

# Extreme weather climate investment risk

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## Biography

Quintin has worked for actuarial and investment consultancy firms and a multi-national European bank, including wide experience in quantitative fund and risk analysis. He is a Fellow of the Institute of Physics, a Chartered Fellow of the CISI and a Chartered Wealth Manager. Quintin has applied skills gained from his Oxford University Physics Doctorate and while working in engineering to finance. He is the second UK graduate from the Sustainable Investment Professional Certification (SIPC) programme and joined [PI Investment Management](#) in January 2017, founding their ethical and sustainable investing proposition.

## Introduction

Environmentally minded investors often consider climate risks [1]. Potential liabilities for climate change induced extreme weather events due to carbon emissions present risks that may not be reflected by financial markets [2]. Considering the devastation of the 2017 Atlantic hurricane season, how close are we to some companies or sectors being held liable, at least partially, for their activities? Perhaps closer than many expect.

Recent studies [3] explore potential consequences for some top carbon-emitting listed companies. Under a hypothetical climate liability regime, these firms might increasingly see losses from North Atlantic hurricane seasons of around 1-2% of their market capitalisations (or share prices). Evidence is mounting of enhanced major hurricane risk in response to human-induced global warming [4]. Future changes may be greater, with greater possible share-price impacts for high-emitting firms.

## Hurricane Season 2017

In 2017 hurricanes Harvey, Irma, Jose and Maria caused damages estimated at \$265 billion [5], possibly making that season the costliest to date. Generally, damages depend on wind strength, although not necessarily straightforwardly. The hurricane damage depends on its path, populated areas, and infrastructure it may cross. An increasing frequency of stronger hurricanes inevitably increases the risks of unprecedented destruction.

## Who are the carbon emitters?

Analyses have started quantifying historical contributions to global warming from individual companies [6]. Atmospheric CO<sub>2</sub> rose from 290 ppm (parts per million) in 1880 to 410 ppm in 2018 [7]. Accumulated emissions between 1980 and 2010 from 90 major carbon producers generated around two-thirds of global mean temperature rises [6]. Cumulative CO<sub>2</sub> emissions are the primary cause of global climate system changes [8], making the allocation of historical responsibility relatively straightforward.

In 2015 the fossil fuel industry accounted for 91% of global industrial greenhouse gas emissions and about 70% of all human emissions. If extraction trends over the next 28 years follow the 28 before, global average temperature rises of around 4°C would be expected by 2100 [9].

Since 1988, seven top emitters were publicly owned companies, collectively accounting for 9.5% of Scope 1 and 3 emissions between 1988 and 2015 [9]. The 'scopes' classify emissions' origin from an organisation. Scope 1 emissions are from sources directly owned and controlled, for example, fuel used by company vehicles. Scopes 2 and 3 cover indirect emissions.



Scope 2 emissions from energy use, with Scope 3 covering all other indirect emissions, including by customers.

Producer	Cumulative 1988-2015 emissions from Scopes 1+3, %
1 ExxonMobil Corp	2.0%
2 Royal Dutch Shell PLC	1.7%
3 BP PLC	1.5%
4 Chevron Corp	1.3%
5 Peabody Energy Corp	1.2%
6 Total SA	0.9%
7 BHP Billiton Ltd	0.9%
Total	9.5%
Cumulative 1988-2015 industrial greenhouse gas emissions from Scopes 1+3, % [9]	

## Financial implications

The seven companies' combined market capitalisation was \$1,303 billion in August 2018, although this fell during the COVID19 pandemic [10]. Conservatively, consider the 2018 values. If hypothetically, the seven firms contributed 9.5% of the \$265 billion hurricane damage from the 2017 Atlantic season, this would be \$25 billion. This amount corresponds to 1.9% of their market capitalisations (or share price). The sum is significant, considering that similar contributions might arise in respect of other past and future extreme weather events.

As global warming inevitably increases the number of major hurricanes, a hypothetical climate-liability regime could develop. Contributions of around 1-2% of these high-emitting companies' market capitalisations might be anticipated increasingly frequently with each annual hurricane season. This figure ignores other global warming impacts, such as sea-level rise, which could easily result in much larger sums. It also neglects the likelihood of increasingly powerful climate responses as global warming intensifies.

## Didn't hurricanes occur before?

Hurricanes occurred before human-made global warming, so only costs linked to additional hurricane frequency or intensity are relevant. Estimating pre-global warming hurricane baselines is not easy. Their frequency or intensity does not follow atmospheric CO<sub>2</sub> concentrations or temperature rise straightforwardly. Hurricanes have become more intense during the last 40 years, resulting in more major hurricanes [4]. Additionally, small

increases in CO<sub>2</sub> could generate unexpected extreme weather responses. There is also a risk that global warming may become self-reinforcing.

Analysis of Hurricane Harvey [11] suggested that at least five-sixths of damage might be attributable to warming since the late twentieth century. This reduces damages to \$21 billion, or 1.6% in share price terms. Some investors are likely to appreciate the support of wealth managers skilled in this area. That way, they can be confident they are contributing to addressing the plague of plastic pollution as well as global warming and social and governance challenges.

### Is it all the extractors' fault?

Are fossil fuel companies entirely responsible? What about fuel users, such as motorists, or home heating? It seems unreasonable to blame all vehicle emissions on motorists. Practically, it depends on whether they need a car. Fossil fuel-free cars are relatively expensive and have not always been available. Much responsibility lies with industrial suppliers to provide efficiency gains and alternative technologies. Users are not excused, but the responsibility share must be established.

One allocation is the current split between industrial and non-industrial emissions. In 2015, around 77% of all human emissions were industrial [9]. On this basis, the share of damages attributable to the seven firms could fall to \$19 billion, or 1.5% in share price terms.

Both pre-global warming hurricanes and producer-user responsibility are relevant. Jointly, the initial damage estimate of \$25 billion should potentially drop to \$16 billion (1.2% in share price terms). These figures all fit within the 1-2% share-price detriment first mentioned. Based on the May 2020 market capitalisations, the equivalent share-price figure would be 2.2%.

Only US hurricanes have been considered. Intense storms with strong winds and high precipitation occur in many world regions. So global damages would be much higher. The analysis also neglects climate change sea-level rise, which could cause tremendous damage.

### How this helps Investors

How rapidly should investors respond to the possibility of companies having or deciding to make contributions to climate damages associated with their past emissions? Currently, no legal cases have established climate damage liability. However, some large investors have backed legal action with investment policies. The City of New York is seeking to divest fossil companies from its \$189 billion pension schemes in a way consistent with fiduciary responsibilities.

Cautious investors might be concerned, particularly if they are uncertain how well the relevant companies' share prices reflected these risks. A movement towards an active liability regime could risk fossil fuel company shares becoming stranded assets, with other investors reluctant to buy them, except at a significant discount. Given the mounting evidence and potential risks, some cautious investors may feel they wish to steer clear.

### References

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