TOXIC FOOTPRINTS EUROPE

Exposing the financiers behind petrochemical toxicity in the EU Chemical Trilateral region

Planet Tracker

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CONTENTS

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KEY TAKEAWAYS

- Petrochemicals, which provide feedstocks for numerous products embedded in the global economy, carry a significant environmental footprint. One of the most important is toxic emissions.

- **The financial market appears largely unconcerned by toxic emissions.**
  This could be for several reasons:
  - perhaps because they are viewed as an unpriced pollutant
  - or investors' focus remains on carbon rather than other discharges
  - or for those monitoring the plastic industry the spotlight is on plastic waste rather than toxic releases

- In the **Trilateral Chemical Region of Europe - an area consisting of Flanders (Belgium), North Rhine-Westphalia (Germany), and the whole of the Netherlands -** which is one of the largest concentrations of petrochemical facilities globally, Planet Tracker identified 1,093 facilities in Belgium, Germany and the Netherlands. These facilities have released and transferred 125 million tonnes of chemicals since 2010 resulting in an estimated 24,640 years of healthy life being lost and 57 billion fractions of species being potentially affected[a].

- **These three countries have different toxic emission footprints**. Germany accounts for the greatest harm to species (ecotoxicity), while Belgium has the worst impact on human toxicity. Petrochemical facilities in the Netherlands release fewer chemicals, by quantity and by type, than petrochemical facilities in Belgium and Germany. However, average releases per facility have been consistently higher in the Netherlands than facilities in the other countries.

- **BASF and Solvay are the most toxic polluters in the region**, appearing in the top 5 of all four metrics analysed (physical releases, ecotoxicity, human toxicity and RSEI hazard).

- **The financiers behind these toxic footprints** are led by BlackRock (5.4% of total investments[b] by equity market value), Vanguard (5.2%) and JPMorgan Chase (3.6%). In terms of debt financing, Citigroup leads with 6.4% of total 10-year capital underwriting (including equity, loans and bonds), followed closely by JPMorgan Chase (6.3%) and Bank of America (5.2%).

a For the methodology used to calculate healthy life lost and species affected please see footnotes to Table 1 – Summary of Findings - and USEtox model analysis in this report.

b The investments include equity, bonds and loans.

SUMMARY OF FINDINGS

Table 1: *Summary of findings in Belgium, Germany and the Netherlands / Source: E-PRTR, Planet Tracker*
Note that numbers in this table may have been rounded.

Metric	Country		
	Belgium	Germany	The Netherlands
Recording system established	2009	2009	1999
Number of facilities	253	666	174
Number of chemicals	58	51	43
Physical releases (kg)	18 billion kg	73 billion kg	34 billion kg
Human Toxicity (DALY)[c]	12 thousand	12 thousand	920
Ecotoxicity (PDF)[d]	17 billion	36 billion	4 billion
RSEI Hazard (Unitless)[e]	1 trillion	2 trillion	1 trillion
Accidental physical releases (kg)	7 million	6 million	4 million
Nr. Exemptions under Article 4[f]	65 from 61 different facilities	3 from 3 different facilities	0
Additional Comments		No further data entry since 2019	average releases per facility have been consistently higher in the Netherlands than facilities in the remaining countries

Table 2: *Summary of top 5 Toxic Polluters based on four metrics / Source: E-PRTR, Planet Tracker*

Rank	Toxic Polluters / Physical Releases	Toxic Polluters / Ecotoxicity	Toxic Polluters / Human toxicity	Toxic Polluters / RSEI Hazard
1	BASF	BASF	BASF	Royal Dutch Shell
2	Solvay	DIC Asset	Umicore	Solvay
3	Dow	Solvay	Solvay	BASF
4	Lanxess	Lanxess	Covestro	Umicore
5	VERBIO Vereinigte BioEnergie	Dow	Lanxess	Westlake

c Human toxicity (DALY): this measures the risk to human health from pollutant releases and quantifies the potential impact in terms of disability-adjusted life years (DALY). It is calculated as the sum of the years of life lost due to premature mortality and the years lived with a disability due to prevalent cases of the disease or health condition in a population. One DALY is equivalent to one person losing one year of healthy life.

d Ecotoxicity (potentially disappeared fraction of species- PDF): this measures the potentially disappeared fraction of species caused by pollutant releases. There are different methodologies used. In this instance we use the USEtox method which measures ecotoxicity for freshwater ecosystems in units of 'potentially disappeared fraction of species. The PDF metric quantifies the potential risk faced by species in an ecosystem

e Risk-Screening Environmental Indicators (RSEI) Hazard (unitless): this measures the risk to human health and is also called toxicity-weighted pounds. Waste management activity quantity (e.g., chemical quantity released to the environment or transferred off-site for further waste management) in pounds per year (TRI Pounds), multiplied by a chemical- and exposure route-specific toxicity weight.

f Facilities are permitted to omit information under Article 4 of the EU Directive on public access to environmental information for several reasons.

Table 3: *Top 10 Toxic Polluters based on physical releases / Sources: ChemSec, E-PRTR, Planet Tracker*

Toxic Polluter	Physical Releases (million kg)	Human Toxicity (DALY3)	Ecotoxicity (million PDF4)	RSEI Hazard[5] (millions Unitless)	2021 ChemScore rating (and ranking)
BASF	18.3	3,972	8.3	149.3	C- (18 / 53)
Solvay	16.5	1,896	3.7	444.5	D (44 / 53)
Dow	14.8	22	1.8	307.2	D+ (36 / 53)
Lanxess	5.0	201	2.6	66.2	D+ (27 / 53)
Verbio	2.9				
Akzo Nobel	2.5			49.4	C (11 / 53)
Covestro	2.5	962	1.0	42.3	C- (14 / 53)
Westlake	1.8	14		67.2	C- (23 / 53)
Royal Dutch Shell	1.5	5	0.2	945.4	

Table 4: *Top 10 Investors holding equity ownership of Global Ultimate Corporate (GUC) of toxic polluters based on physical releases (kg) (million USD) / Source: Refinitiv, Planet Tracker*

Rank	Investor Name	Equity Ownership of GUC (million USD)
1	BlackRock	271,403
2	Vanguard Group	257,044
3	State Street	121,236
4	Buffett (Warren Edward)	113,166
5	Capital Group Companies	77,077
6	FMR	66,712
7	Norway, Kingdom Of (Government)	58,464
8	Geode Capital Holdings	51,628
9	Morgan Stanley	38,050
10	JPMorgan Chase & Co	38,040

BACKGROUND

We live in a world dependent on chemicals. Petrochemical products are a significant part of our daily lives and can be found in many items, including but not limited to, plastics, packaging, clothing, medical equipment, tyres, modern energy systems, including solar panels and wind turbine blades, thermal insulation and electric vehicle parts.

However, the pollutants related to the manufacture of petrochemicals threaten both human health and the environment. **Toxic releases often hide in plain sight.**

Planet Tracker previously analysed US Environmental Protection Agency (EPA) data on petrochemical industry to reveal the largest toxic chemical polluters in the US Gulf states of Louisiana and Texas. In this report, we focus on the European Trilateral Chemical Region[g] and map key toxic hotspots and producers, as well as the financial markets actors responsible for funding them. Table 1 shows the summary of the key findings between the three examined countries in the European Trilateral Chemical Region (Belgium, Germany and the Netherlands).

Please view the data dashboard linked to this report here.

g Strictly speaking the European Trilateral Chemical Region comprises North Rhine-Westphalia (Germany), Flanders (Belgium) and the Netherlands. This region is one of the most powerful clusters of the chemical industry in the world. In this report we include the whole sovereign state, not just the region. For example, we have included all of Germany, not just the state of North Rhine Westphalia.

INTRODUCTION

The pollutants associated with the manufacture of petrochemicals pose a threat to public and environmental health. However, toxic emissions often struggle to make policymakers', corporates' and financiers' priorities.

In June 2022, Planet Tracker released Toxic Footprints - US, and analysed the petrochemical and refining industries in the US Gulf states of Louisiana and Texas, uncovering the toxicity and human health effects of pollutants and also revealing the financial market participants that fund these facilities.

Toxic Footprints - Europe, using a similar approach, focuses on the European Trilateral Chemical Region,[1] an area encompassing the three countries of Germany, Belgium and the Netherlands. It is one of the world's largest chemical industry clusters employing more than 350,000 with a turnover of EUR 180 billion[h,i]. This region has a population of 41 million.

This analysis will make clear to financiers their toxic responsibilities.

With almost 5,000 financial institutions currently funding petrochemical plants in the Trilateral Chemical Region through equity and debt holdings, and finance provision, financiers should pressure these facilities to minimise their toxic releases.

A tightening of regulatory standards would dramatically change the business-as-usual approach; especially as we are in the middle of negotiations to create a first of its kind international legally binding instrument to end plastic pollution. If a meaningful Plastic Treaty is agreed, this could affect governments' regulations on toxic releases (see Planet Tracker's blog: What financial markets should take away from the latest round of negotiations). By revealing the greatest polluters in the industry, Planet Tracker's report and accompanying data dashboard serves as a toolkit for financiers to understand their toxic footprint. They, as a matter of urgency, should recognise the risk associated with these investments, especially if regulatory and legal interventions force the closure and stranding of these investments moving forward.

When analysing the environmental impact of toxic pollutants linked to petrochemical production, we have not included carbon dioxide (CO_2) emissions and water consumption.

h Data is from 2015
i Note that this data refers to the inner core of the European Trilateral Region, which references the regions of Flanders (in Belgium), North Rhine Westphalia (in Germany) and the Netherlands.

INVESTOR CALL TO ACTION

The fact that many petrochemical processes result in the release of toxic pollutants is not disputed. Over 5,000 articles have been identified combining chemical class exposures and health outcomes.[2] In this report, Planet Tracker aims to make clear to financiers their impact both environmentally and on human health and what they can proactively do to ensure better, healthier lives for many people through finance-backed intervention. Financiers have a key role to play in minimising toxic releases.

Financiers of all types should be undertaking due diligence to determine whether these toxic footprints are acceptable. The primary questions financiers should be asking about their investments are:

- ➔ Are they aware of their investment or financing exposure to individual petrochemical facilities?
- ➔ Have they examined their total toxic footprint and that of each facility?
- ➔ Do companies and facilities share the complete set of pollution data?
- ➔ Does the management team operate these facilities in the safest way using up to date emission control technologies?

Financial institutions should regard these as a minimum obligation and be mindful of the potential pollution impacts, especially to local communities.

PETROCHEMICALS PUSH UP OIL DEMAND (2022–2028)[3]

Petrochemicals are rapidly becoming the largest driver of global oil consumption.

In the International Energy Agency's (IEA) 'The Future of Petrochemicals' report[4] in 2018, the Executive Director, Dr. Fatih Birol, stated that 'the market for petrochemical products [is] set to expand further as the global economy develops, the future of the petrochemicals industry is of major significance for both global energy security and the environment'. Using established trends, the IEA predicted that the chemical sector will demonstrate a rate of growth in oil demand that will be higher than that of any other sector, accounting for more than one-third growth in total oil demand. It was also forecasted to play a significant role in gas demand, predicted to account for 7% by 2030.

More recently, the IEA published 'Oil 2023 – Analysis and forecast to 2028'.[5] Although the report predicts that the world oil demand will 'lose momentum over the 2022-28 forecast period' it also notes that '[...] led by continued increases in petrochemical feedstocks, total oil consumption growth will remain narrowly positive through 2028' – see Figure 1.

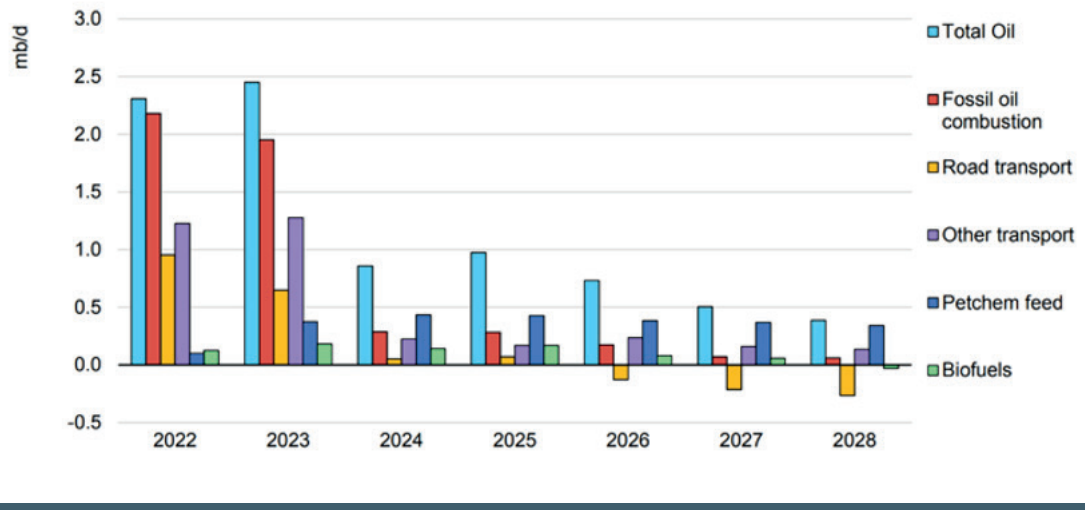

Figure 1: *Annual oil demand growth, 2022-2028. Note: Fossil oil combustion is total demand minus feedstock use, other non-energy uses and biofuels consumed / Source: IEA (2023)*

Over the forecast period from 2022 to 2028, petrochemicals are expected to account for 40% of overall oil demand growth. The IEA sees petrochemical growth 'with scant opportunities for efficiency gains and circular economy initiatives only offering a limited restraint on upward momentum' and suggests that the petrochemical sector is forecasted to be the key driver of global oil demand growth, with liquified petroleum gas (LPG), ethane and naphtha accounting for more than 50% of the rise between 2022 and 2028 and nearly 90% of the increase compared with pre-pandemic levels. By 2028, the IEA forecasts that petrochemicals will account for 17% of world oil demand, a raise of 2% from what accounts currently and positions the sector in the second place in oil consumption[6] – see Figure 2.

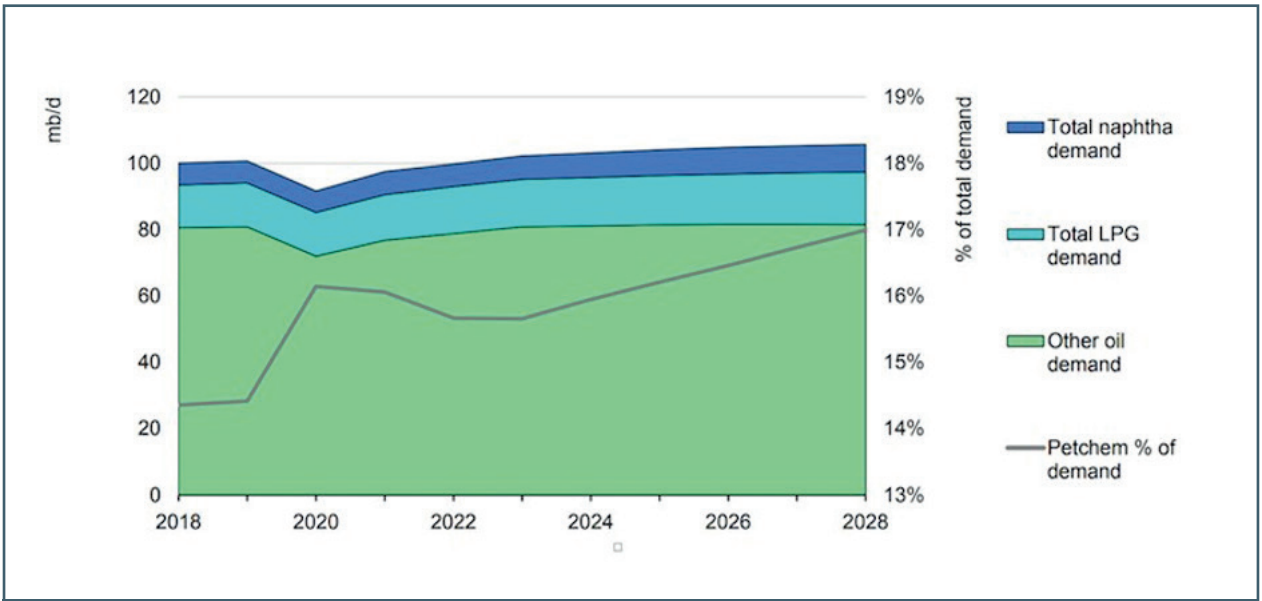

Figure 2: *World oil demand and petrochemical sector contribution / Source: IEA (2023)*

THE REPORTING SYSTEM

Over 30 years ago, in June 1992, the United Nations Conference on Environment and Development (UNCED), (also known as the 'Earth Summit'), established that States of the Earth Summit should develop national laws regarding liability and compensation for the victims of pollution and other environmental damage (Principle 13), that national authorities should take into account the approach that the polluter should, in principle, bear the cost of pollution (Principle 16) and that environmental impact assessment, as a national instrument, shall be undertaken for proposed activities that are likely to have a significant adverse impact on the environment (Principle 17)**.**[7]

Almost 11 years later, the Pollutant Release and Transfer Register ("PRTR") Working Group was introduced at the UN-ECE level (United Nations Economic Commission for Europe) and following two years of negotiations resulted in the implementation of the PRTR Protocol[j] in May 2003, at the 5th Conference of Environment Ministers "Environment for Europe", in Kiev. There, 36 countries signed the Protocol, that had to become active by September 2009, and forced the establishment of national pollutant registers. The European Union (EU) and its Member States, which numbered 15 at that time, were among the 36 consignees. Three years after the Kiev meeting, in January 2006, the EU established the European Pollutant Release and Transfer Register ("E-PRTR") which required all facilities to report information about releases and waste quantities to their national authorities for inclusion in the European Register.[8]

Note that facilities may report more information to their national agencies than to the E-PRTR. The E-PRTR carries information only according to the minimum recording requirements agreed by the member states.

j For more information, UN Economic Commission for Europe, Guidance on Implementation of the Protocol on PRTR

Pollutant Release and Transfer Register ("PRTR") definition and role

The PRTR is a national environmental database which contains information recorded by industrial facilities regarding the volumes of hazardous chemical substances and pollutants they release to air, soil and water, and transferred off-site for treatment or disposal. Some PRTRs also comprise estimations of emissions from diffuse sources, including agriculture and transport, or end-use of products.[9]

PRTRs are designed to provide a valuable source of information for various uses and purposes. Accessibility to everyone is important in various stages of decision-making and thus it is provided free of charge using electronic means. The PRTRs can be used by various stakeholders as seen in Table 5.[10]

Table 5: *Various stakeholders use PRTRs / Source: OECD, Planet Tracker*

Stakeholder	Governments	Public	Corporates	Civil Society	Financiers
Purpose	To understand trends in pollutant releases and waste generation, advise policymaking decisions, and even identify risks that can harm human health and the environment.	To recognize chemical risks caused by emissions from industrial facilities and monitor their efforts to cut down their environmental impact.	To find opportunities to improve efficiency and measure their progress towards sustainability.	Civil society, media and researchers also benefit from access to public information.	To support investments towards green economy.

There are more than 50 countries worldwide with active PRTRs or pilot projects, and many more are expected to be introduced in the next few years especially in Asia and South America - see Figure 4. Often these national registers operate in a similar way but may differ depending on each country's circumstances, including regulations and industry infrastructure.[11]

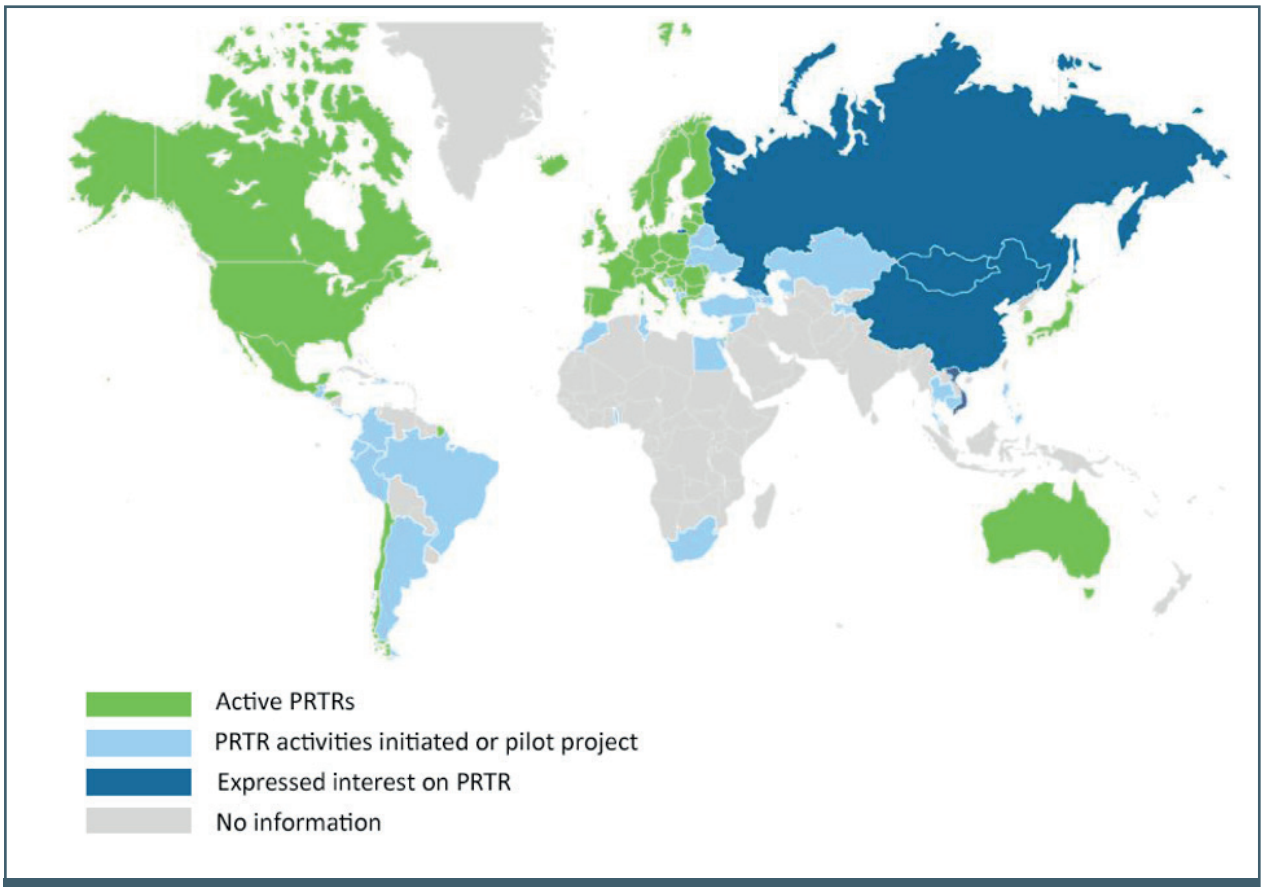

Figure 3: *Map of PRTRs globally / Source: EPA*

PRTR in Belgium

Belgium has been active in developing the PRTR Protocol since the beginning of negotiations and it released its Protocol in 2009. The inventory's information is available via the following channels:

- the PRTR websites of the three Regions:
  - Brussels-Capital Region
  - Flemish Region
  - Walloon Region
- the E-PRTR on the European Environment Agency (EEA) website.

The inventory tool comprises air, water and soil pollutants, including benzene, methane and mercury, as well as sets of substances like volatile organic compounds, greenhouse gases or heavy metals but also data on waste transfer[k]. The term "waste" refers to materials that are:

- disposed of or recovered;
- anticipated to be disposed of or recovered; or
- obliged by national law to be disposed of or recovered.[12]

k The entire list is detailed in Annex II of the Protocol.

PRTR in Germany

Germany also introduced the PRTR Protocol in 2009. The current register provides information on air emissions, volumes of pollution and waste amount of approximately 5,000 facilities in the country[13]. It is also an opportunity for the sector to provide information on their efforts and achievements towards sustainability. The German e-PRTR software is free of charge with no license fees. However, Germany, as we have been advised by the European Environment Agency (EEA), did not submit anything to the PRTR for four years until its latest submission in 2023.

PRTR in the Netherlands:[14]

The Netherlands use the Pollutant Emission Register/Europol Information System ("PER/EIS") which is the Dutch equivalent of the PRTR. So far, the Department for Monitoring and Information Management of the Inspectorate for Environmental Protection is provided yearly with the countrywide emissions information of about 500 facilities (approximately 2,100 plants) on a voluntary basis.

The reporting system in Netherlands started before the introduction of PRTR Protocol. In 1999, large companies were required to submit their emissions in a publicly available report on an annual basis. This environmental report contained information of approximately 320 most polluting companies in the country and became compulsory from 1999 onwards.

In the environmental report, a facility is requested to provide information on its environmental performance and its environmental management system; both topics need to be presented in one report for the public and one for the government – they can also be combined. The former report needs to follow the European standards for the Eco-Management and Audit Scheme ("EMAS") declaration,[15] while the latter report needs to provide data to monitor the progress of emission reductions.

Revision

In 2022, the European Commission adopted proposals to review the Industrial Emissions Directive (IED) and the E-PRTR Regulation in order to create an Industrial Emissions Portal which is expected to launch during the first quarter of 2025.[16]

"The new rules aim to:
- improve data transparency and public access to environmental information through the Industrial Emissions Portal,
- re-align the sectoral scope and granularity of reporting in order to better support IED implementation,
- improve the ability to respond to new reporting demands on pollutants and activities,
- provide information on the industrial use of energy, water and raw materials".[17]

The European Commission is also planning to require companies to report production volume information from the reporting year of 2023. The European Commission would use this data to identify best performers and create benchmarks. This data would be not disclosed to the public, except for aggregated or anonymised format, for confidentiality reasons.[18]

Though the necessity of a recording system became **apparent over 30 years ago** it has taken a considerable amount of time for the countries to develop and implement the register system which still has a lot of room for improvement. One important issue is that the quantities of the chemicals are self-reported and inevitably it is left to the discretion of the facility to provide accurate information on its toxic releases, which raises questions over its reliability as a system of measurement. Below, we discuss whether the political landscape has played a role in delaying its progress?

POLITICAL BACKDROP

In "Global Plastics Treaty Headwinds" published earlier this year, Planet Tracker referred to the strong connections between the political landscape and the fossil fuel and petrochemicals industry. Interestingly, on 9 September 2023, the G20 leaders gathered in New Delhi, India, and adopted a joint declaration covering issues ranging from climate change and sustainable development to gender equality and countering terrorism. On the topic of plastics pollution, it welcomed the development of the legally binding instrument on plastics pollution, emphasising marine pollution, but failed to set a timeline to end the use of oil and gas. The text only mentioned that it 'will increase [their] efforts to implement the commitment made in 2009 in Pittsburgh to phase-out and rationalise, over the medium term, inefficient fossil fuel subsidies that encourage wasteful consumption and commit to achieve this objective, while providing targeted support for the poorest and the most vulnerable'. In the 34-page declaration, this is the only reference to fossil fuels.

A study published in August 2023 by the International Institute for Sustainable Development (IISD), revealed that in 2022, G20 member countries spent a record 'USD 1.4 trillion in the form of subsidies, investments by state-owned enterprises (SOEs), and lending from public financial institutions (PFIs). While much of this was support for consumers, around one third (USD 440 billion) was driving investment in new fossil fuel production'.

STUDY METHODOLOGY

Data Sources

Data in this report and accompanying dashboard has been taken from the following sources:

- European Pollutant Release and Transfer Register (E-PRTR).
- Planet Tracker's corporate and investor Plastic Risk reports.
- ChemSec chemical company sustainability scores.
- OECD chemical categories.
- Equity, bond, and financing information was sourced from LSEG Data & Analytics (formerly Refinitv).

Scope

Planet Tracker identified 19 activities in the E-PRTR which were classified as petrochemical related. There activities are classified at a high level as:

- Production of basic organic chemicals.
- Production of basic inorganic chemicals.
- Production of nitrogen, phosphorus, and/or potassium-based fertilisers.

Planet Tracker analysed facilities that either reported these activities as either their main, or one of their secondary activities. The facilities are only located in either Belgium, Germany, or the Netherlands. Pollutant releases from 2010 to 2021 were included in the analysis.

Key Points

The E-PRTR contains pollutant chemical releases, which also includes the release of greenhouse gases (GHGs). Planet Tracker removed from its analysis the emission of non-toxic GHGs such as carbon dioxide and methane. Some chemicals which have a GHG impact, which are also have some toxicity impact, such as ammonia and nitrogen oxides, were kept in the analysis.

Facilities must report to the E-PRTR[I] if they fulfil the following criteria:[19]

- The facility falls under at least one of the E-PRTR economic activities listed in Annex I of the E-PRTR Regulation and exceeds at least one of the E-PRTR capacity thresholds; and
- the facility transfers waste off-site which exceed specific thresholds set out in Article 5 of the Regulation; or
- the facility releases pollutants which exceed specific thresholds specified for each media – air, water and land – in Annex II of the E-PRTR Regulation.

The data to be reported annually by each facility for which the applicable thresholds are exceeded are:

- Releases to air, water and land of any of the E-PRTR pollutants.
- Off-site transfers of any of the E-PRTR pollutants in wastewater destined for wastewater treatment outside the facility.
- Off-site transfers of waste for recovery or disposal. For transboundary movements of hazardous waste outside the reporting country, details of the waste receivers have to be provided.
- The reported releases include any introduction of any of the listed pollutants into the environment as a result of any human activity, whether deliberate, accidental, routine or non-routine, at the site of the facility.

I The E-PRTR regulation can be found here.

USEtox model

Planet Tracker has taken the USEtox model to calculate ecotoxicity and human toxicity impacts. These metrics quantify the potential impact and risk to human health and biodiversity. The impact pathways covered by USEtox are shown in Figure 4.[20]

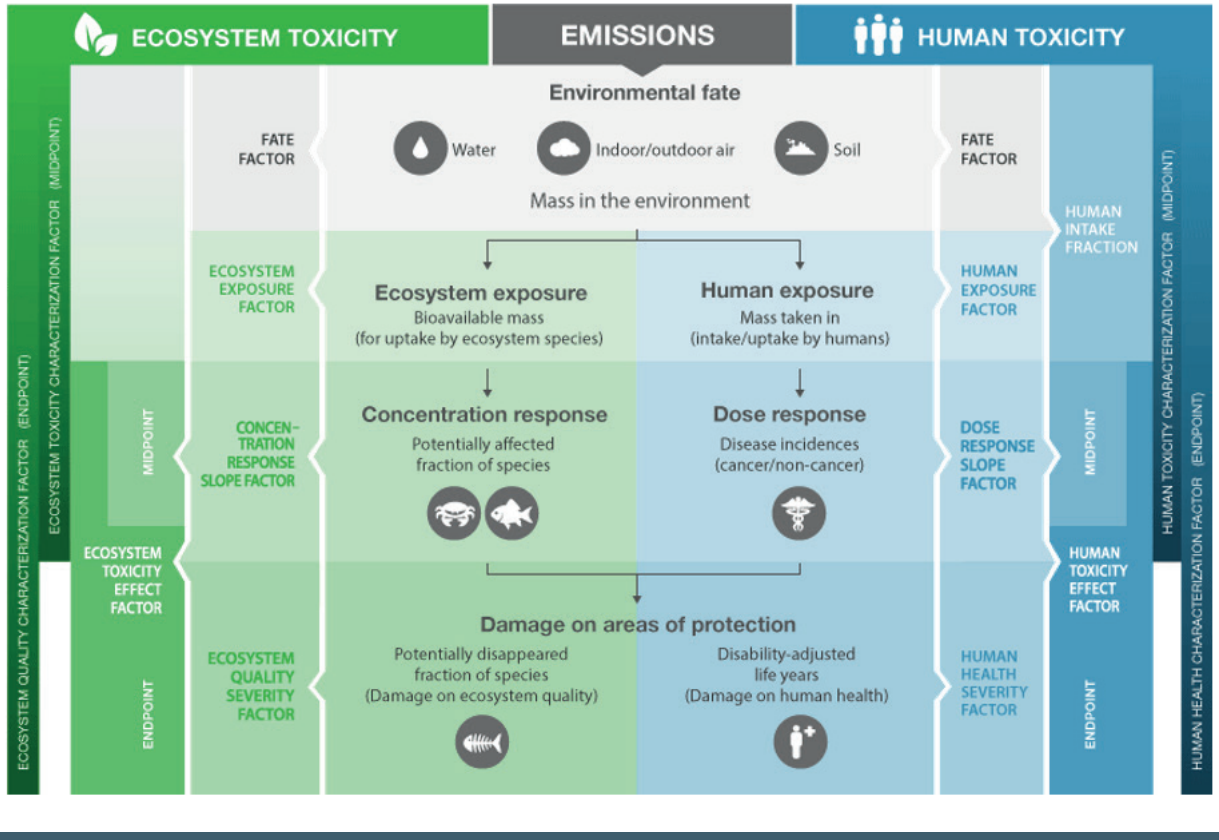

Figure 4: *Usetox comparative toxicity assessment framework / Source: Usetox*

Metrics

Planet Tracker aggregated releases to air, land, and water to arrive at a total amount of pollutants released. For simplicity, only the totals for all metrics have been provided in the report and associated dashboard.

There are four metrics which can be used to assess the toxic releases from EU petrochemical facilities in this report. These are briefly outlined below:

- **Physical quantity** (kg): this is simply the weight of pollutants released and transferred offsite to the environment. In the report we refer to them as physical releases.
- **Ecotoxicity** (Potentially disappeared fraction of species - PDF): this measures the potentially disappeared fraction of species caused by pollutant releases. There are different methodologies, but this report uses the USEtox method. This measures ecotoxicity for freshwater ecosystems with the units 'potentially disappeared fraction of species' (PDF) to study species mortality. The PDF metric quantifies the potential risk faced by species in an ecosystem.[21]

- **Human toxicity** (Disability-adjusted life years - DALY): this measures the risk to human health from pollutant releases and quantifies the potential impact in terms of disability-adjusted life years. DALYs for a health condition are the sum of the years of life lost due to premature mortality and the years lived with a disability due to prevalent cases of the health condition in a population. One DALY is equivalent to one person losing one year of healthy life.[22]
- **Risk-Screening Environmental Indicators (RSEI) Hazard** (unitless): this measures the risk to human health and was the main metric used in Planet Tracker's previous study, Toxic Footprints - US. It calculates the chemical quantity released to the environment or transferred off-site for further waste management in pounds per year (TRI Pounds), multiplied by a chemical- and exposure route-specific toxicity weight.[23] It is provided here so that users can compare toxic releases of facilities between the two studies (which can also be done by using the physical quantity of chemicals released).

Notes on the E-PRTR

Following discussions with the European Environment Agency (EEA) Planet Tracker was informed that there had been significant issues with countries reporting to the E-PRTR in recent years. One of the problems was that countries have submitted data with large reporting errors which was one of the reasons that the E-PRTR database was taken offline in 2023. Another was that some countries, such as Germany, had not reported any information to the inventory for four years prior to 2023. Therefore, research published on E-PRTR data could only use facility reported data to 2017, and then rely on projections to cover the gaps to 2021 until the latest database was published earlier this year.

There are also issues with countries, such as Belgium, who have classified companies and their activities as confidential in their disclosures to the E-PRTR. Planet Tracker contacted OVAM (the Public Waste Agency of Flanders region in Belgium) to question the information in the database and were informed this would be corrected. At the time of publication, this data has still not been corrected and we had not received any further responses to our questions.

Production data would be a valuable metric so users could benchmark the pollutant releases of facilities based on the quantity of products that are manufactured. This data is not available but will be a requirement of facilities to report from 2024 onwards. When published, the data will be aggregated so that sector and activity-level analysis can be conducted, though this will not be possible at the facility level.

Limitations

- Not all chemicals are covered by all metrics in the report. In total, there are 62 pollutant releases in this analysis, 34 of which are covered by USEtox, and 40 by the EPA's RSEI Hazard metric.
- The analysis only includes facilities that fall within the reporting thresholds of the E-PRTR. If facilities release fewer toxic chemicals than the threshold, then they need not report.
- The disclosure of "Hazardous Waste" and "Non-Hazardous Waste" hides a lot of information on the chemical contents of that waste. For the petrochemical facilities in this analysis, 100% of the non-hazardous waste goes to an unknown location, and 94% of the hazardous waste gets sent to an unknown location (98% for all waste combined). We do not know anything about the chemical content of this waste.

PETROCHEMICAL RELEASES IN THE TRILATERAL CHEMICAL REGION

Almost 20% of the petrochemical's industry total turnover at European level is generated in the Trilateral Chemical Region which is by far the highest amount for any chemical per capita.[24]

The Trilateral Chemical Region is the source of high levels of toxic emissions and, therefore, of a significant toxic footprint from both its producers and their financiers. Figure 5 shows the locations of the 1,093 petrochemical facilities identified in the region. The larger the circle, the greater the toxic releases to air, land and water (in Kg).

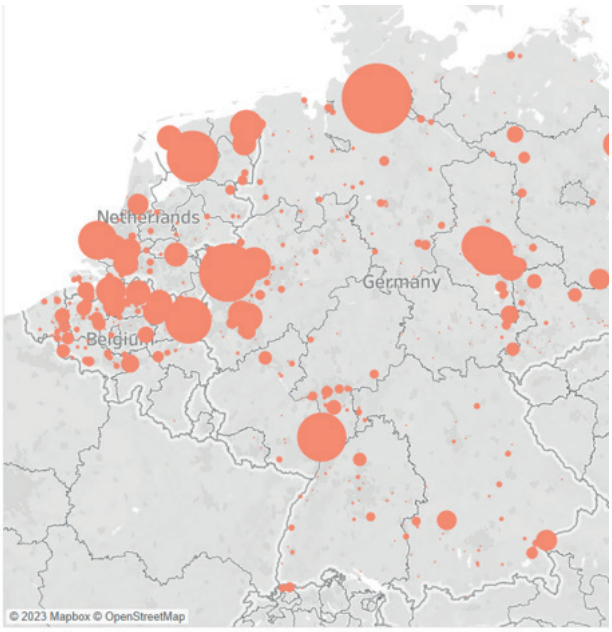

Figure 5: *Location of petrochemical facilities in Trilateral Region measured by releases to air, land and water and offsite waste transfers between 2010 and 2021, in Kilograms / Source: E-PRTR, Planet Tracker*

However, these numbers are largely driven by the 3 categories of chemicals: chlorides, non-hazardous off-site waste transfers and hazardous offsite waste transfers. It is important to note that the toxicity to humans and ecosystems of off-site waste transfers cannot be estimated, since no information is provided regarding the type of chemicals included.

The Bigger Picture (volume of releases and offsite transfers in Kg)

Historically, German petrochemical companies have consistently been the most significant in terms of the physical quantity of toxic chemicals released. Only the Netherlands, in 2021, came close to emitting more. Belgian petrochemical facilities on the other hand have only released 14% of all the toxic chemicals in the region since 2010. The types of chemicals released over this period are dominated by releases of hazardous and non-hazardous waste, and the releases of inorganic substances (which is essentially the release of chlorides) - see Figure 6.

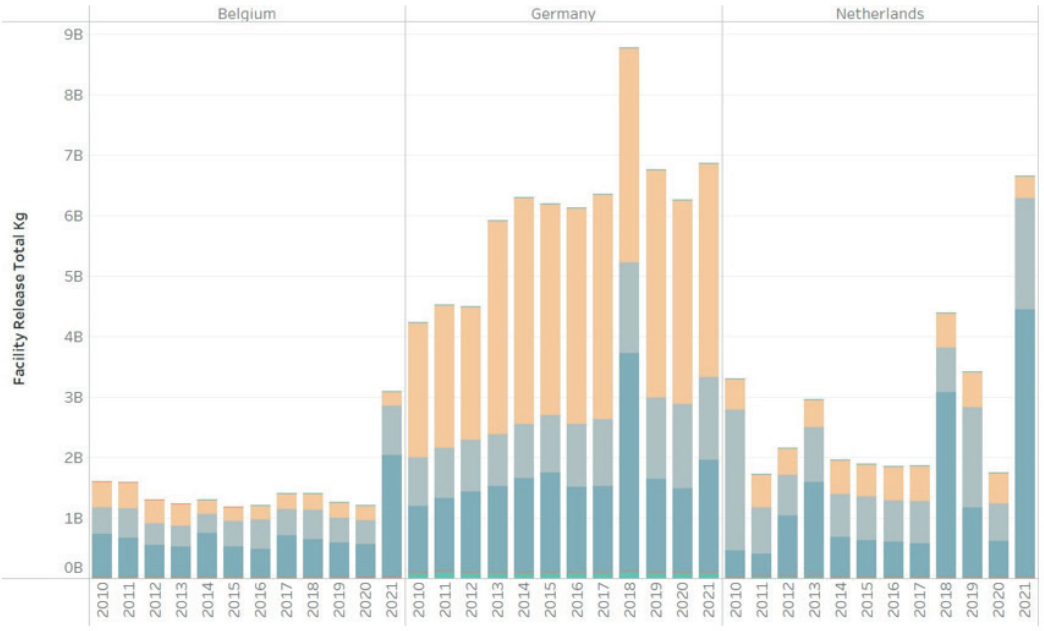

Figure 6: *Total toxic chemical releases by pollutant type and country. Unit: kilogrammes. Colours: GREY – Other Hazardous Waste; BLUE – Other Non-Hazardous Waste; BEIGE – Inorganic Substances. / Source: E-PRTR, Planet Tracker*

However, average toxic releases per facility tell a different story. Median releases from facilities in each of the countries are a lot closer than total releases. On average, a Belgian facility releases 8.5 tonnes of toxic chemicals per year, a German one 13.6 tonnes and a Dutch facility 15.5 tonnes. There have been notable spikes in Belgium in 2021, in Germany in 2018 and in the Netherlands across five years starting in 2010, then in 2013, 2018, 2019 and 2021- see Figure 7.

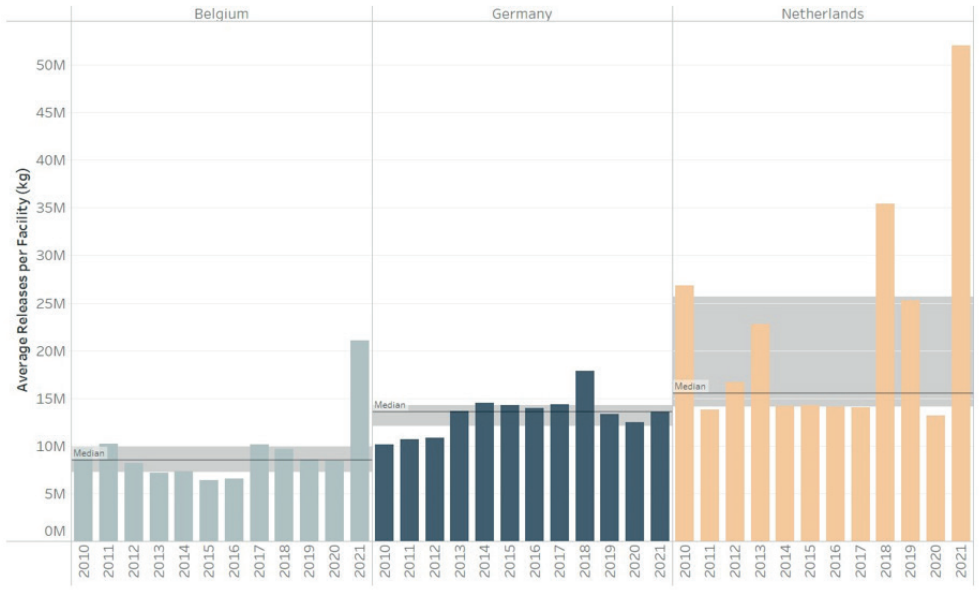

Figure 7: *Average toxic releases per facility by country. UNIT: kilogrammes. COLOURS: GREY - Belgium; BLUE - Germany; BEIGE – Netherlands / Source: E-PRTR, Planet Tracker*

German facilities are the main sources of the top three chemical releases – chlorides, non-hazardous waste, and hazardous waste – responsible for between 42% and 80% of total releases. See Figure 8 for the top 10 toxic chemicals released since 2010.

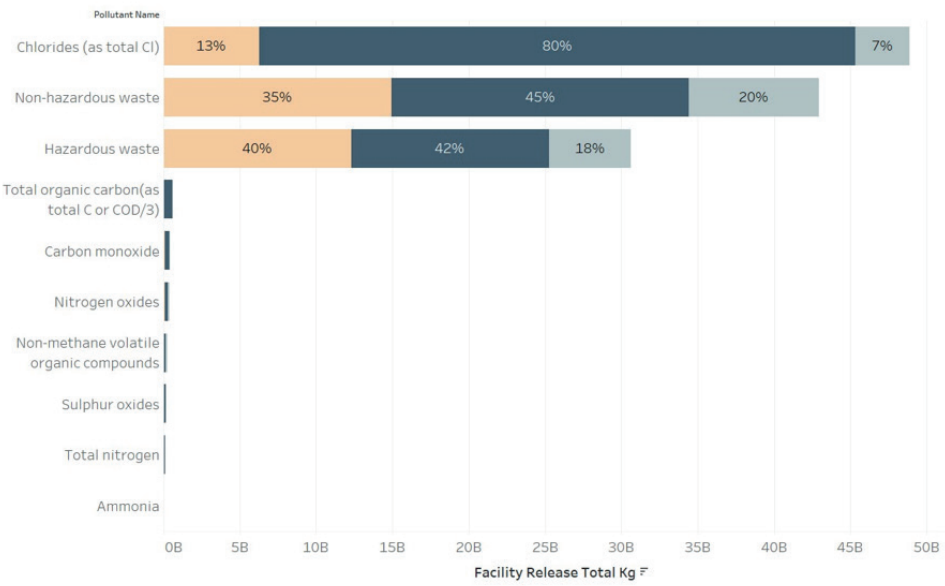

Figure 8: *Top 10 chemical releases since 2010 in the Trilateral Region. Colours: GREY - Belgium; BLUE - Germany; BEIGE – Netherlands / Source: E-PRTR, Planet Tracker*

The activities driving the releases of each of the top three toxic chemicals is shown in Table 6.

Table 6: *Production activities driving the releases of toxic chemicals / Source: E-PRTR, Planet Tracker*

Country	Belgium	Germany	Netherlands
Chlorides	• oxygen containing hydrocarbons (37%) • salts (20%)	• inorganic gases (33%) • salts (26%)	• inorganic chemicals (44%) • organic chemicals (39%)
Non-Hazardous Waste	• oxygen containing hydrocarbons (28%) • basic plastic materials (18%)	• oxygen containing hydrocarbons (34%) • organic chemicals (24%)	• organic chemicals (60%) • thermal power stations (25%)
Hazardous Waste	• non-ferrous crude metals (39%) • oxygen containing hydrocarbons (13%)	• organic chemicals (50%) • oxygen containing hydrocarbons (17%)	• organic chemicals (90%)

Planet Tracker examined chemical releases across a total of four measures – ecotoxicity, human toxicity, physical releases and RSEI Hazard - between 2010 and 2021. In total, the Trilateral Chemical Region released **125 million tonnes of toxic chemicals** and is responsible for **24,640 years of healthy life lost (DALYs)**. Germany has the highest records on three of the four measures, apart from human toxicity where it comes close second after Belgium with over 12,100 DALYs - see Table 7.

Table 7: *Toxic releases recorded between 2010-2021 / Source: E-PRTR, Planet Tracker*

Country	Ecotoxicity (million PDF)	Human Toxicity (DALY)	Physical (million tonnes)	RSEI Hazard (billions, unitless)
Belgium	16,629	12,172	17.8	1,250
Germany	36,387	11,547	72.8	1,741
The Netherlands	4,197	920	33.9	1,201
Trilateral Chemical Region	57,213	24,640	124.5	4,191

Hazardous (30.6 million tonnes) and non-hazardous (42.9 million tonnes) waste accounts for 59% of the toxic releases by petrochemical facilities since 2010. As no further information is provided on the chemical contents of this waste stream it is excluded from further analysis.

Physical releases and offsite transfers

Looking more closely at the remaining pollutants, inorganic substances are the most common chemicals released and transferred offsite by tonnage, accounting for 39% of all releases. Figure 9 shows how pollutant types rank according to their physical releases.

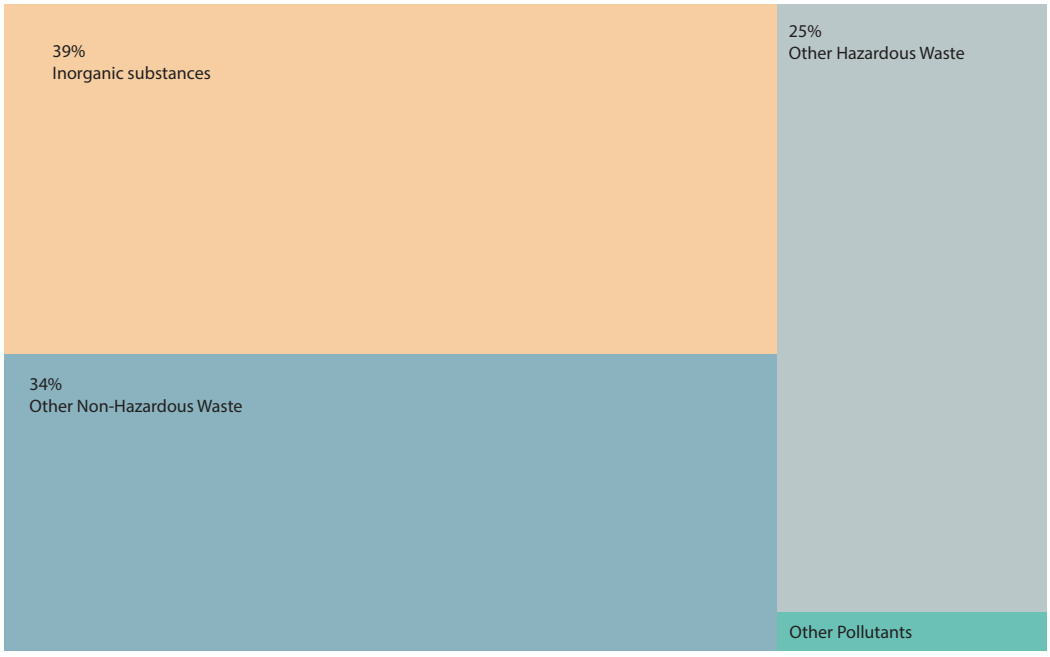

Figure 9: *Top pollutant types by physical releases (kg) / Source: E-PRTR, Planet Tracker*

What we have discussed so far covers releases and offsite transfers measured in kilogrammes. However, as mentioned, these numbers are mainly driven by three categories of pollutants, and they do not tell us much about the toxicity of the releases. To do that, we need to look at metrics that measure toxicity, either to humans or to ecosystems.

Human toxicity

Figure 10 shows the same petrochemical facilities as Figure 5, but with the size of the circle proportional to the human toxicity of the releases to air, land and water measured in DALYs (Disability-Adjusted Life Years). We can see that this map tells a very different story to the previous map (Figure 5), with a strong concentration of human toxic releases in Belgium.

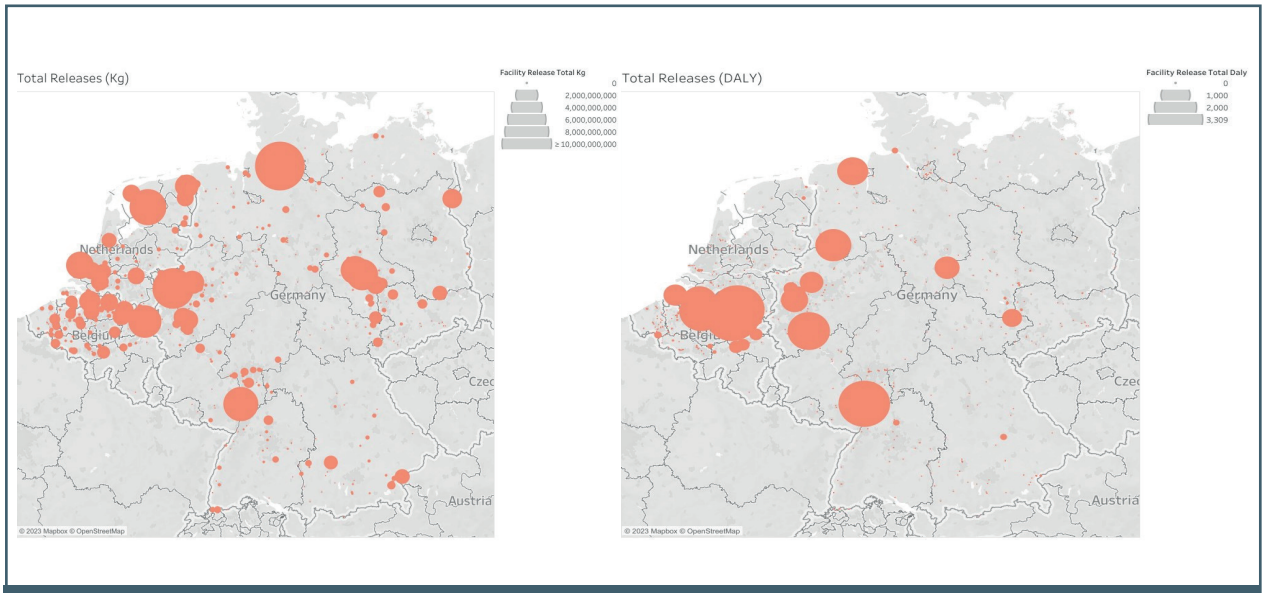

Figure 10: *Map on the Left: Location of petrochemical facilities in Trilateral Region measured by releases to air, land and water and offsite waste transfers between 2010 and 2021, in Kilograms (figure 5). Map on the right: Location of petrochemical facilities in Trilateral Region measured by releases to air, land and water between 2010 and 2021, in Disability-Adjusted Life Years (DALY) / Source: E-PRTR, USETox, Planet Tracker*

Most of that human toxicity is caused by the releases of metals (99%), mostly mercury (72%) and then followed by zinc (16%) – see Figure 11.

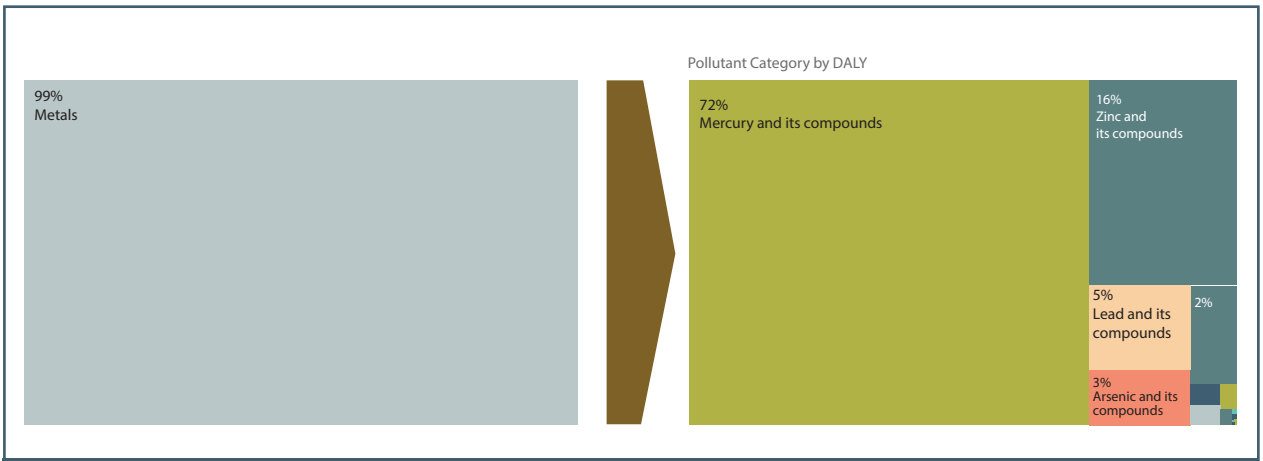

Figure 11: *Top pollutant types by Human Toxicity (DALY) / Source: E-PRTR, Planet Tracker*

Ecotoxicity

Likewise, most of ecotoxicity as measured by potentially disappeared fraction of species (PDF) is caused by metals (94%), mostly zinc (66%) followed by copper (15%) – see Figure 12.

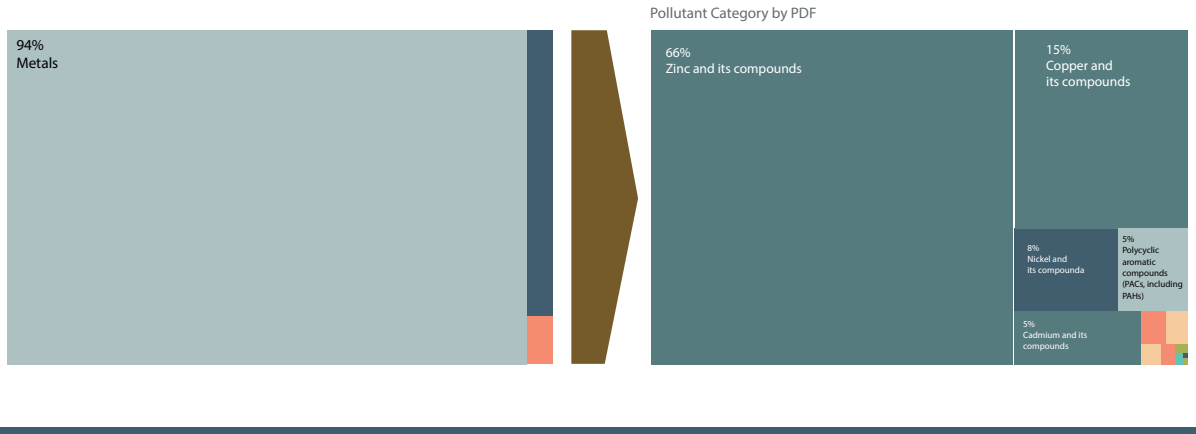

Figure 12: *Top pollutant types by Ecotoxicity (potentially disappeared fraction of species - PDF) / Source: E-PRTR, Planet Tracker*

RSEI Hazard

Lastly, if we attempt to measure toxicity by Risk-Screening Environmental Indicators (RSEI) Hazard, the largest contributors are ethylene oxide (43%), chlorine (26%) and metals (10%) – see Figure 13.

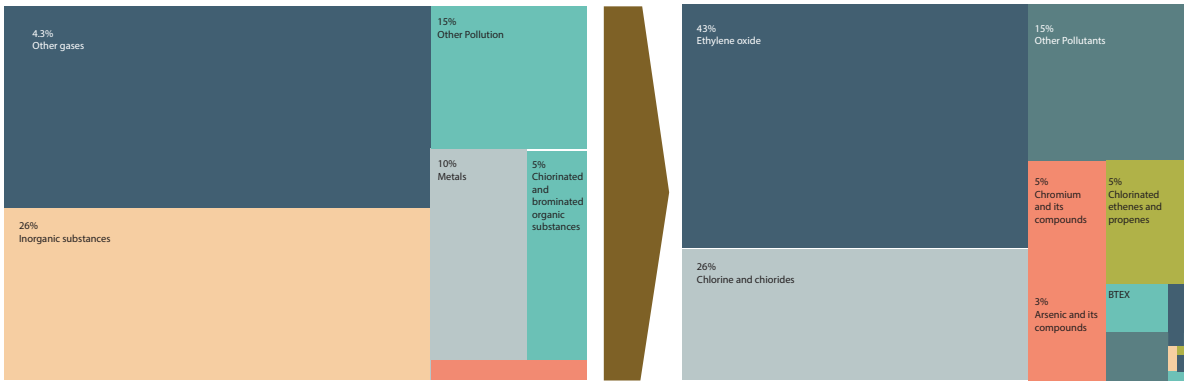

Figure 13: *Top pollutant types by RSEI Hazard / Source: E-PRTR, Planet Tracker*

Human toxicity and ecotoxicity over time

In the Trilateral Region, human toxicity has demonstrated a steady annual decline over the last ten years which hopefully means that fewer harmful toxins in the E-PRTR, measured by human toxicity, are entering the environment. However, this is not the case for ecotoxicity impacts. The median value of the potentially disappeared fraction of species is 4.5 billion, but with a notable dip in 2015 (3.4 billion) and spike in 2018 (7.9 billion) – see Figure 14.

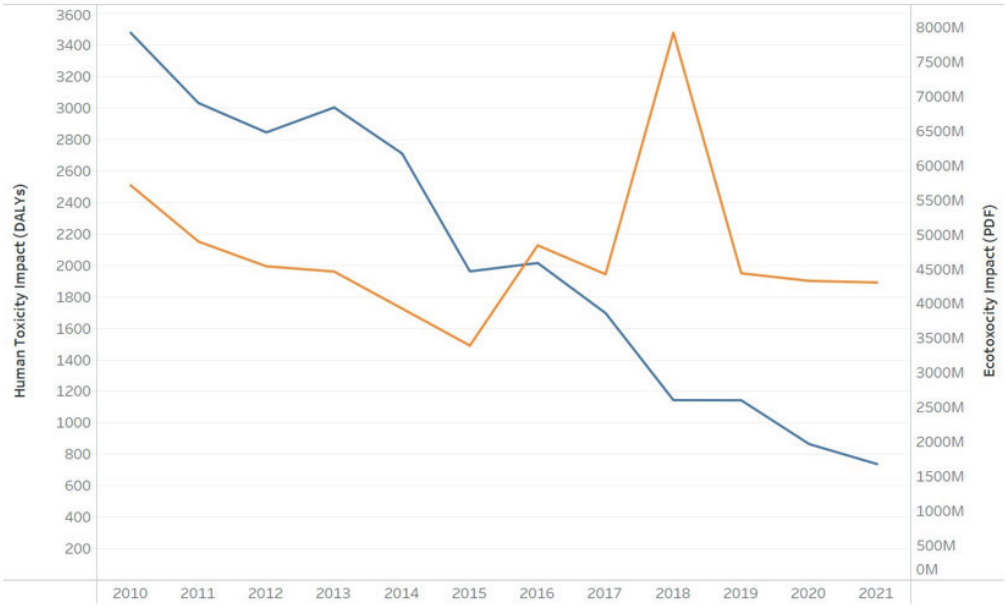

Figure 14: *Human toxicity vs ecotoxicity between 2010-2021. Colours: BLUE - DALYs; ORANGE - PDF / Source: E-PRTR, Planet Tracker*

The spike in 2018 was due to a private firm, Vandeputte Huilerie, releasing 108,000 kg of fluoranthene, a polynuclear aromatic hydrocarbon that is a known human carcinogen, and poses danger to freshwater aquatic life.[25,26]

THE TOXIC PRODUCERS

To incentivise facilities to ensure they report accurate pollutant release data, the EEA has produced a Significant National Polluters table. It identifies facilities that contribute more than 50% of the total release of a pollutant[m]. Facilities are identified on a yearly basis for each country and activity. A total of 54 petrochemical facilities in this study were identified as being significant national polluters. The top five parent companies of these facilities are shown in the Table 8.

Table 8: *Parent companies of facilities identified as significant national polluters by the European Environment Agency / Source: EEA, Planet Tracker*

Rank	Parent Company	Pollutant Name	Media
1	BASF (20 significant national polluter entries)	Hydrochlorofluorocarbons (HCFCs) Ammonia (NH_3) Carbon dioxide (CO_2) Naphthalene Nitrogen oxides (NOX) Nitrous oxide (N_2O)	Air
		Arsenic and compounds (as As) Chlorides (as total Cl) Copper and compounds (as Cu) Cyanides (as total CN) Ethyl benzene Fluorides (as total F) Halogenated organic compounds (as AOX) Nickel and compounds (as Ni) Toluene Total nitrogen Total organic carbon (as total C or COD/3) (TOC) Total phosphorus Xylenes Zinc and compounds (as Zn)	Water
2	Solvay (14 significant national polluter entries)	Ammonia (NH_3) Carbon monoxide (CO) Copper and compounds (as Cu)	Air
		Arsenic and compounds (as As) Chlorides (as total Cl) Lead and compounds (as Pb) Mercury and compounds (as Hg) Nickel and compounds (as Ni) Total nitrogen Zinc and compounds (as Zn)	Water
3	Dow (10 significant national polluter entries)	Naphthalene Nitrogen oxides (NOX)	Air
		1,2-dichloroethane (DCE-1,2) Chlorides (as total Cl) Chromium and compounds (as Cr) Dichloromethane (DCM) Halogenated organic compounds (as AOX) Phenols (as total C) Tetrachloroethylene Total organic carbon (as total C or COD/3) (TOC) Trichloromethane	Water

m In the view of an increased use of the E-PRTR/LCP dataset, to support the Zero Pollution strategy, the EEA has implemented the current meth odology to strengthen the post Submission checks procedure of data reported under the E-PRTR/LCP. The goal was to identify a list of facilities that have a relevant contribution to the releases of a given target (air, water), EPRTR Annex I Activity and year for each reporting Country.

4	INOVYN (9 significant national polluter entries)	Hydrochlorofluorocarbons (HCFCs) Vinyl chloride	Air
		Chlorides (as total Cl) Mercury and compounds (as Hg) PCDD + PCDF (dioxins + furans) (as Teq) Total organic carbon (as total C or COD/3) (TOC) Vinyl chloride Zinc and compounds (as Zn)	Water
5	PRAYON (9 significant national polluter entries)	Fluorine and inorganic compounds (as HF) Zinc and compounds (as Zn)	Air
		Cadmium and compounds (as Cd) Chromium and compounds (as Cr) Fluorides (as total F) Lead and compounds (as Pb) Mercury and compounds (as Hg) Nickel and compounds (as Ni) Zinc and compounds (as Zn)	Water
6	Yara (9 significant national polluter entries)	Benzene Carbon dioxide (CO_2) Carbon dioxide (CO_2) excluding biomass Hydrochlorofluorocarbons (HCFCs) Methane (CH_4) Particulate matter (PM10) Nitrogen oxides (NOX) Nitrous oxide (N_2O)	Air
		Lead and compounds (as Pb)	Water

Note: It may be that one pollutant release by one parent company is identified as a significant national pollutant in more than one year by the EEA, but for simplicity, we have only included this entry once in the table.

Below we reveal the top toxic producers from our study. **BASF**, headquartered in Germany, ranks in the top five for the three out of four metrics we assessed (physical - 5Bn kg, ecotoxicity - 5Bn kg and human toxicity – 3K DALY). **Solvay Chemicals** is ranked in the top five under two metrics (physical – 13Bn kg and RSEI Hazard – 18Bn) and **Umicore** also features in the top five high level pollutants in two categories (human toxicity – 2K DALY and RSEI hazard – 103Bn) – see Figure 15.

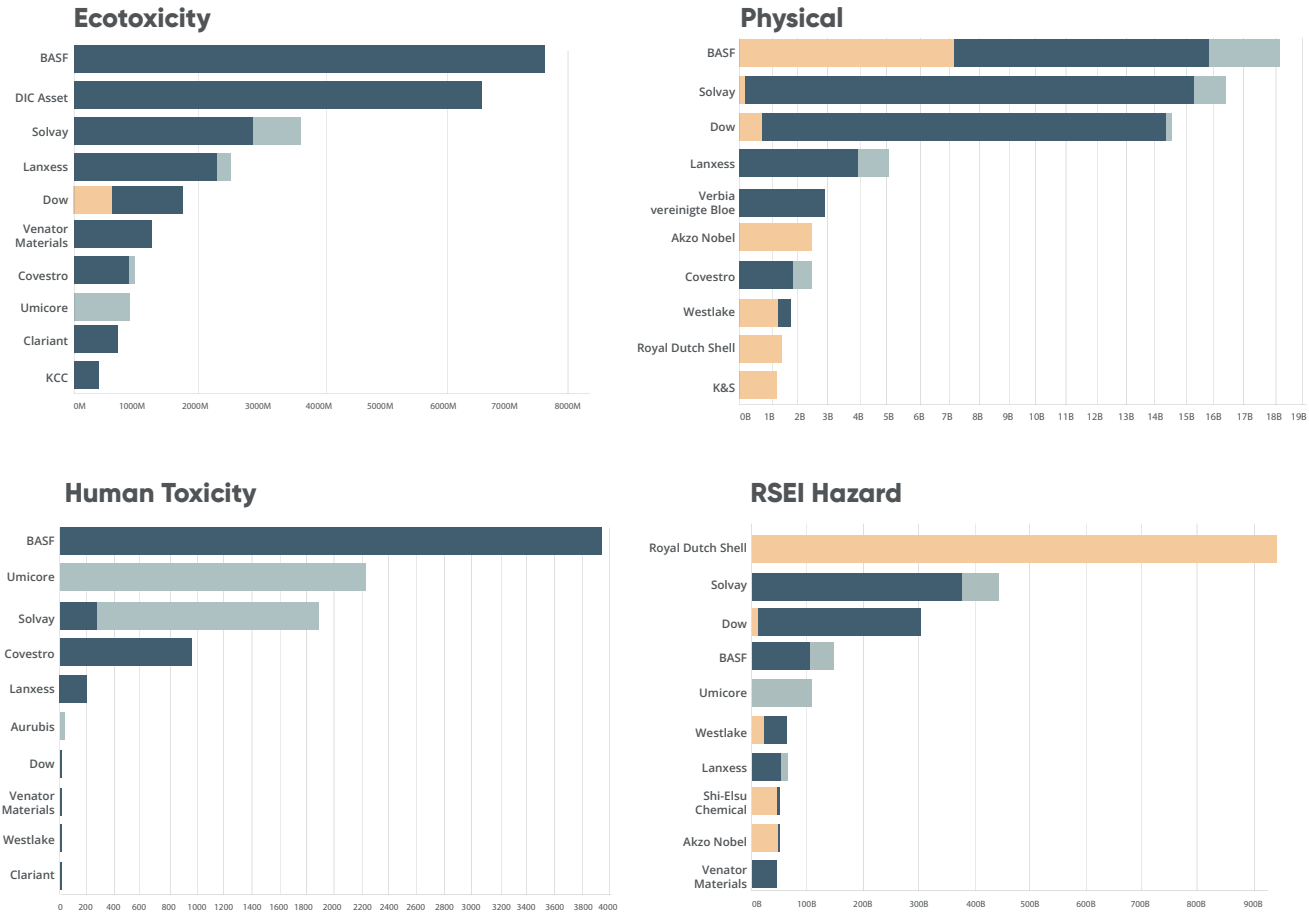

Figure 15: *Top Polluters under four examined measures: physical quantity, ecotoxicity, human toxicity, RSEI Hazard. Colours: GREY - Belgium; BLUE - Germany; BEIGE – Netherlands.*
/ Source: E-PRTR, Planet Tracker

ACCIDENTS

Not all releases were due to standard production processes. Between 2010 and 2021, over 17 million kg of toxic chemicals have been recorded in the Trilateral Chemical Region under an accidental category. Belgium has recorded the highest number of accidental releases with 43% of the total records in the region, followed by Germany with 34% and lastly Netherlands with 23% - see Figure 16.

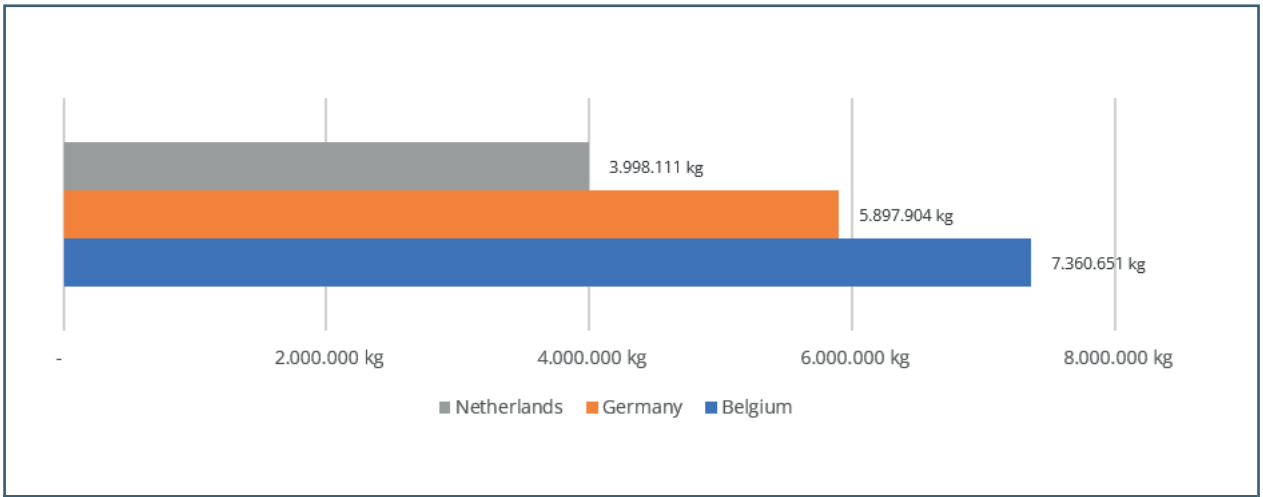

Figure 16: *Total Accidental Physical releases per country between 2010 and 2021 / Source: E-PRTR, Planet Tracker*

In the Trilateral Region, there has been recorded 58 disability adjusted life years (DALY) related to accidental releases with Inovyn in Belgium being responsible for 34 DALY from releases of mercury and compounds and Umicore, also in Belgium, accounting for 19 accidental DALY due to releases of arsenic and cadmium – see Table 6.

Table 9: *Total Accidental releases as measured for human toxicity (DALY) from 2010-2021 / Source: E-PRTR, Planet Tracker*

Country	Parent Company Name	Pollutant Name	Facility Release Accidental (DALY)
Belgium	INOVYN BELGIUM	Mercury and compounds (as Hg)	34
Belgium	UMICORE	Arsenic and compounds (as As)	15
Belgium		Cadmium and compounds (as Cd)	4
Belgium	VYNOVA BELGIUM	Vinyl chloride	1
Belgium		1,2-dichloroethane	1
Belgium		Tetrachloromethane	1
Belgium	TESSENDERLO GROUP	Arsenic and compounds (as As)	1
Germany	BASF	Mercury and compounds (as Hg)	1
Total			58

Umicore has also recorded accidental releases under the ecotoxicity measurement, with over 305 million potentially disappeared fraction of species surpassing any other parent company in the Trilateral Chemical Region, single-handedly accounting for over 90% of the total accidental releases– see Table 10.

Table 10 : *Total Accidental releases as measured for ecotoxicity (PDF) between 2010 - 2021*
Source: E-PRTR, Planet Tracker

Parent Company	Country	Facility Release Accidental (PDF)
UMICORE	Belgium	305,778,847
LANXESS	Belgium	17,577,644
BASF ANTWERPEN	Belgium	8,685,412
TESSENDERLO GROUP	Belgium	5,193,422
JOHNSON MATTHEY CHEMICALS GMBH	Germany	1,836,510
CRODA INTERNATIONAL	Netherlands	245,430
TRONOX PIGMENTS (HOLLAND) B.V.	Netherlands	105,300
DOW BENELUX B.V.	Netherlands	54,850
INOVYN BELGIUM	Belgium	50,695
BASF	Germany	32,269
Others		
Total		339,590,380

EXEMPTIONS ARE PERMITTED

Facilities are permitted to omit information under Article 4 of the EU Directive on public access to environmental information for the either of below reasons,[27]:

- "the information requested is not held by or for the public authority to which the request is addressed;
- the request is evidently unreasonable;
- the request is formulated in too general a manner;
- the request concerns material in the course of completion or unfinished documents or data;
- the request concerns internal communications, considering the public interest served by disclosure".

Further, the Member states may also refuse to provide information if such would adversely affect:

- "the confidentiality of the proceedings of public authorities, where such confidentiality is provided for by law;
- international relations, public security or national defence;
- the course of justice, the ability of any person to receive a fair trial or the ability of a public authority to conduct an enquiry of a criminal or disciplinary nature;
- the confidentiality of commercial or industrial information where such confidentiality is provided for by national or Community law to protect a legitimate economic interest;
- intellectual property rights;
- the confidentiality of personal data relating to a natural person where that person has not consented to the disclosure of the information to the public;
- the interests or protection of any person who supplied the information requested on a voluntary basis without being under, or capable of being put under, a legal obligation to do so;
- the protection of the environment to which such information relates, such as the location of rare species".

Planet Tracker has noted 216 such exemptions for petrochemical facilities in Belgium and Germany since 2010. There have been no exceptions granted in the Netherlands. Planet Tracker noted similar exemptions in the US, where facility emission data excluded those related to 'trade secrets' Please see 'Toxic Fog' (September 2022).

All the exceptions made by the facilities in this study are under category four, the confidentiality of commercial or industrial information. More specifically the exception states that disclosure "would adversely affect the confidentiality of commercial or industrial information where such confidentiality is provided for by national or Community law to protect a legitimate economic interest, including the public interest in maintaining statistical confidentiality and tax secrecy." Table 11 shows the top eight parent companies with the most recorded exemptions, with Belgium recording the majority. Note that there are 20 parent companies all with four exceptions.

Table 11: *Top 8 parent companies with the most recorded exemptions under Article 4*
Source: E-PRTR, Planet Tracker

Parent Company Name	Country	Exceptions
Dystar Colours Distribution Gmbh	Germany	17
Agfa-Gevaert	Belgium	8
Chevron Phillips Chemical	Belgium	8
Lanxess	Belgium	8
Recticel	Belgium	8
Vynova Belgium	Belgium	8
Oleon	Belgium	6
Nickelhütte Aue GmbH	Germany	5

HOLDING INVESTORS ACCOUNTABLE

Unlike greenhouse gas emissions, toxic releases are often ignored by financiers. Currently, many focus on the petrochemical industry's carbon footprint as part of their transition strategies to a net zero economy, while the environmental and human health impact of the industry's toxic releases is often missed. Planet Tracker believes that the financiers have considerable leverage to demand change and therefore identifying the ultimate owners of the most polluting petrochemical facilities is an important step towards reducing toxicity levels.

Following a similar methodology that we used in 'Toxic Footprints - US' , we analysed the equity shareholding positions of publicly traded corporates to reveal 4,986 financial institutions exposed to petrochemical facilities – see Figure 17.

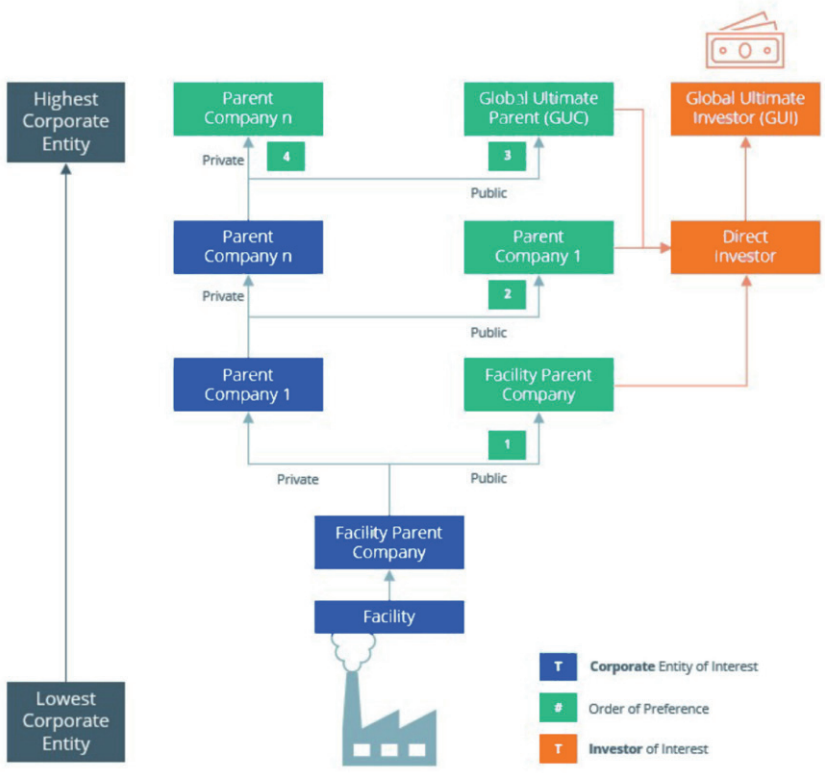

Figure 17: *Methodology for Identifying Investor Ownership of Corporate Entities / Source: Planet Tracker*

BlackRock holds first position in the leaderboard of the investors holding equity in the top toxic polluters based on physical releases, based with over 271 billion USD invested, with the majority of holdings coming from BASF, followed by Dow and Solvay. Vanguard comes second in the ranking with 257 billion USD equity holdings, mainly in BASF, Dow and Solvay Chemicals. State Street Corp has a high number of toxic polluters' equity holdings (121 billion USD) including again Dow, BASF and Solvay – see Table 12. For full list of the entities please see **Toxic Footprint – Europe dashboard**.

Table 12: *Top 20 Investors holding equity ownership of Global Ultimate Corporate (GUC) of toxic polluters based on physical releases (kg) (million USD) / Source: Refinitiv, Planet Tracker*

Rank	Investor Name	Equity Ownership of GUC (million USD)
1	BlackRock	271,403
2	Vanguard Group	257,044
3	State Street	121,236
4	Buffett (Warren Edward)	113,166
5	Capital Group Companies	77,077
6	FMR	66,712
7	Norway, Kingdom Of (Government)	58,464
8	Geode Capital Holdings	51,628
9	Morgan Stanley	38,050
10	JPMorgan Chase & Co	38,040
11	UBS Group	36,763
12	Sun Life Financial	32,583
13	T Rowe Price Group	31,639
14	Northern Trust	30,840
15	Wellington Management Group	30,828
16	Bank of New York Mellon	26,672
17	Credit Agricole	26,226
18	Dimensional Holding	24,151
19	Charles Schwab	23,667
20	Franklin Resources	22,782

Looking at our overall universe of the 1,093 facilities operating in the Trilateral Chemical Region, the total investments are led by BlackRock with 5.4% of total investments by market value, followed closely by Vanguard (5.2%) and JPMorgan Chase (3.6%). The total investments include equity, bonds and loans. Equity investments are transparent, but it is important to mention that many bonds and loans are hidden from view as they are not traded on an exchange. Table 13 shows the overall top 10 financiers in the petrochemical facilities in this analysis.

Table 13: *The overall top 10 investors & underwriters in the petrochemical facilities in this analysis, by total invested amount in petrochemical facilities in the Trilateral Chemical region in addition to capital underwritten in the last 10 years.) (in billion USD) / Source: Refinitiv, Planet Tracker*

Financiers (equity, bonds and loans)	Financier country	Total Investments (billion USD)
BlackRock	United States of America	288,317
Vanguard Group	United States of America	273,602
JPMorgan Chase & Co	United States of America	191,251
Citigroup	United States of America	158,505
Bank of America	United States of America	141,336
State Street	United States of America	124,803
Goldman Sachs Group	United States of America	121,464
HSBC Holdings	United Kingdom	118,628
Mitsubishi UFJ Financial Group	Japan	116,799
Morgan Stanley	United States of America	115,028

Equity holdings are led by BlackRock which owns over 10% of the total equity holdings by market value. It's closely followed by Vanguard (9.5%) and State Street (4.5%). This is not particularly surprising as these are among the five largest asset managers in the world, implying their size pushes them to the top of the rankings – see Table 14.

Table 14: *Top 10 equity owners in petrochemical facilities in the Trilateral Chemical Region (in billion USD) / Source: Refinitiv, Planet Tracker*

Equity Owners	Financier country	Equity Ownership (billion USD)
BlackRock	United States of America	275,675
Vanguard Group	United States of America	260,410
JPMorgan Chase & Co	United States of America	122,424
Citigroup	United States of America	113,166
Bank of America	United States of America	79,808
State Street	United States of America	67,818
Goldman Sachs Group	Norway	59,759
HSBC Holdings	United States of America	52,205
Mitsubishi UFJ Financial Group	United States of America	38,776
Morgan Stanley	United States of America	38,327

A similar pattern is found in bond holdings, but this time Vanguard leads with 8.7%, followed by BlackRock (8.4%) and then by State Farm Insurance Companies (3.9%). We find it particularly interesting that an insurance company should have such significant exposure as in some instances it may have exposure to the provision of health insurance policies of individuals impacted by these toxic emissions - Table 15.

Table 15: *Top 10 bond owners in petrochemical facilities in the Trilateral Chemical Region (in billion USD) / Source: Refinitiv, Planet Tracker*

Bond Owners	Bond owner country	Bond Ownership (billion USD)
Vanguard Group	United States of America	13,192
BlackRock	United States of America	12,642
State Farm Insurance Companies	Canada	5,839
Allianz	Germany	3,641
Franklin Resources	United States of America	3,557
New York Life Insurance	United States of America	3,113
Macquarie Group	Australia	2,694
TIAA Board of Governors	United States of America	2,639
Prudential Financial	United States of America	2,368
Wellington Management Group	United States of America	2,284

Capital underwriting for the last 10 years, which includes equity, bonds and loans, is led by CitiGroup which is responsible for 6.4% of the total underwriting, closely followed by JPMorgan Chase (6.3%) and Bank of America (5.2%) – see Table 16.

Table 16: *Top 10 capital underwriters (including equity, bonds and loans) for the last 10 years in petrochemical facilities in the Trilateral Chemical Region (in billion USD) / Source: Refinitiv, Planet Tracker*

Underwriter	Underwriter country	10 Year Underwriting (billion USD)
Citigroup	United States of America	155,149
JPMorgan Chase & Co	United States of America	150,953
Bank of America	United States of America	125,205
HSBC Holdings	United Kingdom	111,228
Goldman Sachs Group	United States of America	102,981
Mitsubishi UFJ Financial Group	Japan	101,594
Deutsche Bank	Germany	95,012
Mizuho Financial Group	Japan	94,620
Barclays	United Kingdom	94,247
BNP Paribas	France	93,922

CONCLUSIONS

Presently, toxic releases do not appear a top priority for either corporates or the financial markets. This may be because of a lack of analysis linking toxic releases with those financing the facilities that emit them.

The chemical sector is a prominent lobbyist, and its political influence could rise as petrochemical growth remains strong. Currently, most of the attention is focused on end-of life waste pollution and recycling innovations. We encourage a focus on upstream production as well and encourage improved emission transparency, so that the "toxic curtain" can be drawn back.

We encourage financial institutions to use this report and Planet Tracker's **interactive dashboard**, to better understand the impact of their investments, uncover their toxic footprint and engagement with management to ensure best practice in terms of minimizing their toxic emissions. By proactively seeking answers, they will be able to reduce their exposure to environmental and human health risks.

Civil Society can use this report to help identify the bad actors and their financiers and to target their actions and campaigns accordingly.

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Planet Tracker is an award-winning non-profit think tank focused on sustainable finance. We engage directly with financial institutions to drive transformation of global financial activities, achieve real world change in our means of production and align investment with a resilient, just, net-zero and nature-positive economy. Our purpose is to ensure that capital markets' investment and lending decisions are aligned with planetary boundaries and support a just transition.

PLASTIC TRACKER

The goal of Plastics Tracker is to stem the flow of environmentally damaging plastics and related-products that are creating global waste and health issues by transparently mapping capital flows and influence in the sector starting from resins production through to product-use. By illuminating risks related to natural capital degradation and depletion, investors, lenders and corporate interests across the economy will be enabled to create more sustainable plastics products.

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