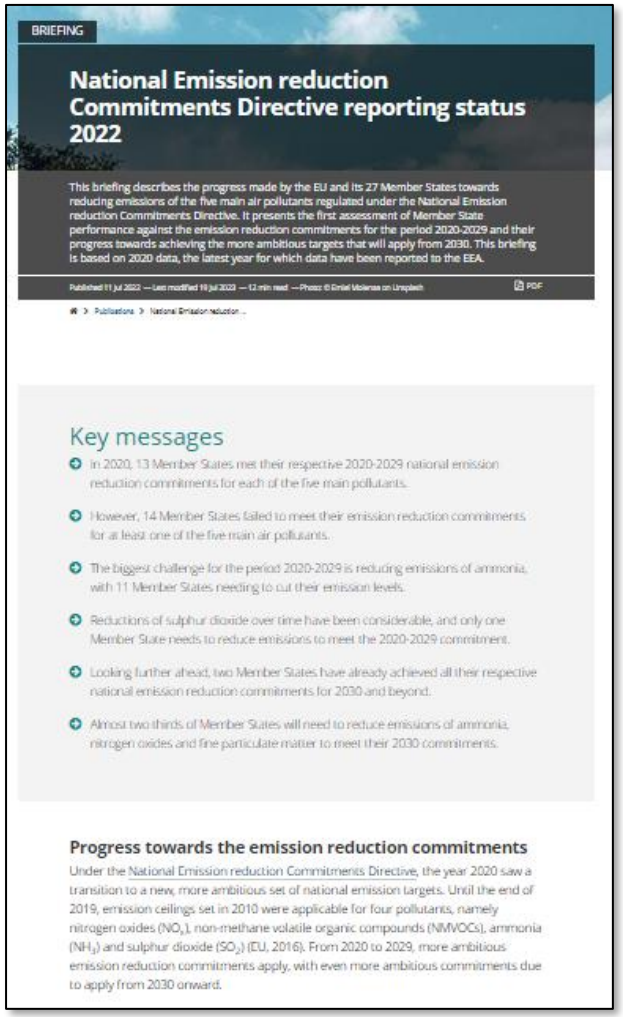


External costs by country aggregated over all pollutants (2021)

EEA products

where inventory compilers are key to enable the analysis

NECD Status



BRIEFING

National Emission reduction Commitments Directive reporting status 2022

This briefing describes the progress made by the EU and its 27 Member States towards reducing emissions of the five main air pollutants regulated under the National Emission reduction Commitments Directive. It presents the first assessment of Member State performance against the emission reduction commitments for the period 2020-2029 and their progress towards achieving the more ambitious targets that will apply from 2030. This briefing is based on 2020 data, the latest year for which data have been reported to the EEA.

Published 11 Jul 2022 — Last modified 19 Jul 2023 — 12 min read — Photo: © Emiel Molenaar on Unsplash

PDF

Publications > National Emission reduction ...

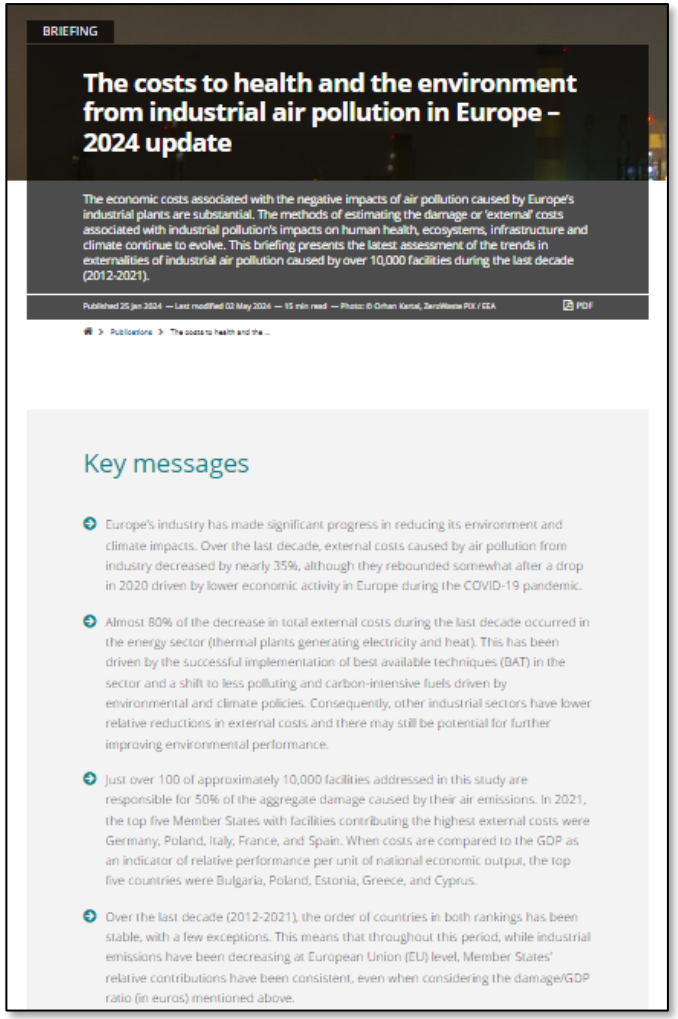
Key messages

- In 2020, 13 Member States met their respective 2020-2029 national emission reduction commitments for each of the five main pollutants.
- However, 14 Member States failed to meet their emission reduction commitments for at least one of the five main air pollutants.
- The biggest challenge for the period 2020-2029 is reducing emissions of ammonia, with 11 Member States needing to cut their emission levels.
- Reductions of sulphur dioxide over time have been considerable, and only one Member State needs to reduce emissions to meet the 2020-2029 commitment.
- Looking further ahead, two Member States have already achieved all their respective national emission reduction commitments for 2030 and beyond.
- Almost two thirds of Member States will need to reduce emissions of ammonia, nitrogen oxides and fine particulate matter to meet their 2030 commitments.

Progress towards the emission reduction commitments

Under the National Emission reduction Commitments Directive, the year 2020 saw a transition to a new, more ambitious set of national emission targets. Until the end of 2019, emission ceilings set in 2010 were applicable for four pollutants, namely nitrogen oxides (NO_x), non-methane volatile organic compounds (NMVOCs), ammonia (NH_3) and sulphur dioxide (SO_2) (EU, 2016). From 2020 to 2029, more ambitious emission reduction commitments apply, with even more ambitious commitments due to apply from 2030 onward.

Externalities



BRIEFING

The costs to health and the environment from industrial air pollution in Europe – 2024 update

The economic costs associated with the negative impacts of air pollution caused by Europe's industrial plants are substantial. The methods of estimating the damage or 'external' costs associated with industrial pollution's impacts on human health, ecosystems, infrastructure and climate continue to evolve. This briefing presents the latest assessment of the trends in externalities of industrial air pollution caused by over 10,000 facilities during the last decade (2012-2021).

Published 25 Jan 2024 — Last modified 02 May 2024 — 15 min read — Photo: © Orhan Kantal, ZeroWaste PIX / EEA

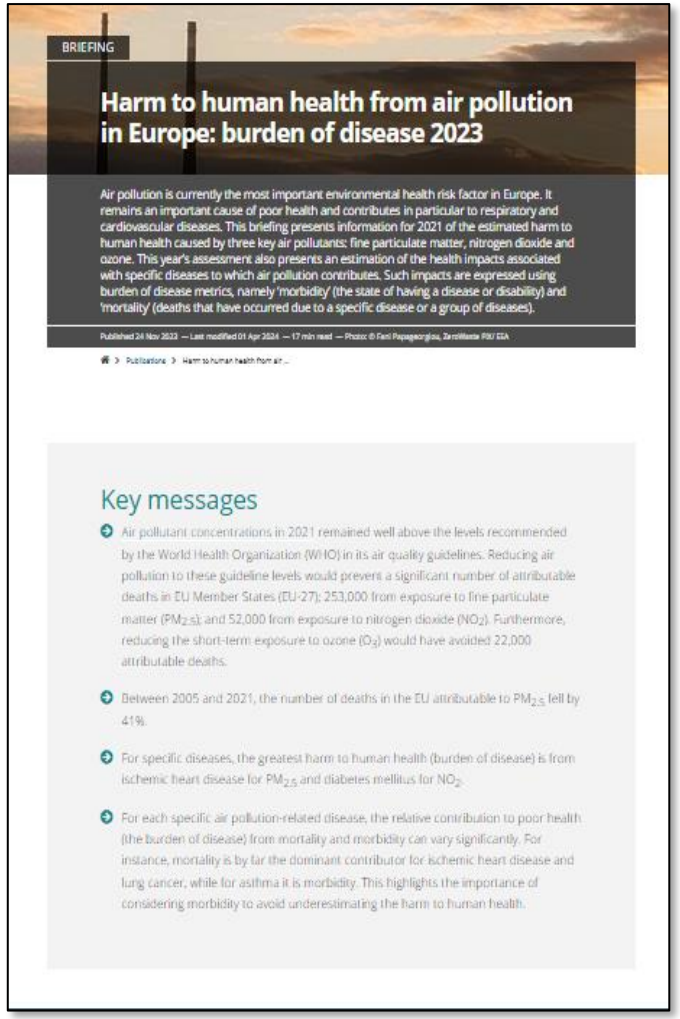
PDF

Publications > The costs to health and the ...

Key messages

- Europe's industry has made significant progress in reducing its environment and climate impacts. Over the last decade, external costs caused by air pollution from industry decreased by nearly 35%, although they rebounded somewhat after a drop in 2020 driven by lower economic activity in Europe during the COVID-19 pandemic.
- Almost 80% of the decrease in total external costs during the last decade occurred in the energy sector (thermal plants generating electricity and heat). This has been driven by the successful implementation of best available techniques (BAT) in the sector and a shift to less polluting and carbon-intensive fuels driven by environmental and climate policies. Consequently, other industrial sectors have lower relative reductions in external costs and there may still be potential for further improving environmental performance.
- Just over 100 of approximately 10,000 facilities addressed in this study are responsible for 50% of the aggregate damage caused by their air emissions. In 2021, the top five Member States with facilities contributing the highest external costs were Germany, Poland, Italy, France, and Spain. When costs are compared to the GDP as an indicator of relative performance per unit of national economic output, the top five countries were Bulgaria, Poland, Estonia, Greece, and Cyprus.
- Over the last decade (2012-2021), the order of countries in both rankings has been stable, with a few exceptions. This means that throughout this period, while industrial emissions have been decreasing at European Union (EU) level, Member States' relative contributions have been consistent, even when considering the damage/GDP ratio (in euros) mentioned above.

Burden of disease



BRIEFING

Harm to human health from air pollution in Europe: burden of disease 2023

Air pollution is currently the most important environmental health risk factor in Europe. It remains an important cause of poor health and contributes in particular to respiratory and cardiovascular diseases. This briefing presents information for 2021 of the estimated harm to human health caused by three key air pollutants: fine particulate matter, nitrogen dioxide and ozone. This year's assessment also presents an estimation of the health impacts associated with specific diseases to which air pollution contributes. Such impacts are expressed using burden of disease metrics, namely 'morbidity' (the state of having a disease or disability) and 'mortality' (deaths that have occurred due to a specific disease or a group of diseases).

Published 24 Nov 2023 — Last modified 01 Apr 2024 — 17 min read — Photo: © Fani Papageorgiou, ZeroWaste PIX/ EEA

Publications > Harm to human health from air ...

Key messages

- Air pollutant concentrations in 2021 remained well above the levels recommended by the World Health Organization (WHO) in its air quality guidelines. Reducing air pollution to these guideline levels would prevent a significant number of attributable deaths in EU Member States (EU-27): 253,000 from exposure to fine particulate matter ($PM_{2.5}$); and 52,000 from exposure to nitrogen dioxide (NO_2). Furthermore, reducing the short-term exposure to ozone (O_3) would have avoided 22,000 attributable deaths.
- Between 2005 and 2021, the number of deaths in the EU attributable to $PM_{2.5}$ fell by 41%.
- For specific diseases, the greatest harm to human health (burden of disease) is from ischemic heart disease for $PM_{2.5}$ and diabetes mellitus for NO_2.
- For each specific air pollution-related disease, the relative contribution to poor health (the burden of disease) from mortality and morbidity can vary significantly. For instance, mortality is by far the dominant contributor for ischemic heart disease and lung cancer, while for asthma it is morbidity. This highlights the importance of considering morbidity to avoid underestimating the harm to human health.

Several indicators

Emissions of air pollutants from transport in Europe

Published 18 Dec 2023

Share

Analysis and data › Indicators › Emissions of air pollutants from transp...

With the introduction of policy measures in recent decades, the emissions
transport in the EU-27 have decreased. Reductions in the road transport se
share of this progress, while emissions from the shipping and aviation sec
pollutants. The dramatic reduction in transport volumes linked to the COV
reductions in emissions for 2020, but this is likely to be temporary. An upt
transportation is already visible for 2021 alongside the rebound in transpo

Figure 1. Emissions of pollutants from transport in EU-27

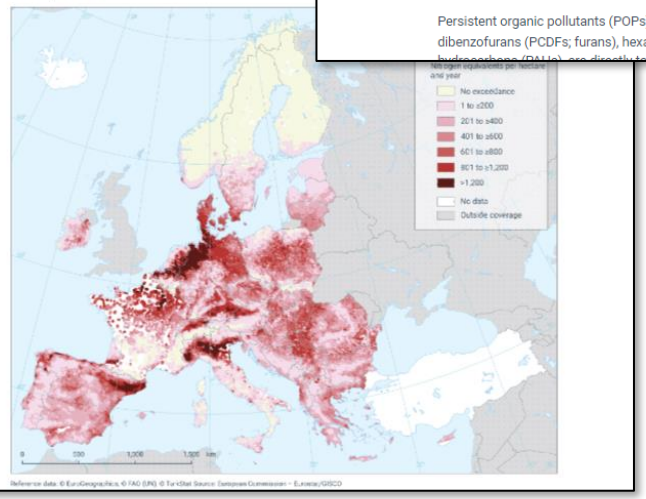
Eutrophication caused by atmos nitrogen deposition in Europe

Published 28 Nov 2023

Analysis and data › Indicators › Eutrophication caused by atmospheric ...

One target of the European Commission's zero pollution act
the EU at risk of eutrophication caused by atmospheric nitro
2005. The total area where nitrogen deposition exceeded th
scientific parameter that measures such a risk - fell by 10%
national emission reduction commitments directive, farm to
are key frameworks to further reduce the risk of eutrophicat

Figure 1. Risk of eutrophication measured as exceeda
in Europe, in 2021



Persistent organic pollutant emissions in Europe

Published 12 Sept 2023

Analysis and data › Indicators › Persistent organic pollutant emissions...

Persistent organic pollutants (POPs) bioaccumulate and harm human health. Targeted EU legislation, in line with commitments under the UNECE Air Convention, led to marked POP reductions from 1990. In recent years (2005-2021), emissions have continued to fall, with declines reported in most Member State hexachlorobenzene by 49%, polychlorinated biphenyls by 53%, dioxins and furans by 43%, and polycyclic aromatic hydrocarbons by 15%. The most significant POP sources are the 'commercial, institutional and households' and 'industrial processes and product use' sectors.

Figure 1. Emissions of persistent organic air pollutants in the 27 EU Member States, 2005-202

Sources | More info

Persistent organic pollutants (POPs), including po
dibenzofurans (PCDFs; furans), hexachlorobenzen

Heavy metal emissions in E

Published 12 Sept 2023

Analysis and data › Indicators › Heavy metal emissions in Europe

Heavy metals accumulate in ecosystems and damage human health. In line with the EU's commitme
under the Air Convention, specific legislation led to reductions in emissions of heavy metals across E
from 1990 levels. Between 2005 and 2021, emissions have continued to decline, with lead emissions
decreasing by 42%, mercury emissions by 47% and cadmium emissions by 37% across the EU-27 Me
States. In 2021, Germany, Italy and Poland contributed most to heavy metal emissions in the EU.

Figure 1. Percentage emission reductions in 2021 of primary heavy metals compared with
levels

Sources | More info

Download Share Enlarge

Heavy metals such as cadmium (Cd), mercury (Hg) and lead (Pb) are toxic to human health, animals and plants. Although ambient air concentrations are above limit values in only a few areas in Europe, typically linked to specific industrial plants, the atmospheric deposition of heavy metals leads to exposure of ecosystems and organisms and bioaccumulation in the food

Emissions of the main air pollutants in Europe

Published 12 Sept 2023

Share

Analysis and data › Indicators › Emissions of the main air pollutants in ...

The air pollutants ammonia (NH_3), non-methane volatile organic compounds (NMVOCs), nitrogen oxides (NO_x), fine particulate matter ($PM_{2.5}$) and sulphur oxides (SO_x) damage human health and the environment, so reducing their anthropogenic emissions is a priority of both EU legislation and international air quality legislation. Since 2005, emissions
significantly by 80% and NH_3 emis
more effort, particularly in the agri
longer term reduction commitmen

Figure 1. Percentage emission re
levels

Sources | More info

Anthropogenic emissions of the main air p
nitrogen oxides (NO_x), fine particulate mat
with damaging effects on human health, v
the Gothenburg Protocol of the Air Conven
reduce emissions of these main air pollut

Emissions and energy use in large combustion plants in Europe

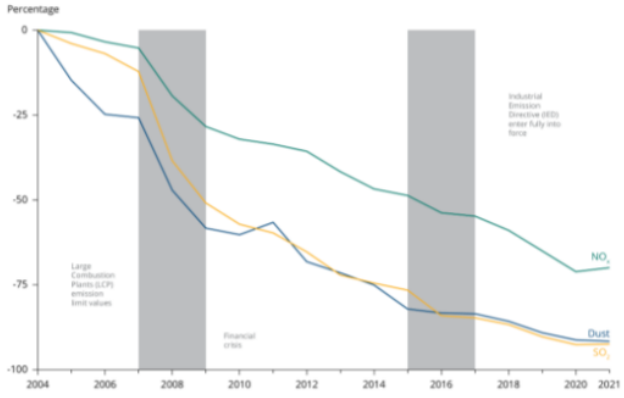
Published 20 Apr 2023

Share

Analysis and data › Indicators › Emissions and energy use in large com...

Between 2004 and 2021, emissions from large combustion plants in the EU decreased: sulphur dioxide (SO_2) and dust by 92%, and nitrogen oxides (NOx) by 70%. Declines in emissions and improvements in environmental performance were largely driven by European policy, which sets legally binding emission limit values. The amount of fossil fuels used decreased by 35%, as energy production shifts to climate-friendly sources and coal is no longer the most used fuel in large combustion plants in Europe. Stricter emission limit values and policies aimed at increasing the use of renewable or cleaner fuels are expected to drive further declines in combustion plant emissions in coming years.

Figure 1. Emission of dust, nitrogen oxides and sulphur dioxide from large combustion plants in the EU-27



Sources | More info

Download Share Enlarge

As of 2021, large combustion plants (LCPs) are responsible for almost 40% of the EU's electricity production capacity. These largely depend on fossil fuels, resulting in the emission of pollutants to air, water and land, with damaging effects on ecosystems. To mitigate the environmental impact, EU policy aims to reduce LCP emissions.

2030 targets and monitoring

TARGET 1
Reduce the health impacts (premature deaths) of air pollution by 55%

Current position/trend (2020 data):

-45% reduction

-55%

Distance to target: **on track**
Baseline year: **2005**

Link to air and health section

TARGET 2
Reduce the share of people chronically disturbed by transport noise by 30%

Current position/trend (2017 data): baseline data available for 2017 only

Trend from 2012 to 2017 is stable

-30%

Distance to target: **not on track**
Baseline year: **2017**

Link to noise and health section

TARGET 3
Reduce EU ecosystem area where air pollution threatens biodiversity by 25%

Current position/trend (2020 data):

-12% reduction

-25%

Distance to target: **partly on track**
Baseline year: **2005**

Link to air and ecosystems section

TARGET 4
Reduce nutrient losses by 50%

Current position/trend: **stable trend**

-50%

Distance to target: **not on track**
Baseline year: **2012-2015**

Link to analysis of nutrient losses

TARGET 4
Reduce the use and risk of chemical pesticides by 50%

Current position/trend: (2020 data)

-14% reduction

-50%

Distance to target: **on track**
Baseline year: **2015-2017**

Link to analysis in production section

4 x on track

TARGET 4
Reduce the use of more hazardous chemical pesticides by 50%

Current position/trend: (2020 data)

-26% reduction

-50%

Distance to target: **on track**
Baseline year: **2015-2017**

Link to analysis in production section

TARGET 4
Reduce the sale of antimicrobials for farmed animals and in aquaculture by 50%

Current position/ analysis: (2021 data)

-18.3% reduction

-50%

Distance to target: **on track**
Baseline year: **2018**

Link to chemicals and health section

TARGET 5
Reduce plastic litter at sea by 50% and microplastics released into the environment by 30%

Current position/trend:

reducing trend for plastic litter at sea

No data for microplastic releases

-30%
-50%

Distance to target: **uncertain**
Baseline year: **2016**

Link to analysis on plastic pollution

TARGET 6
Significantly reduce total waste generation

Current position/trend:

-4% decrease between 2010 and 2020

Distance to target: **not on track**
Baseline year: **not defined**

Link to waste section

TARGET 6
Reduce residual municipal waste by 50%

Current position/trend:

no significant change in residual municipal waste generation since 2016

-50%

Distance to target: **not on track**
Baseline year: **not defined**

Link to waste section

2030 targets and monitoring

TARGET 1 — Reduce the health impacts (premature deaths) of air pollution by 55%

Current position/trend (2020 data): **-45% reduction**

-55%

Distance to target: **on track**
Baseline year: **2005**

Link to air and health section

TARGET 2 — Reduce the share of people chronically disturbed by transport noise by 30%

Current position/trend (2017 data): baseline data available for 2017 only

Trend from 2012 to 2017 is stable

-30%

Distance to target: **not on track**
Baseline year: **2017**

Link to noise and health section

TARGET 3 — Reduce EU ecosystem area where air pollution threatens biodiversity by 25%

Current position/trend (2020 data): **-12% reduction**

-25%

Distance to target: **partly on track**
Baseline year: **2005**

Link to air and ecosystems section

TARGET 4 — Reduce nutrient losses by 50%

Current position/trend: **stable trend**

-50%

Distance to target: **not on track**
Baseline year: **2012-2015**

Link to analysis of nutrient losses

TARGET 4 — Reduce the use and risk of chemical pesticides by 50%

Current position/trend (2020 data): **-14% reduction**

-50%

Distance to target: **on track**
Baseline year: **2015-2017**

Link to analysis in production section

6 x not/partly on track

TARG — chemical pesticides by 50%

Current position/trend: (2020 data) **-26% reduction**

-50%

Distance to target: **on track**
Baseline year: **2015-2017**

Link to analysis in production section

farmed animals and in aquaculture by 50%

Current position/ analysis: (2021 data) **-18.3% reduction**

-50%

Distance to target: **on track**
Baseline year: **2018**

Link to chemicals and health section

T 5 — Reduce plastic litter at sea by 50% and microplastics released into the environment by 30%

Current position/trend: **reducing trend for plastic litter at sea**

No data for microplastic releases

-30%
-50%

Distance to target: **uncertain**
Baseline year: **2016**

Link to analysis on plastic pollution

TARGET 6 — Significantly reduce total waste generation

Current position/trend: **-4% decrease between 2010 and 2020**

Distance to target: **not on track**
Baseline year: **not defined**

Link to waste section

TARGET 6 — Reduce residual municipal waste by 50%

Current position/trend: **no significant change in residual municipal waste generation since 2016**

-50%

Distance to target: **not on track**
Baseline year: **not defined**

Link to waste section

Impact in networking and governance

European Commission

EIONET

45 YEARS 1979-2024 AIR CONVENTION

Thank you