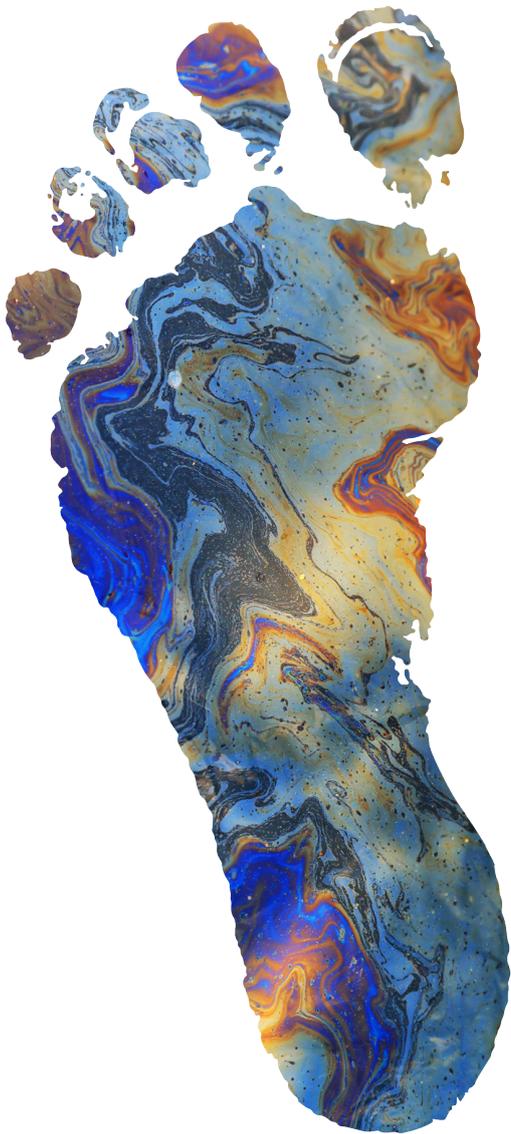


TOXIC FOOTPRINTS

Exposing the investors behind
petrochemical toxicity in the
US Gulf States



HAZARDOUS RELEASES across the
US Gulf States from the **PETROCHEMICAL**

industry have increased markedly since 2016.

Among the **POLLUTANTS**, released via

AIR, LAND and **WATER**, are several

well-known chemical **VILLAINS**



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INTRODUCTION

The products we use every day - from plastics and synthetic rubber to detergents and dyes - hide a dangerous secret: their production currently results in a proliferation of pollutants which are highly toxic to human health. It is often the forgotten dataset, with investors more focused on net zero targets.

However, to people living in the vicinity of these production facilities, the toxic pollution problem is very real.

With this report, Planet Tracker aims to make clear to investors what their contributions are to this environmental and human disaster; and conversely what they can proactively do to ensure better, healthier lives for the greatest number of people through a data-driven, finance-backed intervention in the petrochemical industry.

This study provides a vital step towards this goal by quantifying the impact of harmful pollutants and illuminating the role of the financial markets in underwriting this egregiously polluting business. It removes the easy smoke screen of 'not knowing' from investors and empowers them to take meaningful action to mitigate future risk.

Using data provided by the U.S. Environmental Protection Agency (EPA)¹ (see Toxic Footprints Methodology and EPA Guidebook), Planet Tracker's research uncovers the prevalence, toxicity and human health effects of such pollutants (as measured by the EPA), the facilities most accountable for their emission and overlays this with the financial market participants that are financially supporting them. See Appendix A for individual facilities.

This specific analysis is focused upon the petrochemical and refining industries in the U.S. Gulf Region states of Louisiana and Texas. See Appendix B for a U.S. perspective. Combined, these two states account for more than one-quarter of the country's total petrochemical facilities. Both refineries and petrochemical facilities are examined as the former provide feedstocks used by the latter. The high concentration of petrochemical facilities in this region is because the Gulf is a centre for U.S. oil and gas resources more generally, including about one-fifth of domestic oil production, about half of natural gas processing plant facilities and nearly half of refining capacity along with considerable technical expertise in the oil & gas industry.¹

¹ The three main EPA datasets used in this report: The Toxic Release Inventory (TRI), which contains facility-level disclosures of toxic releases; The Risk Screening Environmental Indicator (RSEI), which provides two main metrics to users - RSEI Hazard (toxicity) and RSEI Score (impact on human health); and The Enforcement and Compliance History Online (ECHO), which provides information on the fines imposed on facilities. For further information on these datasets, please see the Methodology Appendix and the EPA Guidebook released as a companion guide with this report.

The **TOXIC POLLUTION**
problem is very **REAL**



With over 7,400 financial institutions currently contributing to the support of petrochemical plants in the U.S. Gulf States through equity, debt or financing, there is a reputational risk for Global Ultimate Investors (GUIs)² to pressure the facilities responsible for these toxic trails to change the way they operate. Presently, fines for toxin violations are not significant enough to materially impact the operators or investors. However, a tightening of regulatory standards would dramatically change this.

By revealing the most serious offenders in the industry, this report and Planet Tracker's accompanying data dashboard serve as a toolkit for investors to understand this polluting industry and to seek positive investments instead. Investors, as a matter of urgency, must recognise the risk associated with these investments, especially if regulatory and legal interventions force the closure and stranding of these investments moving forward.



OVER 7,400 financial institutions
currently contributing to the **SUPPORT** of
PETROCHEMICAL plants in the US through
EQUITY, DEBT or **FINANCING**

² Global ultimate investor is the individual or financial institution at the top of the corporate ownership structure. For example, State Street is one of the GUIs in Dow (the ultimate corporate entity), which in turn run the Union Carbide chemical facility in St. Charles, Louisiana. Please see Figure 3 for schematic.





INVESTOR ASK

Investors of all types - be they shareholders, bondholders or financiers who facilitate loans or underwrite issues - should be undertaking due diligence to determine whether these toxic trails are acceptable.

The primary questions investors and financiers should be asking about these investments are:

-  Are they aware of their investment or financing exposure to individual petrochemical facilities?
-  Have they examined the toxic trail of each facility?
-  Do the companies which own these plants share pollution data with investors?
-  Does the management team operate these facilities in the safest way using up to date emission technologies – e.g. discuss permit breaches or provide pollution transparency?

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

Please note that individual facilities can be readily checked against EPA databases and the Planet Tracker dashboard. A full list of petrochemical facilities analysed in this report along with the TRI Facility ID has been included in the Appendix A so that it is easier for the user to navigate the EPA's databases and find information on each facility.





SILENT BUT DEADLY: PETROCHEMICAL EMISSIONS

Hazardous releases across the U.S. Gulf States from the petrochemical industry have increased markedly since 2016.

Among these pollutants, released via air, land and water, are several well-known chemical villains, with asbestos, cobalt and chromium dominating in terms of prevalence. Their geographic spread and subsequent impact depend on where and how they are released, and go well beyond immediate exposure.

Toxic chemicals can persist for long periods in the environment and even bio-accumulate, meaning that their concentration in living organisms increases as they travel up the food chain.

Their ultimate impacts on human health range from short-term illness to neurological or developmental problems, to long-term physical illness including respiratory problems and several forms of cancer. Figure 1 shows how the EPA's Risk-Screening Environmental Indicators (RSEI) database attempts to model the impact of these pollutants, from their disposal through to their ingestion by local populations. For a full explanation of the databases used please see the accompanying Methodology Paper and EPA Guidelines Document.

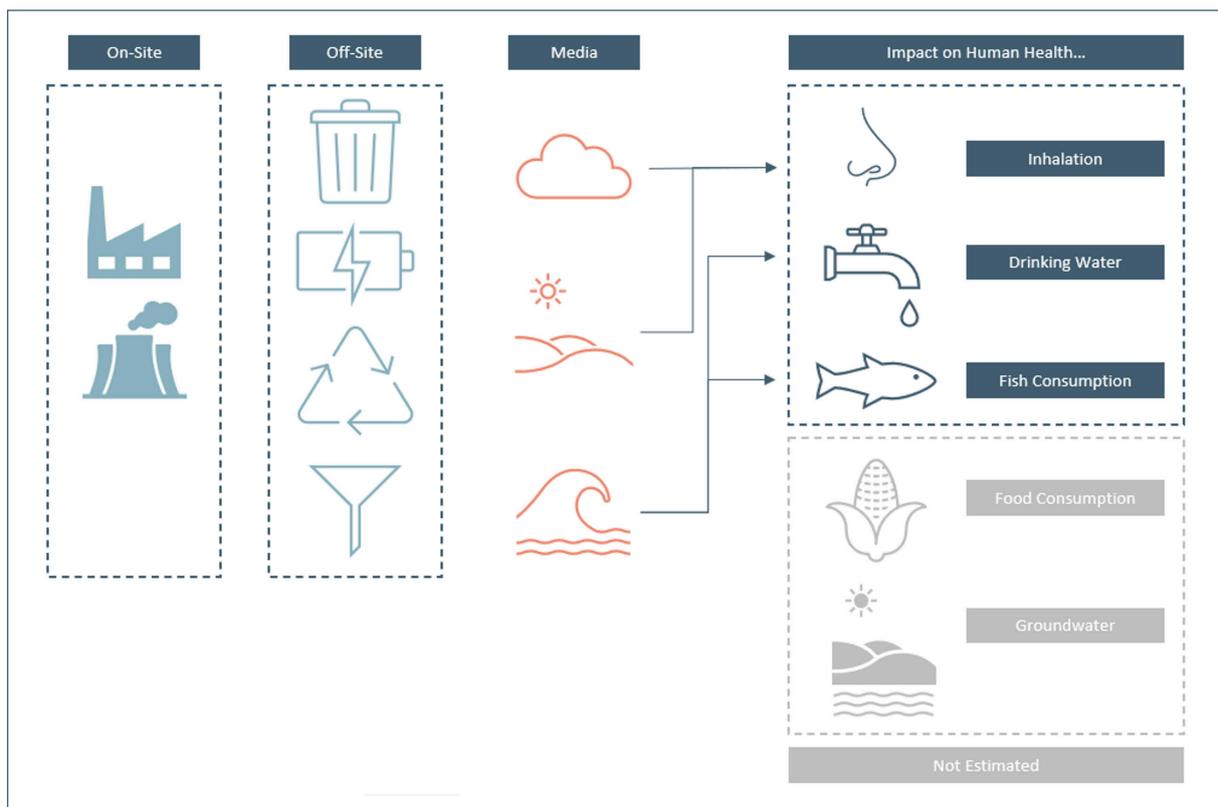


Figure 1: How Chronic Human Health Impacts of Toxic Releases are Modelled to produce the EPA's RSEI metrics



Asbestos' license to kill in the U.S.

Chlor-Alkali processing allows for the creation of chlorine and sodium hydroxide (caustic soda), along with hydrogen. All of these chemicals are used in large-scale industrial applications. These include paper and pulp production, the manufacture of soaps and detergents, as well as its use in food additives and textile processing,

There are three production methods of chlor-alkali: the mercury cell (Castner-Kellner) process, the membrane cell process and the diaphragm cell process. As the name implies the first process requires the use of mercury which can lead to significant environmental problems on emission. The membrane cell process is the most common with the ion-selective membrane – often similar to those used in fuel cells, batteries and electrochemical devices – used to separate the chlorine from the hydroxide. Although the diaphragm method does not use mercury, the permeable diaphragm is often made of asbestos fibres.

Although asbestos was commonly used at one time, as it is an excellent electrical insulator and is fire-resistant, its adverse effect on human health became widely recognised, notably from asbestosis (scarring of the lungs due to asbestos inhalation) and mesothelioma (cancer associated with asbestos).ⁱⁱ In turn this resulted in its widespread ban in over 70 countries. The U.S. is not one of them.

Asbestos is still used throughout the country in cement, plastics, resins, friction materials and textiles. leading to the deaths of over one million Americans between 1990 and 2019.

Approximately 1.3 million U.S workers are currently at risk of asbestos exposure, yet the EPA still has not banned the chemical and the Alan Reinstein Ban Asbestos Now (ARBAN) Act has not been put before a vote in Congress.^{iii, iv}

Cancer Alley

Louisiana's main petrochemical corridor, also called 'Cancer Alley' – a stretch of land between Baton Rouge and New Orleans – forms a key part of the petrochemical footprint of the U.S. Gulf States. The area is known for its higher-than-average cancer risk due to toxic air pollution,^v with an average facility (including petrochemical and non-petrochemical facilities) in Cancer Alley having production-related releases 3.3 times more toxic than an average facility in the rest of Louisiana.

Approximately **1.3 MILLION** US workers are
currently at **RISK** of **ASBESTOS** exposure





CONCENTRATED HARM - WHO IS RESPONSIBLE?

The fact that the petrochemical industry emits a range of toxic substances is scientifically undisputed. What is not so well-known or agreed upon is who carries the responsibility for these emissions and their impact and what plans exist to eliminate these toxic risks as soon as possible.

Through a landmark analysis of EPA data on the petrochemical industry, Planet Tracker has been able to identify toxic trails within the U.S. Gulf States and map key toxic hotspots and producers, as well as the financial markets actors responsible for funding them. We deliberately refer to this pollution as a toxic trail as a pathway can be followed from each facility to the investors and financiers of these operations.

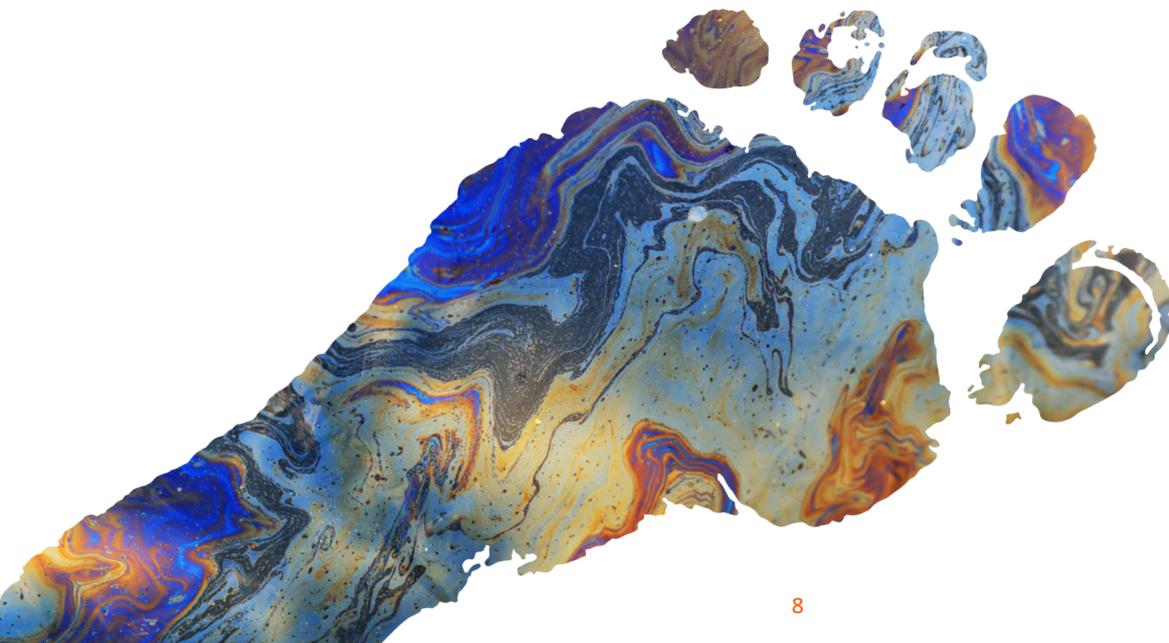
The toxic producers

The five most hazardous petrochemical facilities in the U.S. Gulf States, accounting for over 75% of the total releases, are Olin Corp (Freeport Olin), Olin Corp (Blue Cube Operations - Plaquemine Site), Covestro, Valero Energy Corp (Premcor Refining - Port Arthur), and BASF Corp - see Table 1.

Table 1: The Top Five Toxic Producers in the U.S. Gulf

Company	Facility	% of toxic releases
Olin Corp	Freeport Olin	35.3%
Olin Corp	Blue Cube - Plaquemine	17.4%
Covestro	Covestro	11.2%
Valero Energy	Premcor - Port Arthur	8.9%
BASF	BASF	2.7%

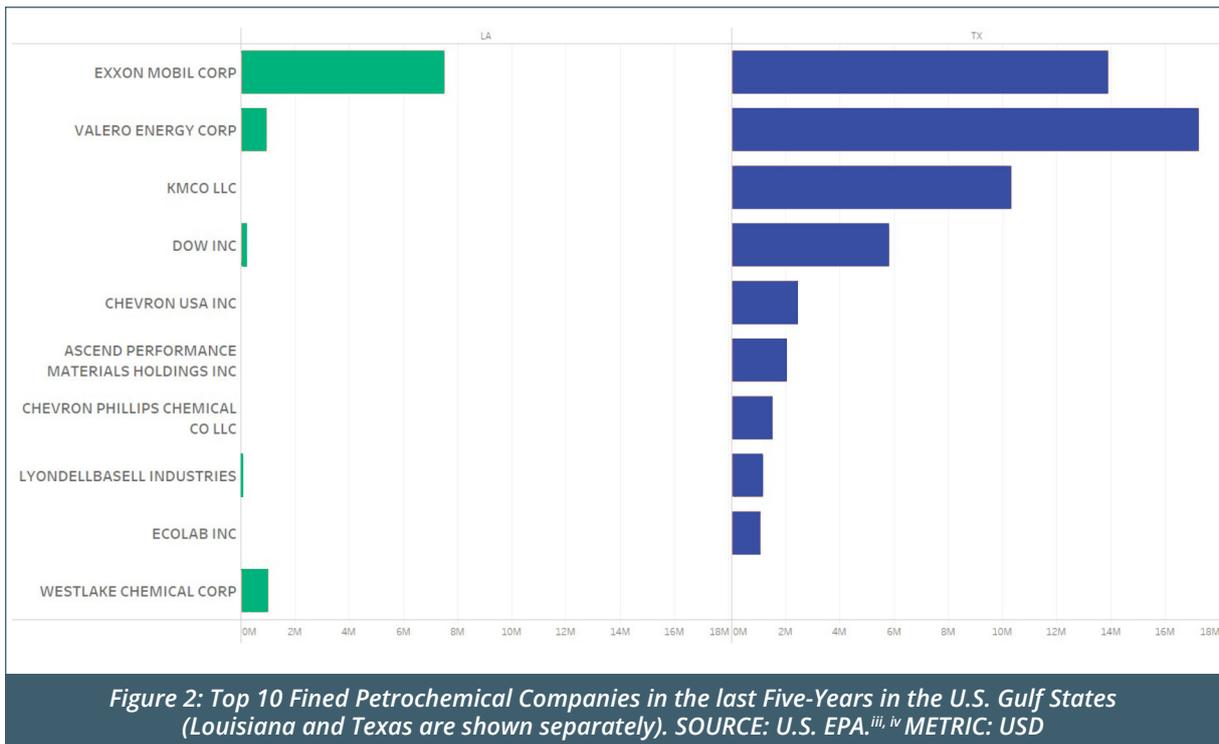
Of these, Olin Corp's two operations alone account for over 52% of hazardous chemical releases. Olin's Plaquemine operations comprises one chlor-alkali facility, one ethylene dichloride facility and supporting assets, which it acquired in 2015. Olin's Freeport complex is its largest chlor-alkali vinyl site. It includes ten individual facilities - five ethylene dichloride facilities, four chlor-alkali and one vinyl chloride monomer facility.



The rule-breakers

Adherence to permit conditions affords valuable insight into the way these facilities are managed – or mismanaged. Fines are issued by state and federal regulators for a range of reasons, including limit violations and oil spill violations.

Figure 2 shows the top 10 companies in the petrochemical industry by amount of fines received. In the last five years, 452 facilities have been fined in the U.S. Gulf States, with ExxonMobil and Valero Energy significant frontrunners.



Despite an uptick in fines compared with the five years prior, environmental violations or breaches of permit conditions are still not being dealt with as sternly as they should be. A release of 300,000 pounds of 1,3-butadiene in 2015 due to a pump failure at Shell's Deer Park Refinery, Texas, cost the company USD 25,000 - the maximum it could receive for an air permit violation under state law. These maximum limits appear very low for major environmental errors. A study by the Texas Tribune found that in 2016, out of a total of 3,723 unauthorised emissions events, only 20 or 0.5% were fined.^{vi}

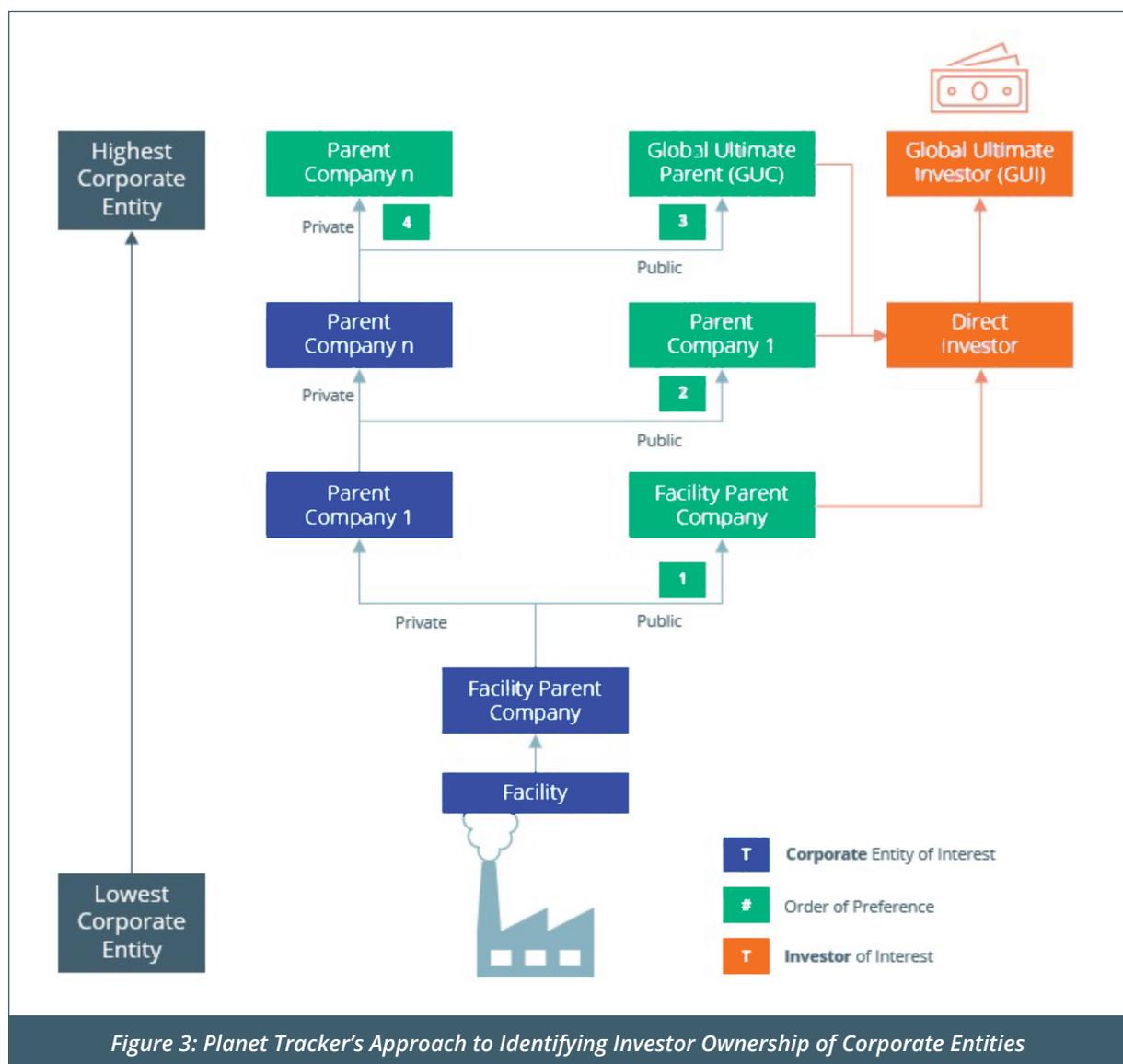


Holding investors accountable

Global Ultimate Investors (GUIs) can often be many times removed from the direct running of the petrochemical facility they are invested in, but this should not mean they are not held accountable.

While many are currently looking towards the petrochemical industry's carbon footprint³ as they consider transition strategies to a net zero economy, they are failing to look at the environmental and human and health impact of the industry's toxic releases.

Identifying the ultimate owners of the most polluting petrochemical facilities is important, as they hold the power to demand change at the C-Suite level. See Figure 3. Planet Tracker has analysed equity shareholding positions within the universe of publicly traded corporates to reveal over 7,400 financial institutions exposed to petrochemical facilities and has identified the GUIs most dominant in this space - see Figure 3.



³ The chemical industry is the third largest source of industrial carbon dioxide emissions, following iron & steel, and cement.



Table 2 shows the overall **top 10 investors in the petrochemical facilities in this study.**

<i>Table 2: Top 10 Investors in Petrochemical Facilities in in the Gulf States region. SOURCE: Refinitiv. METRIC: USD millions</i>					
	Global Ultimate Investor	Equity	Debt	Financing	Total
1	Vanguard	150,662	10,675	-	161,337
2	BlackRock	140,522	7,969	-	148,491
3	Berkshire Hathaway	100,036	-	-	100,036
4	State Street	83,045	1,330	-	84,375
5	FMR	35,176	2,028	-	37,204
6	JPMorgan Chase	23,461	1,417	9,218	34,096
7	Geode Capital	26,970	-	-	26,970
8	Capital World Investors	26,251	122	-	26,373
9	Morgan Stanley	21,890	304	2,755	24,949
10	Norwegian Government	24,781	-	-	24,781

Equity holdings are led by Vanguard which owns over 9.2% of the total equity holdings by market value. It is closely followed by BlackRock (8.6%) and Berkshire Hathaway (6.1%).

A similar pattern is found when analysing 2021 **bond holdings**, as Vanguard takes top spot (9.8%), followed by BlackRock (7.3%) and then Prudential Financial (2.8%). These three make up almost 20% of all bond holdings.

For **loan facilitation and underwriting** in 2021, Bank of America (10.1%), Mizuho Financial (10.1%) and JPMorgan (9.1%) together make-up 29% of the total - see Figure 4.

Looking at the number of unique facilities and facility parents⁴ to which those Global Ultimate Investors are most exposed, this report found that UBS, Morgan Stanley and JPMorgan have indirect equity exposure to around two-thirds of these petrochemical facilities - see Table 3. Facility parents are the companies that run these petrochemical facilities while the exposure to the facilities represent the number of individual facilities. For example, BlackRock is one of the GUIs in BP PLC (the ultimate corporate entity), who in turn own BP America Inc (the facility parent) which run the BP Amoco chemical facility in Texas.

⁴ The facility parent is the company that operates the facility. In turn, these companies may be owned by a Global Ultimate Investor (GUI). For example, Blackrock owns shares in corporations which operate petrochemical facilities. Blackrock does not operate the facility.





Figure 4: Public Equity Holding, Debt Holding, and Financiers of Petrochemical Companies in 2021. SOURCE: Refinitiv.

Table 3: Investors Most Exposed to Petrochemical Facilities and Facility Parents (2021). SOURCE: Refinitiv.

Global Ultimate Investor	Indirect Exposure to Facilities through...		Indirect Exposure to Facility Parents through...		
	Equity	Debt	Equity	Debt	
1	UBS Group	215	136	88	45
2	Morgan Stanley	214	-	87	-
3	JPMorgan Chase	214	135	87	45
4	Geode Capital Holdings	209	-	87	-
5	BlackRock	207	147	86	52
6	Goldman Sachs	207	-	85	-
7	Charles Schwab	205	-	85	-
8	BNY Mellon	205	144	85	49
9	State Street	204	145	84	50
10	Northern Trust	204	134	84	45



Investors of all types - whether shareholders, bondholders or financiers who facilitate loans or underwrite issues - should be undertaking due diligence to determine whether their levels of exposure to these facilities are acceptable and adjusting their portfolios accordingly. This calculation should be based on moral and financial factors. Certainly, the existing financial penalties from regulators look to be too feeble for investors to be concerned, but if this environment were to change – e.g. a direct link proven between a range of toxic emissions and the health issues suffered in nearby communities - the risk assessment would rapidly change and no doubt comparisons with the tobacco industry would be drawn.

The toxic trails laid out in the appendices, data companion documents and data dashboard accompanying this report will serve as important tools for all institutions on this list to understand and manage their impact.

These will also empower them to demand the sharing of pollution data from the companies they invest in, including increased transparency around permit breaches. The more investors that do this, the more mainstream it will become.

Investor responsibilities

The fact that many petrochemical processes result in the release of toxic pollutants is not disputed. Data is collected by the U.S. EPA which allows these emissions to be analysed. It should be noted that these emissions are self-reported by facilities although the EPA does undertake inspections. In a subsequent paper we will examine in more detail the toxin data which facility operators are not obliged to report.

Planet Tracker has been able to determine the toxicity of these emissions and the effect on human health. Financial institutions are capable of undertaking the same analysis, if they would. We provide a Methodology Annex and an EPA Guidebook to assist in this process. By providing these tools we make it possible for investors to undertake this analysis, by providing the data so that they can take the appropriate action.

Planet Tracker is able to identify which facilities have breached emission limits although, in some instances this data is hidden from public view. For example, plant operators are able to classify their chemicals as “trade secrets” which allows them to hide the toxicity data of this product. Furthermore, if chemical releases are sent offsite to Class ‘C’ landfills, it is assumed that no chemicals escape or are leached to groundwater in the EPA data.

All of the above has permitted Planet Tracker to identify toxic trails in the US Gulf States and map toxic hotspots within these states. A pathway can be identified from the individual petrochemical facility to their owners, investors and financiers.

Investors of all types - whether they be shareholders, bondholders or financiers who facilitate loans or underwrite issues - must begin undertaking due diligence to determine whether these toxic trails are acceptable.





The **POLLUTANTS** associated with the
manufacture of **PETROCHEMICALS**
pose a frightening **THREAT** to
PUBLIC HEALTH and the
ENVIRONMENT more generally.



CONCLUSION

The pollutants associated with the manufacture of petrochemicals pose a frightening threat to public health and the environment more generally.

At the moment, not enough people investing in or running the facilities are acting. The spread and impact of the toxic pollutants emitted by the petrochemical industry – which include well-known hazards such as asbestos and arsenic – remain largely ignored. Most consumers are unaware of the link and even the investors helping finance their production remain largely ignorant – wilfully or otherwise.

A lack of transparency in the industry's approach to data sharing has so far allowed it to hide behind a 'toxic curtain'. In some instances, the operating companies of these facilities are able to classify their chemicals as 'trade secrets' and therefore not disclose their composition.

Far from being an acceptable defence for professional investors, as the financiers of these harmful operations, it is up to them to demand this information and hold the companies in their portfolios to account.

As an absolute minimum, GUIs have a duty to be cognisant of the risks of toxic pollutants to local communities and the wider environment. This is part of investment due diligence. They should be pivoting their portfolios away from the damaging impacts of the petrochemical facilities they fund, by pressuring companies to enact change. And if this is unsuccessful, they should consider whether to continue funding such activities.

On a purely financial basis, when the banks and asset managers fully understand the risks of financing petrochemical plants, they will of necessity assess the rewards of such investments. Alarming, the fines from regulators, even for serial offenders, are insufficient to meaningfully

impact the cashflows of the operators or investors. But will this continue? Other industries once believed in the status quo and were caught, along with investors, by a swing in regulation. The tobacco industry is an obvious example as is the periodic mis-selling of financial products or the misrepresentation of pollution data (e.g. Volkswagen's 'Dieselgate').

Financial institutions can use this report and its companion information, and Planet Tracker's interactive dashboard to scrutinise the impact of their investments, uncover toxic trails and push management towards appropriate action.

By seeking answers proactively, they will be able to rectify their exposure before it presents more serious risks, both to their own portfolios and the world at large.

Civil Society can use this report to help identify the bad actors and their investors and to target their actions and campaigns at the most egregious polluters and their financial enablers.

What we already know about the effects these toxic hotspots are having on public health is disturbing enough. What might be revealed as we probe further into known unknowns will likely reiterate or render more shocking our understanding of the impacts of the petrochemical industry.

We must act now.



We must
ACT NOW



APPENDIX A: TOXIC FOOTPRINTS

List of Petrochemical Facilities

The box below links to three tables which list all the petrochemical facilities that have been included in this study. The EPA Toxics Release Inventory (TRI) Facility ID has been included so that it is easier for the user to navigate the EPA's databases and find information on each facility.

Facilities reporting to the TRI can report up to six different activities, each one of which is assigned a NAICS (North American Industry Classification System) code. These sectors are assigned to facilities normally based on the quantity or value of the products produced at each site. Planet Tracker has used the following sectors to identify facilities that are active in the petrochemical sector:

- 1 Petroleum Refineries**
- 2 Petrochemical Manufacturing**
- 3 All Other Basic Organic Chemical Manufacturing**
- 4 Plastics Material and Resin Manufacturing**
- 5 Synthetic Rubber Manufacturing**

As each facility can assign up to six NAICS codes for each site, this can limit the way in which releases are analysed, so Planet Tracker has created three categories of petrochemical facilities. These are:

Pure - facilities where only one of the petrochemical activities takes place on-site. No other production activities take place at these facilities.

Major - a petrochemical activity is the dominant activity on-site, but other petrochemical or non-petrochemical activities also take place.

Minor - the dominant activity is not one of those listed above, but petrochemical production does take place on-site.

Please click on this box to view online the tables of facilities that are classified as either pure, major or minor petrochemical actors.

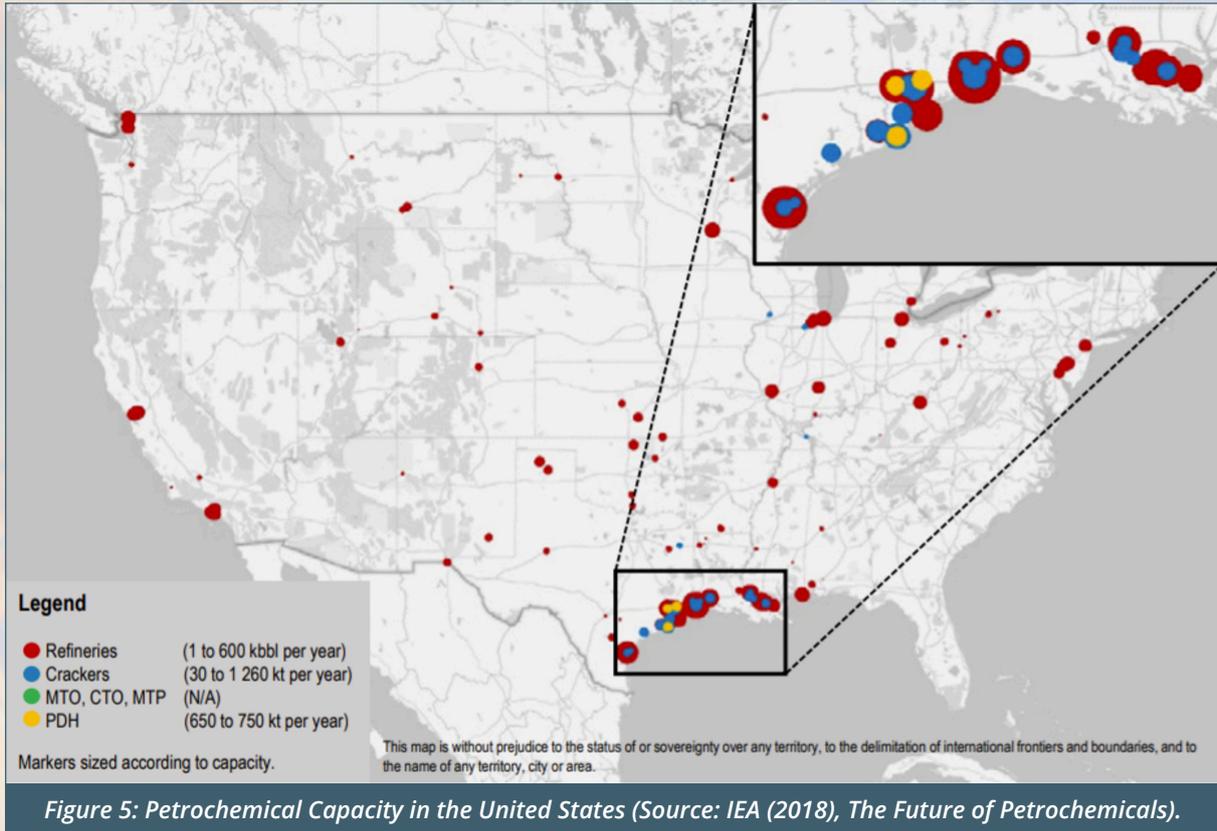




APPENDIX B: TOXIC FOOTPRINTS

Map of Major Refineries and High-Value Chemicals (HVC) Plants in the U.S.

The bulk of the petrochemical capacity in the United States is located on the Gulf Coast, coinciding with substantial refining capacity. This is because the region is a hotspot for both natural gas (NGLs for petrochemicals) and crude oil (for refineries) processing.



N/A = not applicable

kbbl = thousand barrels

kt = kilotonne

MTO = methanol-to-olefins

CTO = coal to olefins

MTP = methanol to propylene

PDH = propane dehydrogenation





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ABOUT PLANET TRACKER

Planet Tracker is an award-winning non-profit financial think tank aligning capital markets with planetary boundaries. Created with the vision of a financial system that is fully aligned with a net zero, resilient, nature positive and just economy well before 2050, Planet Tracker generates breakthrough analytics that reveal both the role of capital markets in the degradation of our ecosystem and show the opportunities of transitioning to a zero-carbon, nature positive economy.

PLASTICS 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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