Zero Carbon Analytics

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Companies face financial risks from growing climate damage litigation

Key points:

- A case brought by a Peruvian farmer against German electricity producer RWE has already set a precedent that fossil fuel companies can be held liable in court for climate damages. The hearing is expected to take place in March 2025.
- Regardless of the result, the use of courts and legal mechanisms to demand compensation for climate impacts will grow as emissions and the frequency and intensity of extreme weather events continue to rise.
- This is particularly the case in the Global South, where climate impacts are most severe. Adaptation and loss and damage remain significantly underfunded by the Global North, which is responsible for the majority of global emissions.
- Alongside the pressures that are driving legal claims, advances in attribution science now make it increasingly possible to link extreme weather events to increased greenhouse gas emissions, primarily from the burning of fossil fuels.
- To date there have been 68 lawsuits filed seeking financial redress for the impacts of climate change, of which 43 are still ongoing. The fossil fuel industry has been the target of 54% of these cases. ExxonMobil, Shell, Chevron, ConocoPhillips and BP have each had more than 20 cases filed against them.[1]
- Legislation is an increasingly significant risk for fossil fuel firms, particularly in the Philippines and the US, where states such as Vermont and New York are seeking billions of dollars for climate damages.
- Estimates of climate damages vary, but they could reach trillions of dollars globally. Researchers have estimated that by 2049 there will be USD 38 trillion in climate damages each year. Climate Analytics has calculated that the share of climate damages attributable to the 25 biggest emitting oil and gas companies for their emissions from 1985 to 2018 totals about USD 20 trillion.
- Companies and investors face additional risks from climate litigation such as deteriorating share prices, reputational damage, reduced creditworthiness and increased financing costs.

Peruvian farmer vs RWE: The tip of the iceberg

The use of courts and legal mechanisms to achieve progress on addressing climate change has grown significantly in recent years, with 70% of cases having been filed since the Paris Agreement was reached in 2015. These cases seek to hold actors accountable for their role in contributing to the crisis and its impacts, or to require public authorities or companies to introduce more effective policies to mitigate climate change.

[1] Each case can have multiple defendants, with some fossil fuel companies being cited in multiple cases.

In 2015, Peruvian farmer Saúl Luciano Lliuya filed a lawsuit against RWE, one of Germany's largest electricity producers. Lliuya accused RWE of being partially liable for the melting of Palcaraju glacier, which had heightened the risk of flooding and landslides in his home-city of Huaraz. He said RWE's large historic emissions from its coal-burning power stations had contributed to the melt, and argued that the company should contribute towards the cost of flood defences to protect the 50,000 residents of the city in Peru's highlands.

A hearing on the case is expected to take place in March 2025. In 2017, an appeals court in Hamm ruled that the case was admissible and recommended a phase to gather evidence on the glacial melt, the risks to Lliuya's home, and RWE's contribution to global emissions. In principle, the ruling means that RWE could be held liable for a share of climate change damages. Regardless of the court's final decision, **the precedent has already been set for future cases that fossil fuel companies can be held liable in court for climate damages.**

Attribution science: linking cause to culprit

Over the last 20 years, the data needed to directly attribute individual extreme weather events to climate change has become significantly more precise. More than 500 studies have attributed extreme weather events to the results of increased greenhouse gas emissions, primarily from burning fossil fuels. Additionally, robust information on the historic emissions of fossil fuel companies allows researchers to calculate a company's contribution to global greenhouse gas emissions. As a result, it is possible to credibly quantify an individual fossil fuel company's contribution to a specific extreme weather event and any resulting damages.

In his case against RWE, Lliuya referred to a finding by the UN Intergovernmental Panel on Climate Change (IPCC) that "there is a very high degree of confidence in the attribution of climate change to the glacier retreat in the Andes in South America". One attribution study found that around 95% of Palcaraju glacier's retreat is due to anthropogenic global warming. Lliuya also referred to the IPCC's finding that emissions are the cause of global temperature increases, which are observed locally in impacts such as the retreat of glaciers worldwide. His claim noted that: "The existence of global climate change caused by increased concentrations of greenhouse gases such as carbon dioxide in the atmosphere is undisputed in Germany." To date the case against RWE is one of the most advanced cases on attribution science.

The case was initially dismissed by a district court in Essen on the grounds that "it is impossible to identify anything resembling a linear chain of causation" between RWE's emissions and specific damages of climate change. However, the appeals court in Hamm overturned the dismissal, setting a precedent that in principle, a private company is responsible for its share in causing climate-related damage. This applies if a share of concrete damage or risks to private individuals or their property can be attributed to the company's activities.

As the world continues to warm, the negative impacts of climate change and extreme weather will intensify. With the growing number and accuracy of climate science attribution studies, legal pressure on companies to contribute to climate costs is likely to keep growing. More examples are already emerging. In 2024, Belgian farmer Hugues Falys filed a lawsuit against French fossil fuel major TotalEnergies, seeking compensation for damage to his farm as a result of extreme weather. He also urged the court to require TotalEnergies to halt new fossil fuel investments and cut its oil and gas production by 75% by 2040. In 2022, four residents of Pari island, around 40 kilometres north of the Indonesian capital Jakarta, started legal proceedings in Switzerland against the Swiss cement firm Holcim. The residents are seeking a 43% reduction in Holcim's carbon

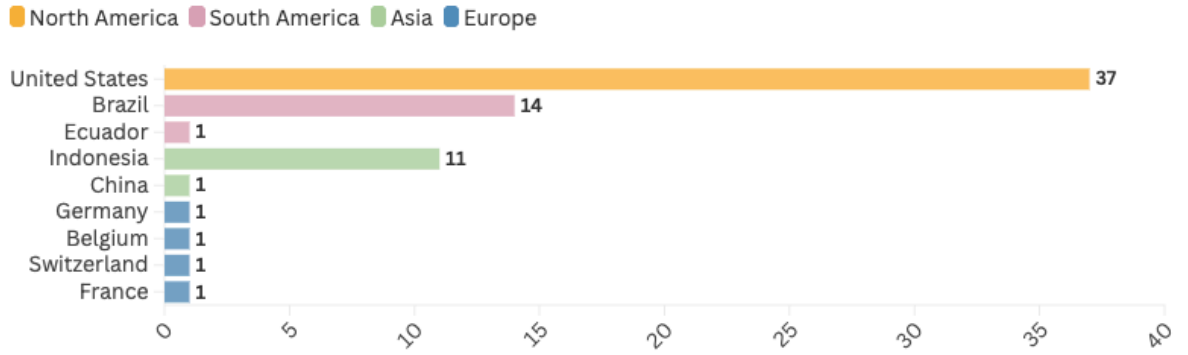
emissions by 2030 and almost USD 4,000 in compensation each for damages caused by flooding. Around 11% of the island's surface area is already under water.

The rise of litigation for climate damages

Analysis by Zero Carbon Analytics found that 68 climate damages cases have been brought worldwide, with 54% of cases being brought in the US. Brazil has seen the second highest number of cases filed, with 14, and 11 cases have been brought in Indonesia.

This analysis is based on Columbia Law School's Climate Change Litigation Database, which comprises 2,914 cases.[2] Climate damages cases were identified as those which sought to seek a financial remedy or payment as a result of harms caused by greenhouse gas emissions, or to cover the cost of adapting to climate change. To be included in the database, cases must be brought before judicial bodies or specific administrative bodies and climate change law, policy or science must be a material issue of law or fact in the case.

Fig. 1: US tops climate litigation, followed by Brazil and Indonesia



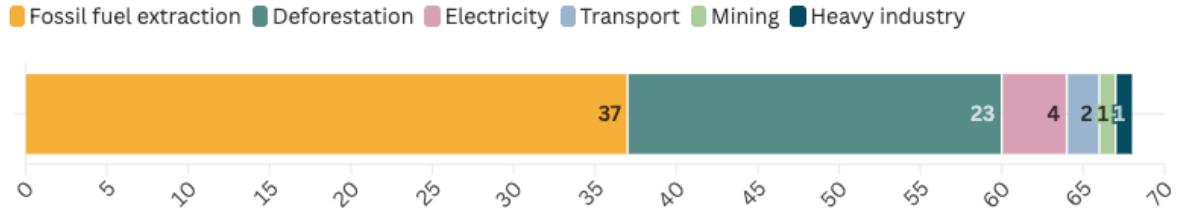
Source: Zero Carbon Analytics analysis, Sabin Centre for Climate Change Law - Climate Change Litigation Database

The fossil fuel industry has been the target of 54% of climate damage cases. Large investor-owned oil and gas companies are the most common defendants, with ExxonMobil, Shell, Chevron, ConocoPhillips and BP each having more than 20 cases filed against them.

Cases linked to illegal deforestation account for one third of cases, all of which were filed against national companies in the country where the lawsuit was filed. In Brazil, payments for climate damages aim to compensate for the collective harm caused by emissions from deforestation. These cases apply a methodology to quantify climate damages from deforestation which could be used in other countries where land use change is a major contributor to national emissions.

[2] Data from January 2025.

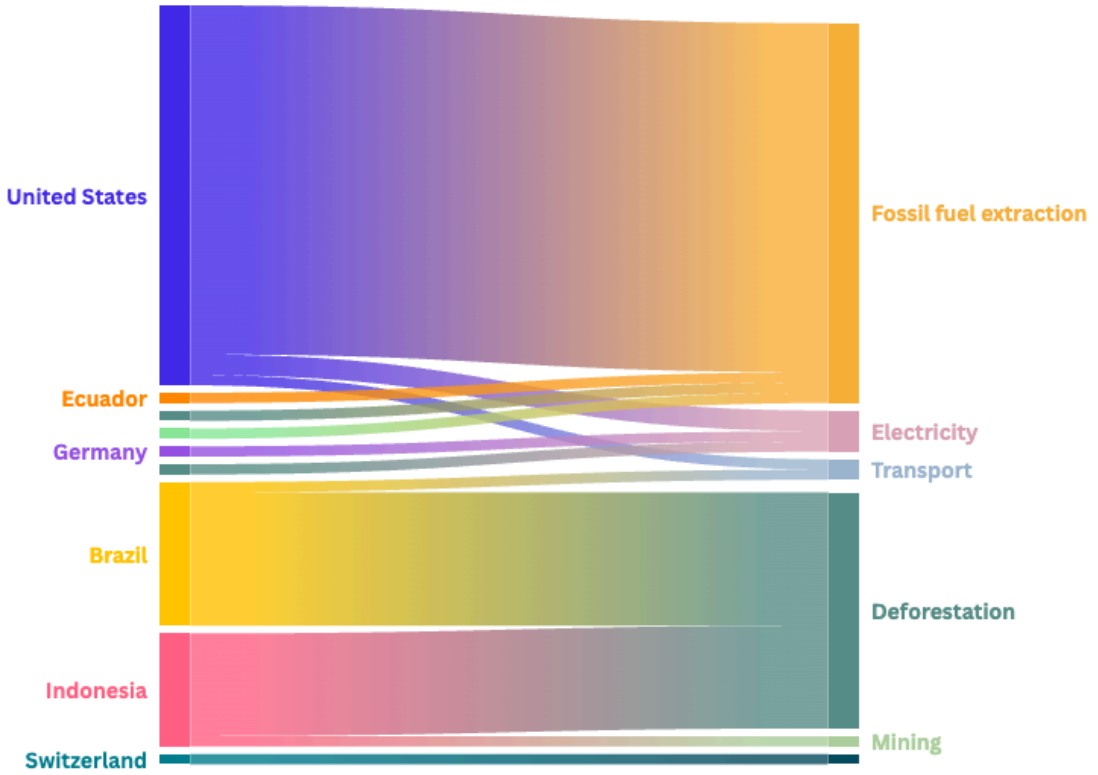
Fig. 2: Fossil fuel companies are the primary target of climate damage litigation



Source: Zero Carbon Analytics analysis, Sabin Centre for Climate Change Law - Climate Change Litigation Database

There is a fairly clear geographic link between the countries and the industries involved, with cases in the US primarily focusing on the fossil fuel industry, and those in Brazil and Indonesia focused on deforestation.

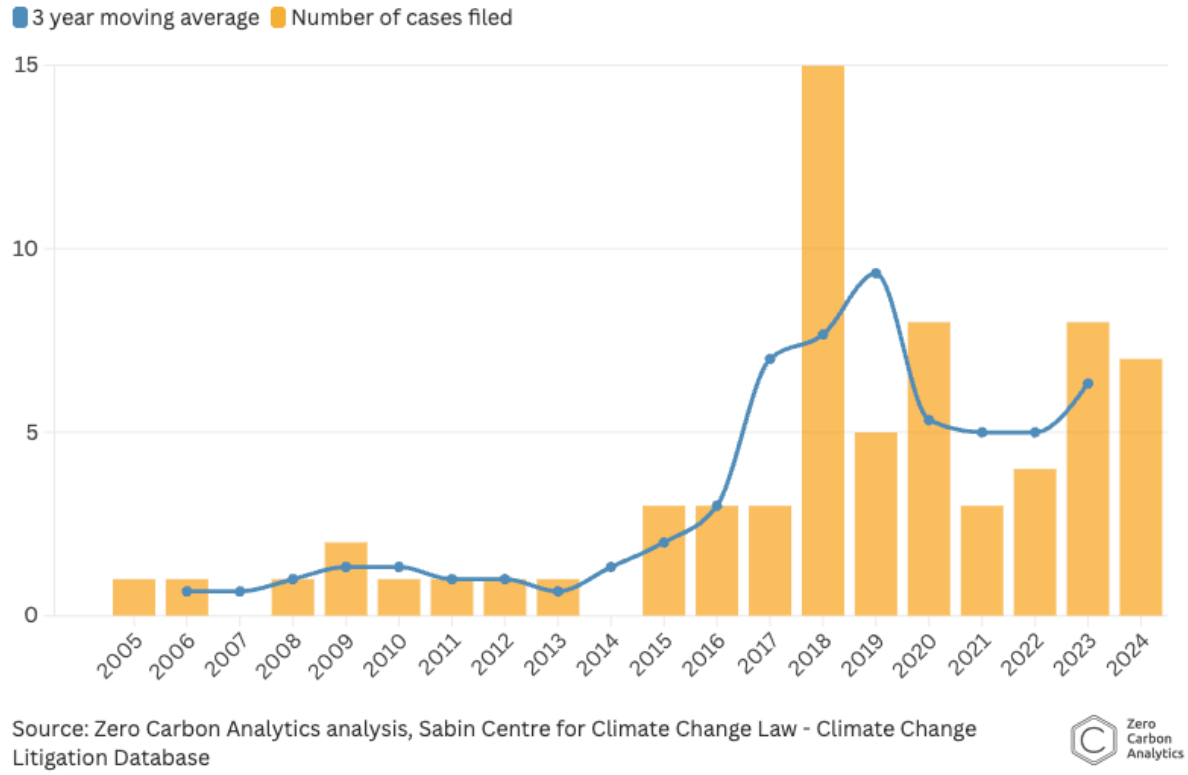
Fig. 3: Cases by country and industry



Source: Zero Carbon Analytics analysis, Sabin Centre for Climate Change Law - Climate Change Litigation Database

The first climate damage case was filed in 2005, and the number of cases filed each year remained relatively low until a boom in 2018 when 15 cases were filed, with seven deforestation cases filed in Brazil and six against fossil fuel companies filed in the US. In recent years this trend has steadied to between three and eight cases each year.

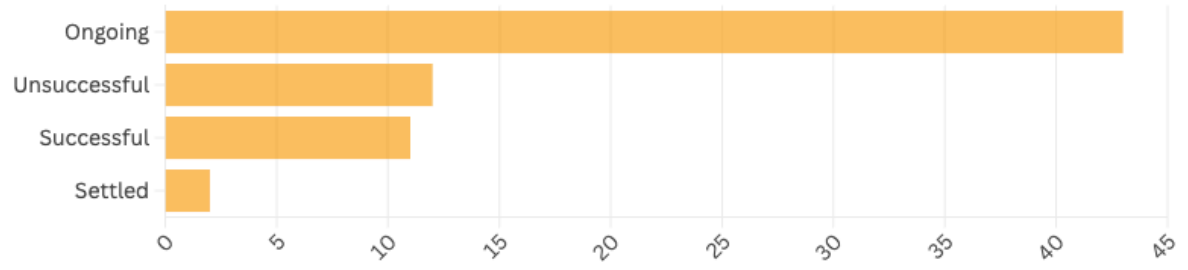
Fig. 4: Rising trend in climate damage litigation over time, with spike in 2018



Source: Zero Carbon Analytics analysis, Sabin Centre for Climate Change Law - Climate Change Litigation Database

Of the 68 cases, 63% are still ongoing. Of those that have concluded, 44% have been successful, 48% have been unsuccessful and 8% have resulted in a settlement. All but one of the successful cases was brought in Indonesia, and all but one were related to illegal deforestation.

Fig. 5 Majority of climate damage cases are ongoing



Source: Zero Carbon Analytics analysis, Sabin Centre for Climate Change Law - Climate Change Litigation Database • Ongoing includes cases where one party has indicated they intend to appeal.

Legislation: Establishing the legal basis for climate accountability

In addition to court cases, companies are also facing legislation by national and local governments that seeks to may them pay for climate damages. The majority of legislation has been developed in the US so far, but are focused in the US but draft bills are being created in countries such as the Philippines that could set a powerful precedent for how.

US states take on fossil fuel firms in court

In the US, 26 lawsuits have been filed by counties, municipalities and cities against fossil fuel producing companies seeking damages for extreme weather events, according to research published by Zero Carbon Analytics last year. The lawsuits have been filed on a range of grounds, including:

- **Consumer protection and consumer fraud** – alleging that companies misled consumers about their role in causing climate change and their own early knowledge of climate science several decades ago.
- **Cost recovery** – arguing that companies should pay compensation for the costs of increasing flooding, forest fires and heatwaves.
- **Racketeering** – alleging that companies have committed fraud.

None of the cases have yet gone to trial, but this could be about to change. In January, the US Supreme Court declined to hear a challenge to a lawsuit filed by Honolulu against oil companies over their role in climate change. The companies are being sued for damages that have already occurred, such as increasing forest fires, and for future rising sea levels and flooding that threaten assets such as harbours and airports. The recent decision will allow the case to go to trial under state law. The oil companies had sought to have the case heard in federal courts, which they believed would have led to a more favourable outcome. The decision is significant in determining whether the more than 20 other lawsuits can go to trial in states across the US. If one of these cases concludes the oil and gas industry is liable, it would set a precedent, with particular impacts in the liability insurance market.

Climate superfund laws

In a related development, a number of US states are in the process of adopting so-called climate superfund laws. In May 2024, Vermont was the first state to pass a law that aims to force the fossil fuel industry to pay into a fund for climate damages that have hurt public health, agriculture, housing and other areas. The state can collect money from companies that emitted more than 1 billion tons of CO2 around the world from 1995 to 2024. Those companies engaged in the trade or business of extracting fossil fuels or refining crude oil in Vermont would be charged according to their percentage of global emissions, and the funds would be used to rebuild and upgrade infrastructure such as stormwater drainage systems, roads and bridges.

New York has also introduced a law that aims to collect USD 3 billion from fossil fuel companies per year, totalling USD 75 billion over the next 25 years. Fossil fuel companies are required to contribute a share of the funds based on their historical contributions to emissions. In February 2025, 22 US states sued to block the law, claiming that it overreaches by seeking to hold energy companies liable that are based outside of the State of New York. The opposition is being led by West Virginia, a leading producer of coal in the US, and includes several oil and gas trade associations.

Similar bills have been proposed in Massachusetts, Maryland, New Jersey and California — which was recently hit with some of the worst wildfires in the state's history. The Eaton and

Palisades fires in California collectively burnt down nearly 40,000 acres of land, resulting in the destruction of 12,000 structures and the deaths of at least 27 people. Climate science attribution studies show that the fires were made worse by climate change. Latest estimates suggest the economic losses could range between USD 95 billion and USD 164 billion. The bill proposed in California last year did not proceed, however, it's possible that a similar bill will be reintroduced this year following the extensive damage.

In addition, a federal bill aiming to create a national climate liability framework and coordinate state-level initiatives was introduced last year and reintroduced in January. The Polluters Pay Fund aims to collect USD 1 trillion in funding from the biggest polluters in annual increments of USD 100 billion. However, the legislation does not currently have the bipartisan support it would need in Congress to become law.

Climate legislation in the Philippines

In the Philippines, which is one of the countries most vulnerable to the impacts of climate change, the Climate Accountability (CLIMA) Act is currently under discussion in Congress. The bill aims to hold corporations and the state accountable for their role in climate change and protect vulnerable communities. The bill states that polluters will pay into a Climate Change Reparations Fund that will respond to claims from victims and survivors of climate-related loss and damage. The bill states that attribution science will be used to determine the extent to which a company is liable. Between 2010 and 2020, national climate-related losses and damages in the Philippines were equivalent to PHP 515.51 billion (USD 10.6 billion), despite the country contributing only 0.3% of total global greenhouse gas emissions, according to the Department of Finance.

If the bill is passed it could have far reaching consequences beyond the Philippines, by reinforcing the cross-border liability of fossil fuel companies. Under EU law, claimants can decide to apply the law of the country where the damage occurred, or the law of the country in which the event giving rise to the damage occurred. In effect this could mean there are many more cases similar to the case brought against RWE.

While other laws under consideration integrate the concept of due diligence, such as the EU's Corporate Sustainability Supply Chain Due Diligence Directive, the CLIMA bill exhibits higher climate ambition as it combines company reporting with emissions reduction obligations and climate reparations, and threatens harsher penalties for companies. For example, companies that fail to comply with the act may face fines equivalent to 15% of their gross income.

Similar draft legislation was approved by a standing committee in February 2025 in Pakistan, with hopes that it will now be considered in parliament. The Climate Accountability Bill aims "to prevent and mitigate the adverse impacts of climate change within the framework of sustainable development and to establish minimum standards for climate accountability of business entities." Penalties will be paid into a fund that will finance climate mitigation and loss and damage reparations.

The scale of climate damages

Estimating climate damages is evolving as the data on attribution becomes more precise. There are a wide range of estimates, often because studies are focused on different geographic areas.

Globally

At the global level, researchers have calculated that by 2049 there will be USD 38 trillion in climate damages each year.[3] The study used data collected over the last 40 years from 1,600 regions around the world. These damages are mainly due to rising temperatures, but also come from changes in the variability in rainfall and temperature, which hits infrastructure, labour productivity and agricultural production.

Countries in the Global South are particularly impacted by extreme weather events. In 2024, the Global South experienced 10 times more flooding events than the Global North, and floods in the Global South affected 900 times more people, according to the International Disaster Database. In January, flooding left almost 350,000 people in the Democratic Republic of the Congo in need of humanitarian aid.

The most vulnerable 20 countries globally calculate that they have lost about USD 525 billion from their economies due to the impact of climate change driven temperature increases and precipitation patterns.

Regionally

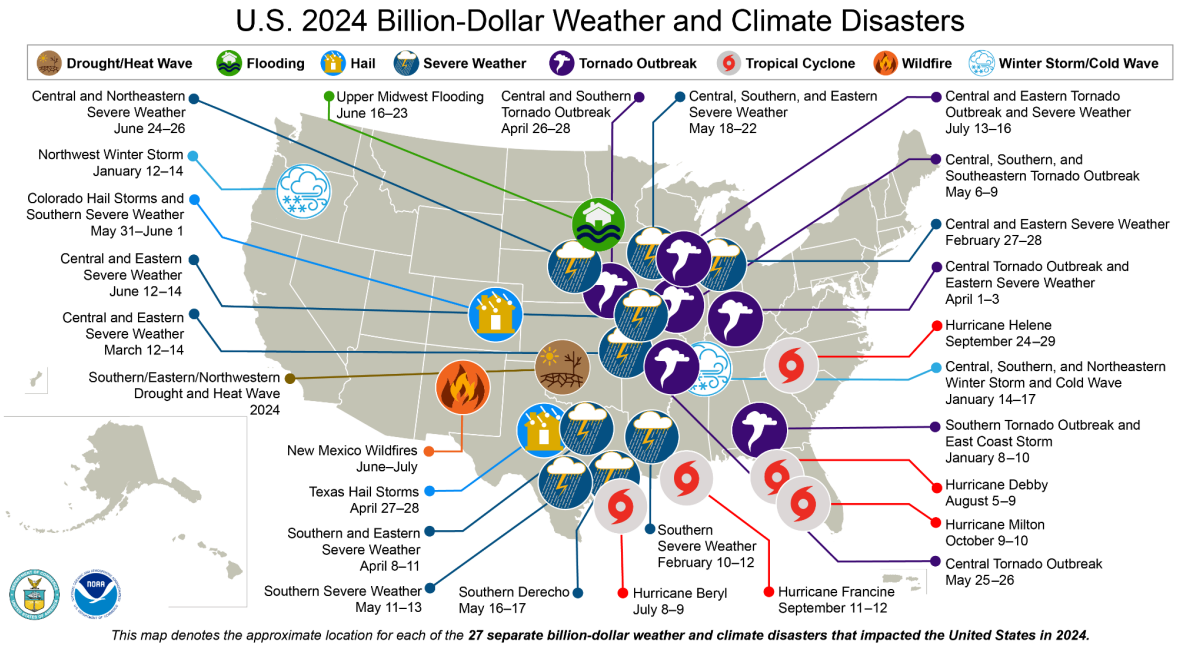
Between 1980 and 2023, there were estimated economic losses from extreme weather and climate of EUR 738 billion in the European Union, according to the European Environment Agency. These losses have intensified over time, meaning that about 22% occurred between 2021 and 2023. Major causes of these losses were flooding (44%), storms (29%), and heat waves (19%).

Nationally

In the US there have been 403 weather and climate disasters between 1980 and 2024 where overall losses have exceeded USD 1 billion, with the total cost of these events exceeding USD 2.9 trillion. There were 27 such events in 2024 (Figure 6).

[3] Under a "middle-of-the-road" scenario, in which social, economic, and technological trends do not shift markedly from historical patterns. Figure in 2005 USD, with a likely range of USD 19 trillion – 59 trillion.

Fig. 6: Weather and climate disasters costing more than USD 1 billion in the US



Source: NOAA National Centers for Environmental Information (NCEI) U.S. Billion-Dollar Weather and Climate Disasters (2025), DOI: 10.25921/stkw-7w73.

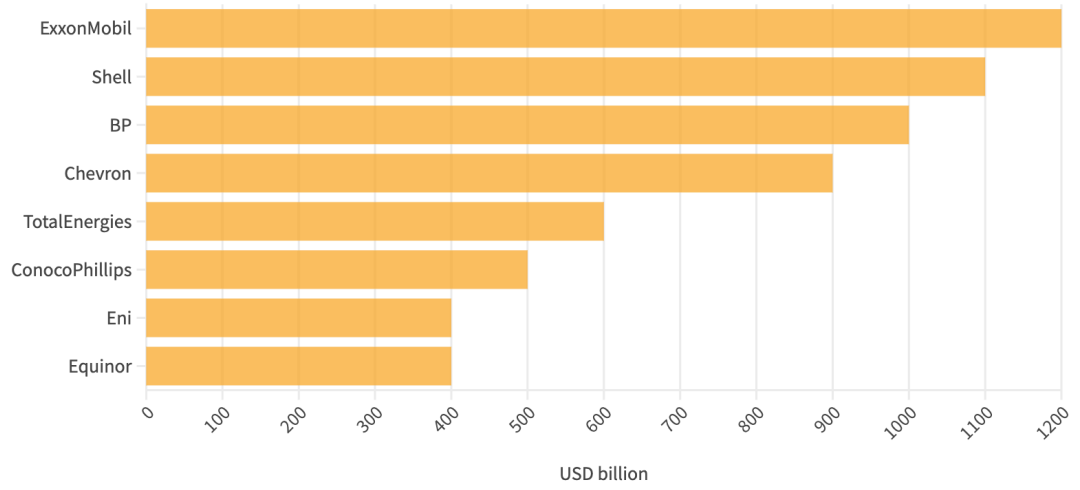
Company

The potential liabilities for fossil fuel companies are substantial. Climate policy institute Climate Analytics has calculated that the share of climate damages attributable to the 25 biggest emitting oil and gas companies for their emissions from 1985 to 2018 totals about USD 20 trillion, based on the social cost of carbon.[4] Of these, ExxonMobil, Shell and BP are estimated to be responsible for climate-related costs of at least USD 1 trillion each.[5]

[4] Climate Analytics calculated the total damages at USD 60 trillion, and attributed one third to fossil fuel companies, on the basis that responsibility for fossil fuel emissions should be shared equally between producers, emitters and policymakers. The USD 20 trillion figure is therefore a conservative estimate. Grasso & Heede reached a similar conclusion in their 2023 academic paper which attributed USD 23.2 trillion to the top 21 companies in the Carbon Majors dataset.

[5] The methodology conservatively estimates that producers are responsible for one third of damages caused by fossil fuels' greenhouse gas emissions.

Fig. 7: Climate damages caused by investor-owned oil and gas companies CO2 emissions



Source: Climate Analytics - Carbon Majors Trillion Dollar Damages • Figures are for 'partial damages' based on fossil fuel companies being responsible for one third of the damage caused by their total emissions.

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Growing risks for companies & investors

To date, no oil and gas company has been held financially liable for damages associated with climate change. If courts and governments start holding oil and gas companies liable for climate change damages, the costs to companies, their investors and insurers would be significant, as would the financial benefits to communities around the world harmed by climate disasters and other impacts. “The financial implications of climate litigation risk are huge,” said the UK Financial Conduct Authority’s Climate Financial Risk Forum. “Aside from damages and transition-related costs, the company’s share price, creditworthiness and financing costs could deteriorate".

A study assessing 108 climate lawsuits between 2005 and 2021 found companies experienced an average 0.41% fall in stock returns following a climate-related filing or negative court decision. The effect was larger for filings against carbon majors, which experienced a 0.57% drop in stock returns following a climate-related filing and a 1.5% drop following negative decisions. The researchers found no significant effect for filings or decisions before January 2019, showing an increase in climate litigation risk over time and “suggesting the financial markets are increasingly responding to climate litigation.” RWE lost almost 6% of its stock market value at times during the court proceedings with Lliuya. Researchers estimate the average economic cost of a negative court decision is around USD 360 million, though they note that figure is highly influenced by cases against large companies.

While S&P Global has not yet identified climate damages cases affecting the credit rating of an oil and gas company, it highlighted that this could change in the future. The credit rating agency found that if the costs "associated with climate litigation were to increase materially, the potential impact on the competitive position and financial risk profiles of some entities would change." S&P also noted that the "direct costs of lawsuits against tobacco companies or opioid-related cases in the US took several years to transpire but had material financial and strategic impacts on many of the companies sued." While individual firms may have sufficient financial resources to pay out any damages, "if many companies in the [oil and gas] sector were hit with financial litigation-related penalties, the implications could be more material for the sector, overall."

This is a growing concern for investors. In 2023, a motion was presented by ExxonMobil shareholders that requested additional litigation disclosures. The motion cited media reports of "multiple climate lawsuits brought by states and attorneys general alleging failures to adequately address climate risks, an obligation to pay damages for climate harms and misleading consumers and investors regarding greenhouse gas emissions." It added that "individually and cumulatively, losing these cases could have a direct financial and/or reputational impact on ExxonMobil." Although the motion did not pass, receiving only 9.1% of shareholder votes, it highlights investor concerns over the potential consequences of climate damages litigation.