

## How Extreme Weather Caused by Global Warming Is Driving New Investment Risks

*Due to improvements in the ability to trace losses from extreme weather events back to emissions, climate-related litigation risks are increasing at many companies. How does loss attribution work, and what are the implications for investments?*

By Quintin Rayer

### Introduction

Recent years have seen extreme weather events, including excessive heat, [prolonged drought or intense rainfall and flooding](#). The consequences are significant, with damages exceeding hundreds of billions of U.S. dollars and many lives lost. The critical question is: Have these events been made more likely by climate change? If so, by how much? And how close are we to high-emitting companies being held liable due to their activities? The answer may be that this is closer than many might expect. Given progress on loss attribution, the risks of climate litigation are likely to increase finds the [Climate Financial Risk Forum \(CFRF\)](#), affecting company valuations. This will impact investors, lenders (including corporate bond holders) and [insurers](#).

Decision-makers and risk managers would like a straightforward answer to the first question. Is an individual extreme weather event due to anthropogenic global warming (AGW)? However, the answer is a more nuanced, probabilistic statement about the altered risks of an event happening. In short, extreme weather events can be, and often have been, linked to AGW already.

Even if legal attribution of responsibility may be challenging, societal responses also have investment implications that risk managers will wish to consider. Regulatory policy may favor cleaner alternatives, while high emitters may risk becoming stranded assets.

### Climate Change and Extreme Events

The [Global Warming Index](#) shows us global warming is approaching 1.3°C above pre-industrial levels and research shows it is [increasing at about 0.2°C per decade](#). At current rates, the 1.5°C threshold will be exceeded between the years 2030 and 2035. The UN Framework Convention on Climate Change (UNFCCC) Paris Agreement aims to hold global average temperature increases to well below 2°C above preindustrial levels while pursuing efforts to limit increases to 1.5°C. But even these increases are likely to result in more frequent extreme weather events.

The science is unambiguous; a hotter atmosphere has a more energetic water cycle. Warmer air can hold more moisture, increasing evaporation and the likelihood of more intense downpours. Climate change is likely to increase the intensity and, perhaps, frequency of storms. [Atlantic tropical cyclone season activity](#) has increased over the last 40 years. [Extreme precipitation](#) has already intensified in Europe. [Increasing concurrent dry and wet spells](#) across densely populated areas in the Northern hemisphere is another climate risk. Droughts and flash floods or river flooding are closely related, virtually emerging in the same regions, sometimes within a single (summer) season.

## Extreme Weather Event Attribution

The science [attributing extreme weather events](#) to human-induced global warming is developing rapidly. To answer the question to what extent event damages can be attributed to AGW, the [climate is considered as a statistical distribution](#) of possible weather outcomes. Observed changes, such as altered rainfall distributions, can be linked to global warming with the help of fundamental physics and climate models. One key aspect is the severity of the event, that is, when does an event count as an extreme event? For rainfall, an extreme event is when precipitation is sufficient to overwhelm infrastructure and cause structural damage or loss of life.

Attribution techniques quantify the changes in event probabilities. If the risk of some event has trebled compared to the pre-industrial climate, probabilistically speaking, global warming is “responsible” for two-thirds of the risk. This is not to say the event “was caused” by AGW, but that AGW made it more likely. The probabilistic evaluation of damages is like techniques used in other areas of finance, such as the valuation of financial options. As examples, AGW means that [2017 Hurricane Harvey](#) precipitation intensities increased sixfold, the [2020 Siberian heatwave](#) became at least 600 times more likely, and the rainfall shortage that threatened [Cape Town’s water supply](#) in 2018 was 3.3 times more probable.

## Company Emissions

Analyses have identified the AGW contributions from the historical emissions of nations and companies. Atmospheric CO<sub>2</sub> rose from 290 to 410 parts per million (ppm) between 1880 and 2018, according to the [Intergovernmental Panel on Climate Change \(IPCC\)](#). Around three-quarters of the increase in atmospheric CO<sub>2</sub> is from emissions between 1980 and 2010.

Cumulative CO<sub>2</sub> emissions are the primary cause of [global climate system changes](#), allowing a relatively simple assignment of historical responsibility. The fossil fuel industry and its products accounted for [about 70% of all anthropogenic emissions](#). Between 1751 and 2017, nine of the top 20 emitters were publicly owned, [collectively accounting for 14.5% of Scope 1 and 3 emissions](#) (direct emissions and indirect emissions, including those of customers using companies’ products). Focusing on Scope 1 and 3 emissions is based on carbon producers’ primary business: the extraction of fossil fuels.

Beyond the responsibility of fossil fuel extractors and producers, one can ask about their customers’ responsibility. What about those using fuel, such as motorists in cars or individuals heating their homes? However, industrial suppliers are better placed to reduce emissions through efficiency gains and alternative technologies than consumers, who often have limited resources.

Further, evidence is mounting of active global warming denial activities by fossil fuel extractors and producers. According to [BBC News](#), companies like ExxonMobil knew the damage they were causing to the climate decades ago which might make society less forgiving of the harm caused.

## Investment Risk Implications

How quickly should investors respond to companies’ potential exposures to emissions-related damages from their high-emissions activities? [Sectoral level estimates](#) suggest hypothetical climate liabilities from Hurricane Harvey could be around 1-2% of market capitalization for affected firms and [2-3% for global floods](#) and droughts over 2012-2016. These represent only a fraction of AGW-

related events, and they ignore many other damaging consequences, such as sea level rise. Furthermore, future changes are projected to be even more significant.

Investors may wish to consider how well they are incorporating the economic impacts from extreme weather events into risk assessments and whether companies' market valuations accurately reflect them. A global shift in perceptions (perhaps relating to the need for the low-carbon transition) can cause stock markets to reprice shares rapidly. Should investors react at all? Undoubtedly, potential AGW damages increase uncertainties, which financial risk analysts would wish to factor into their calculations.

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